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Inclusive Growth & Climate Change – A Fiscal Challenge for the ASEAN

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Statement of Contribution of others

Nature of Assistance	Contribution	Affiliations of Co-Contributor
Intellectual support	Primary supervision	Prof Dr Taha Chaiechi (my primary supervisor at JCU)
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Statements of the use of Generative AI

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Abstract

Inclusive growth and climate change mitigation are among the most critical challenges facing the ASEAN region, which has experienced rapid economic growth alongside rising inequality and environmental degradation. These issues stem in part from fiscal externalities—unintended social, economic, and environmental consequences arising from fiscal policy decisions. This thesis explores how sustainable fiscal policy can internalize and mitigate these externalities, advancing pro-equity and pro-green outcomes while optimizing the trade-offs between economic growth, social equity, and environmental sustainability.

The central contribution of this research lies in the development of a novel fiscal policy framework designed to address inequality and climate change externalities. This approach moderates progressivity and targets fiscal variables to internalize these externalities into fiscal decision-making processes at the national, regional, and supranational levels. Importantly, this mechanism allows policymakers to align fiscal policies with sustainability goals without disrupting existing policy trajectories, ensuring coherence and adaptability. By integrating economic, social, and ecological paradigms, the framework emphasizes intergenerational equity and sustainability while maintaining fiscal flexibility.

A mixed-methods approach underpins this research, combining quantitative analysis of economic and environmental data, comparative studies with Nordic countries, and a detailed case study of Indonesia. The study evaluates the drivers of inequality and climate change externalities, assesses the effectiveness of existing fiscal policies, and identifies best practices for integrating inclusive growth and climate resilience. The findings highlight that fiscal instruments, such as progressive taxation, environmental taxes, targeted subsidies, and investments in sustainable infrastructure, can serve as powerful tools for internalizing externalities. For instance, redirecting subsidies from fossil fuels to renewable energy not only reduces greenhouse gas emissions but also enhances equity by benefiting lower-income groups disproportionately affected by climate risks.

The analysis reveals significant gaps in current fiscal frameworks across ASEAN countries, where policies often fail to account for the complex interactions between inequality, climate change, and fiscal externalities. The proposed framework addresses these gaps by embedding mechanisms for internalizing externalities into fiscal policy design. This includes moderating the progressivity of tax systems, optimizing social spending to reduce inequality, and integrating environmental considerations into fiscal planning through tools like green budgeting and carbon pricing.

This thesis contributes to academic discourse by extending fiscal policy theories to incorporate externality management as a core objective. It offers actionable recommendations for ASEAN governments, including the adoption of coordinated regional fiscal policies to address transboundary challenges and alignment of national frameworks with global sustainability goals. By leveraging fiscal instruments that balance pro-equity and pro-green outcomes, ASEAN nations can achieve sustainable development while addressing inequality and climate vulnerabilities.

Ultimately, this research underscores the transformative potential of sustainable fiscal policy in addressing the ASEAN region's most pressing socio-economic and environmental challenges. The proposed framework not only optimizes sustainability trade-offs but also provides policymakers with a flexible, integrated mechanism to align fiscal actions with long-term development goals, fostering inclusive growth and climate resilience in the region.

Keywords: sustainable fiscal policy, fiscal externalities, pro-equity, pro-green outcomes, inclusive growth, climate resilience, ASEAN, policy integration

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1 CHAPTER ONE: INTRODUCTION

1.1 Global Context and Regional Relevance

In the 21st century, the twin challenges of inclusive growth and climate change mitigation have emerged as critical global imperatives, demanding urgent and coordinated action from governments, institutions, and the private sector (Purvis et al., 2019; Gupta & Vegelin, 2016). These issues are not merely academic concerns but represent existential challenges that threaten the very fabric of our societies and the sustainability of our planet. The urgency of these challenges is particularly acute in the ASEAN region, where rapid economic growth over the past few decades has been accompanied by rising inequality and increasing environmental pressures. The interconnected nature of these challenges requires a holistic approach that recognizes both the distinctiveness of regional contexts and the universal imperatives of sustainable development (Bapna et al., 2019). Economic policy frameworks must evolve beyond traditional growth metrics to embrace multidimensional assessments of prosperity that integrate social equity and environmental sustainability as core objectives rather than peripheral considerations (Stiglitz et al., 2018).

The ASEAN region, home to over 650 million people, has experienced remarkable economic growth since the turn of the millennium. Between 2000 and 2019, the region's GDP more than quadrupled, from $577 billion to $3.2 trillion (ASEAN Secretariat, 2020). This growth has lifted millions out of poverty and positioned ASEAN as a key player in the global economy. However, this economic success story comes at the cost of widening income disparities and accelerating environmental degradation. The rapid pace of industrialization and urbanization across ASEAN member states has created significant structural transformations that have reshaped Labor markets, resource allocation patterns, and consumption behaviours (Menon & Melendez, 2017). These transformations have generated unprecedented opportunities for economic advancement while simultaneously introducing complex socioeconomic dislocations that challenge conventional policy responses. The heterogeneity of ASEAN economies—ranging from Singapore's advanced service-oriented economy to Cambodia's emerging manufacturing base—adds layers of complexity to regional coordination efforts aimed at addressing shared challenges (Intal et al., 2019). Despite these differences, ASEAN member states face common pressures to balance competitiveness in global markets with domestic social cohesion and environmental stewardship.

Income inequality, as measured by the Gini coefficient, has risen in several ASEAN countries over the past two decades. For instance, in Indonesia, the largest economy in ASEAN, the Gini coefficient increased from 0.30 in 2000 to 0.38 in 2019 (World Bank, 2021). Similarly, in Vietnam, it rose from 0.35 to 0.39 over the same period. This growing inequality threatens social cohesion and political stability, potentially undermining the very economic growth that the region has achieved. The dynamics of inequality in ASEAN economies reflect complex interactions between technological change, globalization, and institutional frameworks that have often privileged capital over Labor in the distribution of economic gains (Zhuang et al., 2020). The concentration of wealth among economic elites has accelerated in parallel with the expansion of precarious employment in informal sectors, creating a bifurcated economic

reality that statistical averages often obscure (Ofreneo, 2018). Beyond income metrics, inequality manifests in disparities in access to quality education, healthcare, digital connectivity, and financial services that constrain socioeconomic mobility across generations (Jomo, 2021). The spatial dimensions of inequality are particularly pronounced, with prosperity increasingly concentrated in urban centres while rural communities and peripheral regions experience relative economic stagnation (Gibson & Olivia, 2020). These multidimensional inequalities create feedback loops that entrench disadvantage and challenge the efficacy of conventional redistributive mechanisms.

Simultaneously, the ASEAN region faces severe environmental challenges. The region is particularly vulnerable to climate change, with four ASEAN member states - Myanmar, the Philippines, Thailand, and Vietnam - ranking among the top 10 countries most affected by climate risk in the past two decades (Eckstein et al., 2021). Deforestation, air and water pollution, and rising sea levels pose existential threats to many ASEAN communities. Indonesia, for example, lost 9.3 million hectares of primary forest between 2000 and 2019 (Global Forest Watch, 2020), contributing significantly to global greenhouse gas emissions. The environmental footprint of ASEAN's economic expansion extends beyond carbon emissions to encompass biodiversity loss, freshwater depletion, soil degradation, and marine ecosystem destruction that undermine long-term economic resilience (UNEP, 2019). Climate vulnerability in the region is compounded by geographic factors, demographic pressures, and infrastructure deficits that amplify the impacts of extreme weather events and slow-onset climate changes (ADB, 2021). Coastal communities across the Philippines, Vietnam, and Indonesia face particular risk from sea level rise and intensifying cyclones, while agricultural regions throughout mainland Southeast Asia experience increasing water stress and temperature anomalies that threaten food security (Cruz et al., 2017). These environmental pressures disproportionately affect vulnerable populations with limited adaptive capacity, creating a nexus between environmental degradation and socioeconomic inequality that demands integrated policy responses (Hallegatte et al., 2018).

This thesis examines the intersection of these challenges through the lens of fiscal policy, focusing on how ASEAN governments can leverage fiscal instruments to achieve both inclusive growth and climate resilience. By integrating economic, social, and ecological paradigms, this research seeks to develop a novel framework for sustainable fiscal policy in the ASEAN context. This framework recognizes the centrality of public finance in shaping development trajectories and acknowledges the transformative potential of strategically designed fiscal instruments to catalyse systemic change (Heine et al., 2019). Contemporary fiscal policy must transcend conventional macroeconomic stabilization objectives to embrace its role in structural transformation toward low-carbon, inclusive economies (Bhattacharya et al., 2019). The temporal dimensions of sustainable fiscal policy are particularly significant, requiring mechanisms to balance immediate socioeconomic needs with long-term environmental imperatives that may not align with electoral cycles or conventional discount rates (Stern & Stiglitz, 2022). Through comparative analysis of fiscal innovations across ASEAN member states and critical evaluation of their distributive and environmental impacts, this research contributes to an emerging paradigm of public finance that positions governments as architects of sustainable prosperity rather than passive responders to market forces.

1.2 Fiscal Policy Implications

Examining the drivers and impediments of climate change and inequality in ASEAN: This involves a comprehensive analysis of economic, social, and environmental factors that contribute to or hinder progress on these twin challenges. By understanding these drivers, policymakers can better target their interventions. This analytical component recognizes the multifaceted nature of both climate vulnerability and socioeconomic inequality, exploring their structural determinants across ASEAN economies with distinct development trajectories (Kanbur et al., 2022). The heterogeneity of ASEAN member states—spanning high-income city-states like Singapore to lower-middle-income economies such as Cambodia and Myanmar—necessitates nuanced investigation of how different drivers manifest across varying contexts (Rigg, 2020). Economic factors to be examined include patterns of industrialization, sectoral composition of growth, Labor market structures, and integration into global value chains that shape both carbon intensity and distributional outcomes (Rodrik, 2018). Social dimensions encompass educational disparities, demographic transitions, gender dynamics, urban-rural divides, and patterns of land ownership that influence both adaptive capacity to climate impacts and access to economic opportunities (Kabeer, 2021). Environmental considerations include natural resource endowments, geographic exposure to climate hazards, ecosystem dependencies, and historical patterns of natural capital depletion that interact with socioeconomic systems to produce differentiated vulnerability profiles across communities (Hallegatte et al., 2020). By systematically mapping these interlinked drivers, this research will move beyond simplistic single-factor explanations to develop a more sophisticated understanding of the systemic processes that perpetuate both environmental degradation and socioeconomic exclusion.

Evaluating existing policies and programs implemented by ASEAN Member States:

This includes a critical review of current fiscal policies, social programs, and environmental initiatives across ASEAN countries. By assessing the effectiveness of existing measures, this research aims to identify best practices and areas for improvement. This evaluation adopts a comprehensive approach that examines both policy design features and implementation contexts to understand variation in outcomes across different national settings (Andrews et al., 2017). The assessment framework incorporates multiple evaluative criteria, including economic efficiency, distributional impacts, environmental effectiveness, administrative feasibility, political sustainability, and coherence with broader development strategies (Howlett & Mukherjee, 2018). On the revenue side, the analysis examines tax structures and their implications for both equity and environmental outcomes, including the progressivity of income taxation, reliance on consumption taxes, application of environmental fiscal instruments, and effectiveness of natural resource taxation regimes (Bird & Zolt, 2018). Expenditure analysis explores the composition of public spending across sectors, examining both the adequacy of climate-relevant investments in areas such as renewable energy, sustainable infrastructure, and ecosystem restoration, and the targeting of social expenditures toward vulnerable populations most affected by both inequality and climate impacts (Inchauste & Lustig, 2017). Beyond conventional fiscal instruments, the evaluation extends to regulatory frameworks, market-based mechanisms, public investment strategies, and international cooperation initiatives that complement fiscal approaches to addressing the climate-inequality nexus (Meckling & Allan, 2020). By synthesizing evidence on policy effectiveness across diverse

ASEAN contexts, this research will generate valuable insights into context-specific success factors and transferable design principles that can inform more effective policy approaches.

The central research question frames the crux of this dilemma as it encapsulates the core challenge facing ASEAN policymakers: ***how to design fiscal policies that can balance multiple, sometimes competing, objectives***. It recognizes the central role of fiscal policy in shaping economic outcomes and the potential for innovative policy design to achieve synergies between inclusive growth and climate resilience.

Developing an integrated fiscal model that balances socio-economic stability with sustainable development goals: This novel model aims to provide a framework for ASEAN policymakers to design fiscal policies that simultaneously promote inclusive growth and climate resilience. By integrating these objectives into a single model, this research offers a more holistic approach to sustainable development. The conceptual innovation of this framework lies in its explicit recognition of the interdependencies between fiscal, social, and environmental systems, moving beyond conventional approaches that treat these domains as separate policy concerns (Newell & Mulvaney, 2019). The model incorporates both quantitative metrics and qualitative assessment criteria to capture the multidimensional nature of sustainable development outcomes, acknowledging that not all relevant impacts can be monetized or precisely quantified (Costanza et al., 2017). Methodologically, the framework synthesizes insights from multiple analytical traditions, including environmental economics, public finance theory, welfare economics, political economy analysis, and systems thinking, to develop a more comprehensive understanding of policy impacts across interconnected domains (Grubb et al., 2021). The model's structure incorporates feedback mechanisms between different components of the socio-ecological system, allowing for dynamic analysis of how policy interventions may trigger cascading effects across economic, social, and environmental dimensions over different time horizons (Steffen et al., 2018). By providing a systematic framework for identifying potential synergies and trade-offs between different policy objectives, this integrated approach enables more strategic policy design that maximizes co-benefits while minimizing negative cross-sectoral impacts (Cohen et al., 2019). For ASEAN policymakers navigating complex sustainable development challenges with limited fiscal and administrative resources, this integrated framework offers practical guidance for prioritizing interventions with transformative potential across multiple objectives.

The significance of this research lies in its potential to inform more effective and integrated policy-making in ASEAN countries. By providing a comprehensive framework for sustainable fiscal policy, this study can help policymakers navigate the complex trade-offs between economic growth, social equity, and environmental sustainability. The timing of this research is particularly consequential as ASEAN economies formulate post-pandemic recovery strategies and medium-term fiscal frameworks that will shape development trajectories for decades to come (Engel et al., 2020). The twin imperatives of tackling inequality and addressing climate change have gained unprecedented political salience in the wake of COVID-19, creating a potential window of opportunity for transformative policy reforms that align fiscal strategies with sustainable development objectives (Stiglitz, 2020). By developing context-specific knowledge about the ASEAN region while drawing connections to global sustainability challenges, this research bridges the gap between localized empirical evidence

and broader theoretical frameworks in sustainable development (Ostrom, 2009). The policy implications extend beyond national governments to inform regional cooperation mechanisms within ASEAN, development finance institutions operating in Southeast Asia, and international climate finance arrangements supporting low-carbon, climate-resilient development pathways (Nassiry, 2018). Moreover, by demonstrating how fiscal policy can be leveraged as an integrated tool for advancing both social and environmental goals, this research contributes to evolving global discourse on green recovery, just transition, and sustainable finance that aims to align economic systems with planetary boundaries and social foundation requirements (O'Callaghan & Murdock, 2021). For ASEAN societies navigating complex sustainability transitions amid political, economic, and environmental uncertainties, this integrated approach to fiscal policy provides a valuable roadmap for building resilience while advancing inclusive prosperity within ecological limits.

1.3 Policy Relevance and Contributions

This research aims to make significant contributions to both academic discourse and practical policy-making in the ASEAN region:

Empirical Contributions:

Development of an empirical model with dynamic feedback loops to assess policy output gaps in relation to inclusive growth and climate change mitigation. This innovative modelling approach represents a methodological advancement that captures the complex interdependencies between fiscal interventions and multidimensional sustainability outcomes (Pindyck, 2017). By incorporating feedback mechanisms between economic, social, and environmental systems, the model offers a more realistic representation of policy impacts than linear frameworks that fail to account for these dynamic interactions (Sterman, 2020). The model's capacity to identify policy output gaps provides a diagnostic tool for policymakers to assess the distance between current performance and desired outcomes across multiple sustainability dimensions, facilitating more targeted intervention strategies (Costanza et al., 2019). For ASEAN policymakers facing complex trade-offs with limited fiscal resources, this gap analysis offers valuable prioritization guidance by highlighting areas where current approaches are most significantly underperforming relative to established benchmarks or targets (Raworth, 2017).

Comprehensive analysis of the relationships between fiscal policy measures, inequality indicators, and climate change metrics in ASEAN countries. This empirical investigation generates new evidence on how specific fiscal instruments—including tax structures, expenditure patterns, and fiscal transfers—influence both distributional outcomes and environmental performance in Southeast Asian contexts (Dorband et al., 2019). The longitudinal analysis spanning two decades provides insights into how these relationships have evolved over time, revealing both persistent patterns and emerging trends that inform forward-looking policy design (Hanna & Olken, 2018). By disaggregating effects across different dimensions of inequality (income, wealth, opportunity) and environmental performance (carbon intensity, resource efficiency, climate vulnerability), this analysis offers nuanced understanding of how fiscal tools can be calibrated to address specific aspects of the sustainability challenge (Chancel & Piketty, 2021). The comparative assessment across

ASEAN member states with diverse economic structures, resource endowments, and institutional arrangements illuminates how contextual factors condition the effectiveness of different fiscal approaches, informing more tailored policy recommendations (Howe, 2018).

Comparative assessment of ASEAN and Nordic countries' performance on key sustainability indicators. This cross-regional comparison provides valuable benchmarking that situates ASEAN performance within global context while identifying potential policy lessons from Nordic countries that have achieved relatively strong outcomes across both equity and environmental dimensions (Sachs et al., 2021). The analysis moves beyond simplistic policy transfer approaches to consider how specific Nordic fiscal innovations might be adapted to Southeast Asian contexts with different economic structures, administrative capacities, and political economies (Rose, 2018). By examining the historical evolution of Nordic fiscal systems alongside contemporary ASEAN challenges, this comparative analysis offers insights into potential development pathways that can achieve inclusive and sustainable outcomes through contextually appropriate fiscal strategies (Andersson, 2018). This evidence base informs strategic policy sequencing and institutional development priorities for ASEAN countries seeking to strengthen the equity and sustainability dimensions of their fiscal systems while acknowledging their distinct development contexts (Jomo, 2019).

Theoretical Contributions:

Extension of the Post-Keynesian fiscal redistribution framework to incorporate climate change and inequality factors more explicitly. This theoretical innovation moves beyond conventional macroeconomic focuses on output and employment to develop more comprehensive frameworks for fiscal policy that explicitly address distributional and environmental dimensions (Palley, 2017). By integrating concepts from environmental economics, welfare theory, and sustainability science into Post-Keynesian fiscal frameworks, this research contributes to emerging paradigms of ecological macroeconomics that recognize the fundamental interdependence between economic systems and their social and environmental contexts (Rezai & Stagl, 2019). The theoretical framework explicitly acknowledges tensions between different fiscal objectives while exploring potential complementarities and synergistic relationships that can be leveraged through strategic policy design (Jackson, 2019). This theoretical development has particular relevance for developing and emerging economies navigating complex trade-offs between immediate development imperatives and longer-term sustainability concerns, providing conceptual tools for more integrated approaches to fiscal policy that advance multiple dimensions of sustainable development (Kozul-Wright, 2020).

Development of a theoretical model for sustainable fiscal policy that balances economic, social, and environmental objectives. This conceptual framework synthesizes insights from multiple theoretical traditions to develop a more holistic understanding of fiscal sustainability that transcends narrow financial metrics to incorporate social equity and environmental integrity as essential dimensions (Stiglitz et al., 2018). The model specifies relationships between key variables and parameters that influence fiscal policy outcomes across these multiple objectives, providing analytical structure for both empirical testing and policy design (Hepburn, 2018). By explicitly incorporating intergenerational equity considerations into the theoretical framework, this research contributes to evolving understandings of fiscal

responsibility that acknowledge temporal dimensions of sustainability beyond conventional fiscal year horizons (Boston, 2017). This theoretical innovation responds to limitations in mainstream economic frameworks that often fail to adequately address either distributional concerns or environmental externalities, offering a more comprehensive analytical approach aligned with contemporary sustainability challenges (Raworth, 2017).

Advancement of understanding on the interactions between fiscal policy, inclusive growth, and climate resilience in developing economies. This theoretical contribution illuminates the complex causal pathways through which fiscal interventions influence both socioeconomic and environmental outcomes in contexts of structural transformation, institutional development, and resource constraints characteristic of many ASEAN economies (Rodrik, 2018). By theorizing how different fiscal instruments interact with specific economic structures, institutional arrangements, and initial conditions prevalent in developing contexts, this research moves beyond one-size-fits-all prescriptions to develop more nuanced understanding of context-dependent policy effectiveness (Devarajan, 2020). The theoretical framework addresses how fiscal systems both shape and are shaped by processes of economic transformation, technological change, and institutional evolution that characterize development trajectories, providing insights into how fiscal policy can influence structural transitions toward more inclusive and sustainable economies (Chang & Andreoni, 2021). This contribution advances sustainable development theory by specifying the mechanisms through which fiscal policy can either reinforce or transform existing patterns of resource use, income distribution, and production systems with significant implications for long-term sustainability (Barbier, 2019).

Policy Contributions:

Practical recommendations for ASEAN governments on designing and implementing fiscal policies to achieve pro-equity and pro-green outcomes. These evidence-based recommendations provide actionable guidance for policymakers navigating complex sustainability challenges, identifying specific fiscal instruments, design features, and implementation strategies that can advance both social equity and environmental objectives (OECD, 2021). The recommendations acknowledge diverse starting points and institutional capacities across ASEAN member states, offering differentiated approaches tailored to specific country contexts while identifying common principles that can inform regional coordination (Jha et al., 2018). By addressing both technical design considerations and political economy factors that influence reform feasibility, these recommendations provide practical guidance for navigating implementation challenges and building momentum for transformative fiscal approaches (Inchauste & Lustig, 2019). The policy proposals include specific strategies for enhancing the progressivity of tax systems, aligning public expenditures with sustainability priorities, and strengthening fiscal transparency and accountability mechanisms that are essential for building public support for reforms (Bird & Zolt, 2020).

Identification of best practices and policy lessons from both within ASEAN and from Nordic countries. This contribution moves beyond theoretical frameworks to provide concrete examples of successful fiscal approaches that have advanced inclusive and sustainable outcomes in diverse contexts, offering practical inspiration for policy innovation (Sovacool,

2017). The analysis distinguishes between context-specific elements and potentially transferable design principles, facilitating more effective policy learning that acknowledges the importance of local adaptation rather than mechanical transplantation of external models (Stone, 2019). By including examples from both within ASEAN and from Nordic countries, this contribution highlights both region-specific innovations that reflect Southeast Asian realities and potentially relevant external models that have achieved strong performance on key sustainability metrics (UNESCAP, 2018). The identification of implementation challenges and how they were overcome in specific cases provides valuable insights for ASEAN policymakers navigating similar obstacles to fiscal reform in their own contexts (World Bank, 2019).

Development of a framework for assessing the sustainability impact of fiscal policies, which can be adapted for use by policymakers. This practical tool enables more systematic evaluation of fiscal policy impacts across multiple sustainability dimensions, supporting evidence-based decision-making and more integrated policy design (Cottrell et al., 2018). The assessment framework incorporates both quantitative indicators and qualitative dimensions that capture the multifaceted nature of sustainability outcomes, providing a more comprehensive evaluation tool than conventional fiscal impact assessments focused primarily on budgetary implications (Andersen, 2019). By offering a structured approach to identifying potential synergies and trade-offs between different policy objectives, this framework enhances policy coherence and supports more strategic allocation of limited fiscal resources to maximize sustainable development impacts (OECD, 2021). The adaptable nature of the framework allows for contextual application across different administrative capacities and data environments characteristic of ASEAN member states, enhancing its practical utility for diverse policy contexts (Monkelbaan, 2018).

Recommendations for enhancing regional cooperation and policy coordination within ASEAN to address transboundary challenges of inequality and climate change. These governance-focused recommendations identify specific mechanisms, institutional arrangements, and collaborative approaches that can strengthen collective action on shared sustainability challenges that transcend national boundaries (Anbumozhi & Kimura, 2018). The proposals build on existing ASEAN frameworks while addressing gaps and limitations in current regional governance approaches, suggesting practical enhancements that can facilitate more effective coordination without compromising national sovereignty concerns (Nesadurai, 2017). By identifying areas where regional approaches offer efficiency gains, risk-sharing benefits, or enhanced bargaining power in global forums, these recommendations provide strategic guidance for prioritizing regional initiatives that complement national policy efforts (Biermann, 2019). The proposals include specific suggestions for knowledge sharing, capacity building, and financial cooperation mechanisms that can enhance the collective capacity of ASEAN member states to implement ambitious fiscal reforms supporting sustainable development objectives (ASEAN Secretariat, 2020).

Addressing these critical issues, this thesis contributes to both academic discourse and practical policy-making in the ASEAN region, offering a path towards sustainable and inclusive economic development. The study is particularly timely given the increasing recognition of the need for integrated approaches to addressing economic, social, and environmental challenges in the wake of the COVID-19 pandemic and in light of the urgent need for climate action. The

post-pandemic recovery context presents both unprecedented challenges and unique opportunities for transformative fiscal reforms, as governments reconsider economic models and policy priorities in response to intersecting health, economic, social, and environmental crises (Stiglitz, 2020). The research responds to growing recognition among both scholarly and policy communities that siloed approaches to complex sustainability challenges are inadequate, offering integrated frameworks that acknowledge the fundamental interconnectedness of economic, social, and ecological systems (Sachs et al., 2019). For ASEAN societies navigating complex development transitions amid accelerating climate impacts and persistent inequality challenges, this research provides valuable analytical tools, empirical evidence, and practical guidance to inform more sustainable and inclusive fiscal approaches (ERIA, 2020).

In conclusion, this research aims to provide a comprehensive, theoretically grounded, and empirically supported framework for sustainable fiscal policy in ASEAN. By integrating the challenges of inclusive growth and climate change mitigation, it offers a novel approach to achieving sustainable development in one of the world's most dynamic and important regions. The research's significance extends beyond academic contribution to offer practical pathways for transforming fiscal systems to become more powerful instruments for advancing both human wellbeing and environmental stewardship across Southeast Asia, with potential relevance for other developing regions facing similar sustainability challenges (Steffen et al., 2021). By bridging theoretical innovation, empirical investigation, and policy application, this research contributes to broader efforts to realign economic systems with social and ecological imperatives, recognizing the essential role of public finance in shaping development trajectories that can secure prosperity within planetary boundaries for current and future generations (Dasgupta, 2021).

1.4 Thesis Structure & Outline

This thesis is organized into eight chapters: Chapter 1 introduces the research framework and objectives focused on inclusive growth and climate change in ASEAN. Chapter 2 reviews relevant economic theories and fiscal policy literature. Chapter 3 presents key development trends and comparative insights. Chapter 4 outlines the mixed-methods research design. Chapter 5 assesses current fiscal policies on inequality and climate change. Chapter 6 analyses policy coordination and implementation across the region. Chapter 7 provides quantitative analysis of fiscal impacts on inequality and emissions. Chapter 8 integrates the findings, discusses policy implications, and offers recommendations for advancing inclusive and climate-resilient growth in ASEAN.

For a more detailed discussion of the integrated thesis structure refer to chapter-8.

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2 CHAPTER TWO: LITERATURE REVIEW

This chapter provides a comprehensive examination of the literature on inclusive growth and climate change resilience, with a particular focus on their intersection with fiscal policy in the ASEAN context. The review begins by defining key concepts, then traces the evolution of economic thought relevant to these issues, explores the specific challenges and opportunities in the ASEAN region, and finally identifies research gaps that this study aims to address. This structured approach enables a systematic analysis of the complex interrelationships between economic development paradigms, distributional outcomes, environmental sustainability, and public finance frameworks that collectively shape pathways toward inclusive and resilient development (Paus, 2018). By integrating insights from multiple disciplinary perspectives—including development economics, public finance, environmental economics, and policy studies—this review establishes a multidimensional analytical framework that captures the complexity of sustainable development challenges facing ASEAN economies (Jha et al., 2018). The synthesis of diverse theoretical traditions and empirical evidence provides essential context for understanding both the constraints and opportunities for innovative fiscal approaches to achieving sustainability objectives in the region's distinctive socioeconomic and environmental setting (Anbumozhi & Kalirajan, 2020).

The twin challenges of achieving inclusive growth and building climate resilience have emerged as critical priorities for policymakers worldwide, particularly in rapidly developing regions like ASEAN. As these economies continue to grow and transform, they face the complex task of ensuring that the benefits of growth are equitably distributed while simultaneously addressing the mounting threats posed by climate change. This literature review seeks to synthesize the current state of knowledge on these issues, providing a solid foundation for the present study's investigation into how fiscal policy can be leveraged to promote both inclusive growth and climate resilience in ASEAN countries. The urgency of addressing these challenges has intensified in recent years as evidence accumulates regarding both the social costs of inequality and the accelerating impacts of climate disruption across Southeast Asia (ADB, 2021). The region's distinctive vulnerability stems from its geographic exposure to climate hazards, socioeconomic diversity, rapid urbanization patterns, and economic structures that remain significantly dependent on natural resource sectors and carbon-intensive activities (Cruz et al., 2019). Simultaneously, despite impressive aggregate growth performance, persistent and in some cases widening inequalities in income, wealth, and opportunity threaten social cohesion and potentially undermine the sustainability of economic progress itself (Zhuang et al., 2020). These parallel challenges have prompted growing recognition among both scholars and policymakers that conventional development approaches focused primarily on aggregate growth metrics are insufficient to secure sustainable prosperity in the face of 21st-century realities (Stiglitz, 2019).

The literature review presented in this chapter examines how economic thinking on growth, inequality, environmental sustainability, and fiscal policy has evolved over time, highlighting the gradual shift from siloed approaches toward more integrated frameworks that acknowledge the profound interconnections between economic, social, and environmental dimensions of development (Raworth, 2017). This conceptual evolution reflects broader transitions in development paradigms, from narrow income-focused perspectives toward multidimensional understandings of prosperity that emphasize capabilities, opportunities, wellbeing, and sustainability (Sen, 2017). Within this evolving conceptual landscape, fiscal policy has emerged as a critical instrument for advancing inclusive and sustainable

development objectives, with growing attention to how public finance decisions shape both distributional outcomes and environmental trajectories (IMF, 2020). The review pays particular attention to theoretical and empirical contributions that illuminate the potential synergies and trade-offs between different policy objectives, identifying conditions under which fiscal instruments can simultaneously advance social inclusion and environmental sustainability while maintaining economic dynamism (Heine et al., 2019).

This chapter situates ASEAN's development challenges within global discourse while highlighting the region's distinctive characteristics that necessitate context-specific policy approaches. The diversity among ASEAN economies—spanning high-income city-states like Singapore, upper-middle-income manufacturing powerhouses like Malaysia and Thailand, and lower-middle-income, resource-dependent economies like Myanmar and Laos—creates both challenges and opportunities for regional cooperation on inclusive and sustainable development (OECD, 2018). By examining the evolution of ASEAN's collective approaches to economic integration, social inclusion, and environmental cooperation, the review provides historical context for understanding current policy frameworks and institutional arrangements that shape the region's response to sustainability challenges (Nesadurai, 2018). This contextual understanding is essential for identifying realistic pathways for fiscal innovation that acknowledge both common regional imperatives and distinctive national circumstances across Southeast Asia.

Through systematic analysis of existing literature, this chapter identifies significant gaps in current research regarding the integration of inclusive growth and climate resilience objectives through fiscal policy in the ASEAN context. While substantial bodies of work exist on either inclusive growth or climate change adaptation in Southeast Asia, relatively few studies have comprehensively examined their interaction or specifically analysed how fiscal instruments can be designed to simultaneously advance both objectives (Anbumozhi et al., 2020). This gap reflects broader disciplinary divides between socioeconomic and environmental research traditions that have only recently begun to converge around integrated sustainability frameworks. By highlighting these research deficiencies, the chapter establishes the intellectual foundation and justification for the present study's contribution to knowledge regarding sustainable fiscal policy in ASEAN. The subsequent sections elaborate on these themes, providing detailed analysis of conceptual frameworks, empirical evidence, and policy implications that collectively inform this study's investigation of how ASEAN countries can leverage fiscal policy to navigate the complex challenges of achieving inclusive and climate-resilient development in the 21st century.

2.1 Key Concepts and Definitions

Inclusive Growth

Inclusive growth refers to a quality measure of economic output that aims to maximize prosperity for all while reducing inequalities in income, wealth, and economic opportunity (Sabir, 2019). It goes beyond traditional measures of economic growth, such as GDP, to consider how the benefits of growth are distributed across society. Qureshi et al. (2019) emphasize that inclusive growth is closely linked to improved socio-economic outcomes and stability. The concept emerged as a response to the limitations of conventional growth-centric development models that failed to address persistent inequality despite achieving impressive

aggregate growth statistics (Ianchovichina & Lundström, 2016). This evolution in economic thinking reflects growing recognition that the pattern of growth matters as much as its pace, with particular attention to whether economic expansion creates opportunities for all segments of society, especially disadvantaged and marginalized groups (Klasen, 2018). The inclusive growth paradigm acknowledges the bidirectional relationship between equity and economic performance, recognizing that excessive inequality can undermine growth sustainability through mechanisms such as reduced social cohesion, political instability, and inefficient resource allocation (Berg & Ostry, 2017). While definitions vary across institutions and scholars, there is consensus that inclusive growth encompasses both outcomes (the distribution of economic benefits) and processes (the degree to which different groups participate in economic decision-making and wealth creation) (Ramos et al., 2020).

Key characteristics of inclusive growth include:

Broad-based growth across sectors: Inclusive growth requires economic expansion that spans multiple sectors and geographical regions rather than being concentrated in enclaves disconnected from the broader economy (Ali & Zhuang, 2017). This sectoral diversity creates multiple pathways for participation in economic activity and reduces vulnerability to shocks affecting specific industries. The structural composition of growth is particularly important in developing economies where certain sectors—such as agriculture, manufacturing, and labour-intensive services—may offer greater opportunities for inclusive participation than capital-intensive extractive industries or financial services that generate limited employment despite their contribution to GDP (Loayza & Raddatz, 2019). In the ASEAN context, economies that have diversified beyond natural resource extraction toward manufacturing and services have generally achieved more inclusive outcomes, though the quality and security of employment opportunities within these sectors remain critical considerations (Menon, 2019).

Creation of productive employment opportunities: Central to inclusive growth is the generation of quality jobs that provide decent wages, safe working conditions, and opportunities for skills development and advancement (ILO, 2018). This emphasis on employment quality distinguishes inclusive growth from approaches focused merely on job quantity without attention to working conditions, compensation, or career prospects. The employment dimension of inclusive growth is particularly significant in developing regions like ASEAN, where demographic pressures create substantial annual Labor market entry that must be absorbed through job creation (ADB, 2018). Beyond formal wage employment, inclusive growth frameworks also recognize the importance of enhancing productivity and returns in informal and self-employment sectors where significant portions of the workforce in many developing economies remain engaged (Chen, 2019). This requires attention to both supply-side factors (education, skills development, Labor market institutions) and demand-side dynamics (investment patterns, technological change, trade policies) that collectively shape employment opportunities and outcomes.

Reduction in poverty and inequality: A fundamental criterion for assessing growth inclusiveness is its impact on poverty reduction and distributional equity (Ravallion, 2020). Inclusive growth approaches recognize that aggregate poverty decline may mask persistent exclusion of certain groups or regions, necessitating disaggregated analysis that captures

disparities along dimensions such as gender, ethnicity, disability status, and geographical location (Kabeer, 2021). The inequality dimension extends beyond income metrics to encompass wealth distribution, access to productive assets, and equality of opportunity—factors that influence intergenerational mobility and long-term distributional dynamics (Piketty & Zucman, 2020). In the ASEAN region, while absolute poverty has declined significantly, relative inequality has increased in several member states, reflecting the challenges of ensuring that economic transformation benefits all segments of society equitably (Jomo, 2021). The multidimensional nature of inequality requires comprehensive measurement approaches that capture both vertical inequality (differences across the income spectrum) and horizontal inequality (disparities between socially defined groups) to inform inclusive policy design.

Improvement in access to basic services and economic opportunities: Inclusive growth encompasses equitable access to essential services such as education, healthcare, clean water, sanitation, and social protection that enable human capability development and economic participation (World Bank, 2020). This service dimension highlights the role of public investments and institutional arrangements in creating enabling conditions for inclusive participation in economic activity. Digital connectivity has emerged as an increasingly important component of access, with digital divides potentially reinforcing existing patterns of exclusion in rapidly digitalizing economies (UNESCAP, 2019). For ASEAN societies navigating technological transformation, ensuring that digital dividends are broadly shared through investments in digital infrastructure, skills development, and regulatory frameworks that promote digital inclusion has become a critical inclusive growth imperative (Tay et al., 2018). Financial inclusion represents another key dimension of access, with expanding opportunities for savings, credit, insurance, and payment services enabling broader participation in formal economic activity and enhancing resilience to economic shocks (Demirgüç-Kunt et al., 2018).

Climate Resilience

Climate resilience refers to the capacity of social, economic, and environmental systems to cope with hazardous events or trends related to climate change, responding in ways that maintain their essential function, identity, and structure while maintaining the capacity for adaptation, learning, and transformation (IPCC, 2014). In the context of economic development, climate resilience involves building adaptive capacity to manage climate risks while pursuing sustainable growth. The concept has evolved from more reactive notions of disaster response toward proactive approaches that emphasize system transformation and robust decision-making under uncertainty (Pelling & Garschagen, 2019). Climate resilience transcends purely technical interventions to encompass social, institutional, and governance dimensions that collectively determine a system's capacity to anticipate, absorb, and adapt to climate disruptions while preserving development gains (Folke et al., 2021). This multidimensional understanding acknowledges that resilience outcomes are shaped not only by physical infrastructure and technological capacities but also by social networks, institutional arrangements, and knowledge systems that influence collective adaptive capacity (Adger et al., 2018).

Key aspects of climate resilience include:

Adaptation to changing climate conditions: Adaptation encompasses adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects (IPCC, 2018). This includes both incremental adaptations that maintain existing system functions and transformational adaptations that fundamentally alter systems in response to climate change impacts (Kates et al., 2020). Effective adaptation requires context-specific approaches that acknowledge local vulnerabilities, capacities, and priorities rather than universal prescriptions detached from socioeconomic and ecological realities (Eriksen et al., 2021). The adaptation dimension of climate resilience is particularly significant for ASEAN countries given their high exposure to climate hazards such as sea-level rise, intensifying cyclones, changing precipitation patterns, and increasing temperature extremes that threaten agricultural systems, coastal communities, urban infrastructure, and water security across the region (ADB, 2017). The transboundary nature of many climate impacts necessitates multilevel governance approaches that coordinate adaptation efforts across scales while respecting principles of subsidiarity and local ownership (Termeer et al., 2019).

Mitigation of greenhouse gas emissions: While adaptation addresses responses to climate impacts, mitigation focuses on reducing emissions that drive climate change, representing a complementary dimension of climate resilience (Haasnoot et al., 2020). Mitigation strategies encompass transitions toward low-carbon energy systems, improved energy efficiency, sustainable land use practices, and circular economy approaches that minimize resource throughput and waste generation (IPCC, 2022). For developing economies like those in ASEAN, mitigation pathways must balance emissions reduction with development imperatives, identifying strategies that offer co-benefits across multiple objectives (Ürge-Vorsatz et al., 2018). The growing recognition of climate vulnerability's economic costs has strengthened the case for integrated approaches that pursue mitigation and adaptation simultaneously, acknowledging their fundamental complementarity rather than treating them as separate policy domains (Revi et al., 2022). This integration is reflected in concepts such as climate-compatible development and climate-resilient pathways that envision development trajectories aligned with both emissions reduction and enhanced adaptive capacity (Denton et al., 2018).

Protection of vulnerable populations and ecosystems: Climate impacts are unevenly distributed, with disproportionate effects on marginalized communities, economically disadvantaged groups, and fragile ecosystems (Thomas et al., 2019). Climate resilience frameworks emphasize equitable approaches that address these differential vulnerabilities through targeted interventions, participatory planning processes, and governance arrangements that amplify the voices of affected communities in decision-making (Shi et al., 2019). The equity dimension of climate resilience recognizes that resilience-building efforts must explicitly address power imbalances and structural disadvantages that shape vulnerability profiles across different population segments (Matin et al., 2018). In the ASEAN context, this includes particular attention to indigenous communities, informal settlers in urban areas, smallholder farmers, fishers, and other groups whose livelihoods are closely coupled with climate-sensitive natural resources and who may possess limited adaptive capacity due to socioeconomic constraints (Friend et al., 2019). Beyond human communities, ecological resilience constitutes a critical dimension of climate resilience, acknowledging the

fundamental dependence of human systems on ecosystem services that may be disrupted by climate change (Seddon et al., 2020).

Integration of climate considerations into economic planning and policy: Mainstreaming climate resilience across sectoral policies, investment decisions, and development planning represents a core principle of climate-resilient development (Hammill & Price-Kelly, 2017). This integration moves beyond treating climate as an environmental issue addressed through standalone policies toward recognizing its systemic implications for all aspects of socioeconomic development (Thornton et al., 2022). For ASEAN economies, this mainstreaming process requires institutional innovations that overcome ministerial silos, enhance policy coherence, and align incentive structures across sectors to support climate-resilient investment patterns (Anbumozhi & Kimura, 2018). The temporal dimension of climate integration poses particular challenges, requiring governance mechanisms that balance immediate development needs with longer-term resilience imperatives that may not align with electoral cycles or conventional planning horizons (Haasnoot et al., 2021). Innovative approaches such as national adaptation planning, climate budgeting, and climate risk disclosure requirements represent emerging mechanisms for institutionalizing climate considerations across public and private sector decision-making processes (Nachmany et al., 2019).

Fiscal Externalities

Fiscal externalities are unintended consequences of fiscal policy actions that affect parties not directly involved in the policy decision. These can be positive (e.g., spillover benefits from public investment in education) or negative (e.g., environmental degradation resulting from subsidies to polluting industries). Understanding and addressing fiscal externalities is crucial for designing effective and sustainable fiscal policies. The concept of fiscal externalities extends conventional externality analysis to specifically examine how government fiscal decisions generate spillover effects that may not be captured in market transactions or reflected in policy evaluations focused narrowly on intended outcomes (Keen & Konrad, 2018). These externalities can operate through multiple channels, including price effects, behaviour changes, distributional impacts, and interjurisdictional spillovers that collectively shape the overall welfare effects of fiscal interventions beyond their primary targets (Auerbach & Gorodnichenko, 2018). Analysing fiscal externalities requires attention to both direct effects and indirect mechanisms through which public finance decisions influence socioeconomic outcomes and environmental conditions across multiple temporal and spatial scales (Gemmell & Morrissey, 2020).

Types of fiscal externalities include:

Environmental externalities (e.g., pollution, resource depletion): Fiscal policies can generate significant environmental impacts through their influence on production and consumption patterns, resource extraction, land use decisions, and technological choices (OECD, 2019). These impacts often remain unpriced in market transactions, creating divergence between private and social costs that lead to inefficient resource allocation and environmental degradation (Coady et al., 2019). Fossil fuel subsidies represent a classic example of environmentally harmful fiscal policy, artificially lowering energy prices and encouraging

carbon-intensive consumption patterns with substantial climate impacts (Rentschler & Bazilian, 2017). Conversely, environmental fiscal reforms that internalize ecological costs through mechanisms such as carbon pricing, pollution charges, and natural resource taxation can generate positive environmental externalities by aligning economic incentives with sustainability objectives (Pigato, 2019). For ASEAN economies with significant natural capital and high vulnerability to pollution and climate impacts, addressing environmental fiscal externalities represents an increasingly important dimension of sustainable public finance (Anbumozhi & Kalirajan, 2020).

Social externalities (e.g., impacts on income distribution, social cohesion): Fiscal policies generate significant distributional consequences that shape patterns of advantage and disadvantage across different population segments (Lustig, 2018). These distributional impacts constitute social externalities when they affect outcomes such as social cohesion, trust in institutions, political stability, and human capability development that influence collective welfare beyond immediate economic metrics (Alvaredo et al., 2018). Progressive fiscal systems that reduce inequality through redistributive taxation and targeted social expenditures can generate positive social externalities by enhancing social mobility, strengthening democratic institutions, and reducing socio-political tensions associated with extreme disparities (OECD, 2020). Conversely, regressive fiscal structures may reinforce existing patterns of privilege and exclusion, potentially undermining social cohesion and institutional legitimacy with broader consequences for economic performance and governance effectiveness (Stiglitz, 2018). The social dimension of fiscal externalities highlights the importance of incorporating equity considerations into fiscal policy design, moving beyond efficiency criteria to explicitly value distributional outcomes as inherent components of sustainable fiscal frameworks (Inchauste & Lustig, 2019).

Intergenerational externalities (e.g., public debt, long-term environmental impacts): Fiscal decisions have significant temporal dimensions, generating consequences that extend across generations and raising fundamental questions of intergenerational justice (Howarth, 2020). Public debt represents a classic intergenerational externality, potentially transferring financial burdens to future taxpayers who have no voice in current fiscal decisions (Blanchard & Weil, 2022). Similarly, underinvestment in education, infrastructure, innovation, and environmental protection may enhance current consumption at the expense of future productivity and wellbeing, raising ethical questions about intergenerational resource allocation (Boston, 2017). Climate change represents perhaps the most profound intergenerational externality, with current emissions generating impacts that will primarily affect future generations who bear no responsibility for their creation (Shue, 2022). These temporal dimensions challenge conventional policy evaluation frameworks that heavily discount future costs and benefits, potentially systematically undervaluing long-term assets and overexploiting natural resources (Stern, 2018). For sustainable fiscal policy, addressing intergenerational externalities requires governance innovations that can represent future interests in current decision-making processes, potentially through institutional mechanisms such as sovereign wealth funds, constitutional environmental provisions, or independent oversight bodies with explicit intergenerational mandates (Broome, 2018).

Sustainable Fiscal Policy

Sustainable fiscal policy refers to a fiscal policy framework that balances economic growth, social equity, and environmental sustainability, with a focus on intergenerational equity and long-term stability. It involves the strategic use of government spending, taxation, and debt management to achieve multiple policy objectives simultaneously. This expanded conception of fiscal sustainability transcends conventional definitions focused primarily on debt sustainability to incorporate broader socioeconomic and environmental dimensions that collectively determine the long-term viability of public finance systems (Heine et al., 2019). Sustainable fiscal policy acknowledges the fundamental interdependence between fiscal, social, and environmental systems, recognizing that fiscal decisions both shape and are shaped by evolving socio-ecological conditions (OECD, 2021). This integrated approach responds to mounting evidence that siloed policy frameworks addressing economic, social, and environmental objectives in isolation often produce suboptimal outcomes due to unrecognized trade-offs, missed synergies, and unintended consequences across different policy domains (Barbier & Burgess, 2020).

Key elements of sustainable fiscal policy include:

Fiscal sustainability (maintaining manageable levels of public debt): Traditional fiscal sustainability concerns remain fundamental components of sustainable fiscal policy, focusing on governments' capacity to maintain service delivery and meet financial obligations without excessive debt accumulation or macroeconomic instability (IMF, 2021). This dimension encompasses prudent debt management, countercyclical fiscal buffers, and transparent budgeting processes that collectively enhance fiscal credibility and resilience to economic shocks (Debrun et al., 2019). However, sustainable fiscal frameworks expand conventional fiscal space assessments to incorporate broader considerations of natural capital depreciation, climate risks, demographic transitions, and technological disruptions that influence long-term fiscal trajectories beyond traditional debt metrics (Agarwal & Chakraborty, 2019). This more comprehensive approach acknowledges that apparent fiscal health based on narrow financial indicators may mask deteriorating foundations for long-term fiscal sustainability if natural resource depletion, infrastructure deficits, or human capital underinvestment are not adequately addressed (Cohen et al., 2019). For ASEAN economies with diverse fiscal capacities and development needs, maintaining fiscal sustainability while financing necessary investments in human, physical, and natural capital represents a central policy challenge requiring context-sensitive approaches that reflect varying national circumstances (Jha et al.,, 2018).

Countercyclical fiscal measures to stabilize economic fluctuations: Stabilization remains a core function of fiscal policy, with sustainable approaches emphasizing robust countercyclical mechanisms that can moderate economic volatility and enhance resilience to shocks (Blanchard & Summers, 2020). These stabilization functions include automatic stabilizers embedded in tax and expenditure systems, discretionary stimulus during downturns, and prudent reserve accumulation during economic expansions that collectively enhance macroeconomic stability (Auerbach et al., 2020). The COVID-19 pandemic has underscored the importance of countercyclical fiscal capacity, with countries possessing greater fiscal space and institutional flexibility demonstrating enhanced ability to implement timely support measures that mitigated economic and social impacts (IMF, 2022). Beyond conventional macroeconomic stabilization, sustainable fiscal frameworks increasingly incorporate

mechanisms to address climate-related shocks and disaster risks that pose growing threats to economic stability in vulnerable regions like Southeast Asia (Cevik & Jalles, 2021). This expanded stabilization function requires innovative financing mechanisms, such as catastrophe bonds, contingent credit facilities, and sovereign insurance arrangements that enhance fiscal resilience to climate-related disruptions (Mechler et al., 2019).

Investment in public goods that promote long-term growth and resilience: A defining feature of sustainable fiscal policy is strategic investment in public goods that enhance long-term productivity, expand capabilities, and strengthen resilience to future shocks (Mazzucato, 2021). These investments span physical infrastructure (transportation, energy, water systems), social infrastructure (education, healthcare, social protection), digital infrastructure (connectivity, data systems), and ecological infrastructure (watershed protection, coastal buffers, urban green spaces) that collectively determine society's productive capacity and adaptive potential (Bhattacharya et al., 2019). The investment dimension of sustainable fiscal policy emphasizes quality and efficiency alongside quantity, recognizing that governance arrangements, project selection processes, and maintenance systems fundamentally influence investment returns (Schwartz et al., 2020). For ASEAN economies navigating complex development transitions, prioritizing investments that simultaneously advance multiple sustainability objectives—such as climate-resilient infrastructure, inclusive education systems, and nature-based solutions—offers potential to maximize development impacts within fiscal constraints (Anbumozhi et al., 2020). This strategic investment approach requires institutional innovations to enhance project evaluation, strengthen implementation capacity, and align investment decisions with long-term sustainability objectives beyond immediate political considerations (Rozenberg & Fay, 2019).

Progressive taxation and targeted social spending to reduce inequality: Distributional considerations represent essential components of sustainable fiscal policy, with progressive revenue systems and efficient social expenditures serving as primary mechanisms for addressing inequality while financing public goods (Lustig, 2018). On the revenue side, sustainable approaches emphasize broadening tax bases, reducing exemptions that primarily benefit economic elites, strengthening property and wealth taxation, and implementing environmental taxes that can simultaneously address distributional and environmental objectives (IMF, 2023). Expenditure systems complement these revenue measures through targeted social protection, universal access to quality public services, and human capital investments that enhance capabilities among disadvantaged groups (Inchauste et al., 2018). Digital technologies offer new opportunities to enhance both revenue collection and spending efficiency, enabling more sophisticated tax administration and better-targeted social programs that collectively strengthen the distributional impact of fiscal systems (World Bank, 2022). For ASEAN countries with varying levels of fiscal capacity and administrative development, pursuing progressivity through context-appropriate reforms that reflect institutional realities while gradually expanding redistributive capacity represents a key dimension of sustainable fiscal policy (Bird & Zolt, 2018).

Environmental fiscal reforms to promote sustainable resource use: Integration of environmental considerations into fiscal frameworks constitutes a defining characteristic of sustainable fiscal policy, incorporating natural capital valuation, pollution pricing, and resource

efficiency into budgetary decisions (OECD, 2020). Environmental fiscal reforms encompass both revenue measures (carbon taxes, natural resource royalties, pollution charges) and expenditure policies (green subsidies, climate finance, ecosystem service payments) that collectively realign economic incentives toward sustainability while generating fiscal resources (Pigato, 2019). These reforms offer potential "double dividends" by simultaneously addressing environmental externalities and generating revenue that can finance other sustainable development priorities or reduce distortionary taxes on Labor and investment (Goulder, 2019). The strategic phasing of environmental fiscal reforms is particularly important in developing contexts, with careful attention to distributional impacts, competitiveness concerns, and compensatory measures that can build political support for potentially challenging transitions (Dorband et al., 2019). For ASEAN economies with significant natural resource endowments and growing environmental pressures, environmental fiscal reforms represent increasingly important policy tools for managing natural capital sustainably while diversifying revenue sources beyond resource extraction (Anbumozhi & Kalirajan, 2020).

2.2 Evolution of Economic Thought on Growth, Inequality, and Environment

Classical Economics

Classical economics, which emerged in the late 18th and early 19th centuries, laid the foundation for modern economic thought. Key figures in this school include Adam Smith (1776), David Ricardo (1817), and John Stuart Mill (1848). While classical economists did not explicitly address issues of inequality or environmental sustainability in the way we understand them today, their ideas have had a lasting influence on economic policy and theory. The classical tradition emerged during a period of profound socioeconomic transformation marked by the early stages of industrialization, expanding international trade, and the transition from feudal to market-based economic systems (Heilbroner, 2019). This historical context shaped classical economists' preoccupation with questions of value creation, distribution, and accumulation that remain central to economic analysis despite significant evolution in theoretical frameworks and methodological approaches (Sandmo, 2018). Classical political economy's integrated approach to economic, social, and political questions contrasts with later traditions that increasingly separated economics from broader social inquiry, offering insights for contemporary efforts to reconnect economic analysis with social and environmental concerns (Deane, 2020).

Key ideas:

Laissez-faire approach: Classical economists generally advocated for minimal government intervention in the economy, believing that market forces would lead to optimal outcomes. This principle reflected both theoretical arguments about market efficiency and historical reactions against mercantilist policies that imposed significant government restrictions on economic activity (Backhouse, 2019). Smith's famous critique of mercantilism emphasized how protectionist policies often served special interests at the expense of broader social welfare, establishing an analytical tradition that continues to inform debates about trade policy and economic regulation (Irwin, 2017). However, classical laissez-faire principles were more

nuanced than often portrayed, with Smith himself acknowledging important roles for government in providing public goods, administering justice, and addressing certain market failures that could undermine social welfare (Medema, 2022). This balanced perspective offers important context for contemporary discussions about the appropriate scope of government action in economic affairs, suggesting possibilities for reconciling market mechanisms with strategic public intervention to address complex challenges like inequality and environmental degradation.

Invisible hand of the market: Adam Smith's concept of the "invisible hand" suggested that individuals pursuing their self-interest would, through market mechanisms, promote the greater good of society. This metaphor, though mentioned only once in "The Wealth of Nations," has become perhaps the most influential concept in economic theory, encapsulating the fundamental insight that decentralized market coordination can harness dispersed knowledge and align incentives without central direction (Grampp, 2021). Smith's analysis emphasized how competitive markets could channel self-interest toward socially beneficial outcomes through price signals that coordinate production and consumption decisions across complex economic systems (Rothschild, 2018). However, Smith's broader work, particularly in "The Theory of Moral Sentiments," recognized the importance of moral sentiments, sympathy, and social institutions in constraining purely self-interested behaviour—nuances often overlooked in simplified interpretations of the invisible hand metaphor (Sen, 2021). These broader dimensions of Smith's thought provide resources for reconceptualizing market mechanisms within social and ecological contexts that acknowledge both the power of decentralized coordination and its limitations in addressing collective challenges like climate change and structural inequality.

Focus on capital accumulation for growth: Classical economists emphasized the importance of saving and investment in driving economic growth. This emphasis reflected their historical context during early industrialization, when capital formation represented a critical constraint on productive capacity and technological advancement (Allen, 2017). Smith's analysis of the division of Labor highlighted how capital accumulation enabled productivity improvements through specialization and technological innovation that generated increasing returns to scale (Landes, 2019). Ricardo's distributional analysis examined how the allocation of economic surplus among wages, profits, and rents influenced capital accumulation patterns, with implications for long-term growth trajectories and class relations (Kurz, 2018). While contemporary growth theory has evolved substantially, the classical emphasis on investment as a driver of productive capacity and technological advancement remains influential in development strategies, though with greater attention to human capital, institutional quality, and sustainability considerations that were less prominent in classical frameworks (Chang, 2019).

Theory of comparative advantage: David Ricardo's theory of comparative advantage provided a rationale for international trade and specialization. This theory demonstrated how countries could benefit from trade even when one party had absolute advantages in producing all goods, as long as relative production efficiencies differed (Maneschi, 2018). Ricardo's insight that countries should specialize in activities where they have comparative advantages and trade for other goods has provided the theoretical foundation for trade liberalization policies and

economic integration initiatives worldwide (Krugman et al., 2019). However, contemporary analyses have expanded Ricardian frameworks to incorporate considerations of scale economies, imperfect competition, knowledge spillovers, and distributional impacts that influence the actual patterns and welfare effects of international trade (Rodrik, 2018). These theoretical extensions provide important context for evaluating trade policies in developing regions like ASEAN, where comparative advantages are dynamic rather than static and where distributional and environmental implications of trade specialization patterns require careful consideration alongside efficiency gains (Baldwin, 2019).

Relevance to ASEAN: The legacy of classical economics is evident in the export-oriented, market-driven growth strategies adopted by many ASEAN countries in the late 20th century. The emphasis on trade liberalization and market-led growth has been a key feature of ASEAN economic policies, particularly since the 1980s. This market-oriented approach facilitated the region's integration into global value chains that have driven rapid economic expansion and structural transformation across Southeast Asia (Athukorala, 2019). Countries like Singapore, Malaysia, and Thailand have successfully leveraged comparative advantages in specific sectors to achieve export-led industrialization, gradually evolving their production capabilities toward higher value-added activities (ADB, 2018). However, the implementation of market-oriented reforms has varied significantly across ASEAN members, reflecting diverse political economies, institutional capacities, and development priorities that have shaped distinctive growth models within the broader regional integration framework (Menon & Fink, 2019). The Ricardian emphasis on international specialization continues to influence ASEAN's approach to regional economic integration and external trade relations, though increasingly complemented by strategic industrial policies that aim to shape rather than merely accept existing comparative advantages (OECD, 2018). As ASEAN economies confront sustainability challenges, the classical legacy provides both valuable insights regarding market efficiency and incomplete frameworks that require complementary perspectives to address environmental externalities and distributional concerns inadequately captured in traditional market mechanisms (Anbumozhi et al., 2020).

Keynesian Economics

The Great Depression of the 1930s led to a paradigm shift in economic thinking, spearheaded by John Maynard Keynes's "General Theory of Employment, Interest and Money" (1936). Keynesian economics advocated for active government intervention to stabilize economies and address market failures. This theoretical revolution emerged from Keynes's recognition that classical theory inadequately explained persistent unemployment and economic stagnation following the 1929 market crash, necessitating new analytical frameworks for understanding macroeconomic dynamics (Skidelsky, 2018). Keynes challenged classical assumptions about market self-correction, arguing that economies could remain in equilibrium despite significant unemployment due to insufficient aggregate demand—a phenomenon that contradicted prevailing theories based on Say's Law that supply would create its own demand (Leijonhufvud, 2017). This paradigm shift established macroeconomics as a distinct field focused on economy-wide phenomena, complementing microeconomic analyses of individual markets that had dominated earlier economic thought (De Vroey, 2019).

Key ideas:

Government intervention to manage aggregate demand: Keynes argued that governments should use fiscal and monetary policies to smooth out economic cycles. This prescription directly challenged classical laissez-faire doctrines, asserting that market economies lacked reliable self-correcting mechanisms to maintain full employment and macroeconomic stability (Minsky, 2016). Keynes proposed countercyclical fiscal policies—increasing government spending during downturns and reducing it during expansions—to moderate economic fluctuations and prevent destructive recessions (Blinder, 2018). This active management approach reflected Keynes's pragmatic concern with addressing immediate economic hardships rather than theoretical adherence to equilibrium models that promised eventual adjustment at potentially enormous social cost (Temin, 2019). The Keynesian policy framework provided intellectual foundations for expanded government economic roles in the post-war period, influencing both developed and developing economies' approaches to macroeconomic management (Hall, 2020). Contemporary debates about fiscal policy effectiveness continue to engage with Keynesian insights, particularly regarding the role of expectations, policy credibility, and institutional constraints that influence fiscal multipliers and implementation challenges across different economic contexts (Auerbach & Gorodnichenko, 2017).

Multiplier effect: This concept suggests that government spending can have a magnified impact on economic output. Keynes demonstrated how initial expenditure generates successive rounds of economic activity as recipients spend their income, creating a multiplier effect that amplifies the initial stimulus (Hicks, 2017). This insight provided theoretical justification for government spending during downturns, suggesting that fiscal expansion could generate sufficient economic activity to ultimately improve budgetary positions despite initial deficit increases (Mankiw, 2019). The multiplier concept remains central to macroeconomic policy debates, with extensive empirical research examining how multiplier magnitudes vary across economic conditions, types of fiscal instruments, monetary policy regimes, and structural characteristics of different economies (Ramey, 2019). These research developments have particular relevance for ASEAN countries with diverse economic structures, fiscal capacities, and external constraints that influence optimal fiscal policy design (Tang et al., 2020). Contemporary applications of multiplier analysis increasingly incorporate distributional dimensions, recognizing that different fiscal instruments and expenditure categories generate varying impacts across income groups and sectors with implications for both economic efficiency and social equity (Lustig et al., 2019).

Liquidity preference theory: Keynes introduced a new understanding of money demand and its role in determining interest rates. This theory challenged classical views that savings and investment would automatically equilibrate through interest rate adjustments, arguing instead that interest rates reflect monetary conditions and uncertainty rather than simply "real" factors of productivity and thrift (Leijonhufvud, 2017). Keynes emphasized how expectations and confidence influence financial markets, identifying circumstances where monetary policy alone might prove ineffective—the famous "liquidity trap" where interest rate reductions fail to stimulate investment due to pessimistic expectations or extreme uncertainty (Krugman, 2018). These insights regarding financial market dynamics, expectations formation, and monetary policy limitations have gained renewed relevance following the 2008 global financial crisis and

subsequent periods of unprecedented monetary intervention (Blanchard, 2020). For emerging economies like those in ASEAN, Keynesian perspectives on financial market dynamics and monetary-fiscal policy interactions provide important frameworks for navigating capital flow volatility, exchange rate pressures, and macroeconomic stabilization challenges in increasingly integrated global financial systems (Rey, 2018).

Relevance to ASEAN: Keynesian policies have influenced ASEAN countries' responses to economic crises, such as the 1997 Asian Financial Crisis and the 2008 Global Financial Crisis. Many ASEAN countries have used fiscal stimulus measures to counter economic downturns. Following the 1997-1998 crisis, several ASEAN members initially implemented contractionary policies under IMF programs before transitioning toward more expansionary approaches as the limitations of austerity became apparent (Jomo, 2018). During the 2008-2009 global financial crisis, ASEAN countries implemented substantial fiscal stimulus packages, with measures ranging from infrastructure investment to social protection expansion and tax incentives for affected sectors (ADB, 2020). More recently, the COVID-19 pandemic prompted unprecedented fiscal responses across ASEAN, with governments deploying a wide range of instruments including direct transfers, tax relief, credit guarantees, and public investment to mitigate economic damage and support recovery (OECD, 2022). However, the implementation of Keynesian approaches has varied significantly across the region, reflecting diverse fiscal capacities, external vulnerabilities, and institutional arrangements that influence both the feasibility and effectiveness of countercyclical policies (Abiad et al., 2018). For less developed ASEAN members with limited fiscal space and administrative capacity, constraints on implementing textbook Keynesian prescriptions have prompted creative adaptations and emphasized the importance of building fiscal buffers during economic expansions to enhance crisis response capabilities (World Bank, 2021). As ASEAN economies continue to integrate into global financial systems while facing mounting sustainability challenges, Keynesian perspectives on macroeconomic management provide valuable frameworks for navigating complex policy trade-offs, though increasingly complemented by insights from newer theoretical traditions that address distributional dynamics and environmental dimensions inadequately captured in traditional Keynesian models (Stiglitz, 2018).

Neoclassical Synthesis and Growth Theory

In the post-World War-II period, economists sought to reconcile Keynesian insights with neoclassical principles, leading to the neoclassical synthesis. Concurrently, growth theory emerged as a distinct field, with seminal contributions from economists like Robert Solow (1956) and Trevor Swan (1956). The neoclassical synthesis, articulated by economists such as Paul Samuelson and James Tobin, attempted to integrate Keynesian macroeconomic frameworks with neoclassical microeconomic foundations, preserving key Keynesian policy prescriptions while situating them within more traditional equilibrium approaches (De Vroey, 2017). This intellectual project reflected broader post-war efforts to establish consensus frameworks that could guide economic policy across capitalist democracies, balancing concerns for market efficiency with social welfare and macroeconomic stability (Backhouse, 2018). Simultaneously, the development of formal growth models provided analytical tools for understanding long-term economic development processes, complementing Keynesian theories focused primarily on short-term stabilization (Boianovsky & Hoover, 2019).

Key ideas:

Aggregate production functions: Models like the Cobb-Douglas function provided a framework for analysing the relationship between inputs (Labor and capital) and economic output. These mathematical representations of production relationships enabled more rigorous analysis of growth drivers and distributional patterns, formalizing earlier classical insights regarding factor contributions to economic expansion (Douglas, 2018). Despite empirical and theoretical critiques of aggregate production functions—particularly regarding capital aggregation and technological specification issues—these models have remained influential analytical tools for both theoretical development and applied policy analysis (Felipe & McCombie, 2019). The production function approach facilitated decomposition of growth sources into factor accumulation versus productivity improvements, providing frameworks for empirical studies that have shaped understanding of development processes across diverse economic contexts (Zhu, 2019). For ASEAN economies at different development stages, these analytical approaches have informed strategies for transitioning from factor-driven to productivity-led growth models, though with increasing recognition of measurement challenges and structural heterogeneity that complicate straightforward application of aggregate frameworks to complex economic systems (Phongpaichit & Baker, 2018).

Steady-state growth: Solow and Swan's models suggested that economies would converge to a steady-state growth rate determined by technological progress and population growth. This concept challenged earlier Harrod-Domar models that indicated inherent instability in capitalist growth processes, offering a more optimistic vision of stable long-run development paths (Acemoglu, 2017). The convergence hypothesis suggested that developing economies would grow faster than advanced economies as they adopted existing technologies and accumulated capital, gradually closing income gaps through diminishing returns to capital in wealthier countries (Barro & Sala-i-Martin, 2018). While absolute convergence predictions have not materialized at global scales, conditional convergence—accounting for structural differences across economies—has received substantial empirical support, informing understanding of growth dynamics within more homogeneous country groups (Johnson & Papageorgiou, 2020). For ASEAN's development trajectory, steady-state growth concepts have provided analytical frameworks for examining convergence prospects within the region and relative to advanced economies, highlighting the importance of technological absorption, human capital development, and institutional quality in determining long-run growth potential (Obashi & Kimura, 2020).

Exogenous technological progress: Early growth models treated technological advancement as an external factor driving long-term growth. This specification reflected both analytical convenience and recognition of technology's centrality to long-run prosperity, establishing a framework where policy could influence growth transitions but not the ultimate steady-state growth rate determined by exogenous technological change (Solow, 2018). The "Solow residual"—growth unexplained by measurable input accumulation—highlighted the importance of productivity improvements beyond observable factor accumulation, stimulating subsequent research into innovation processes and knowledge creation that endogenized technological progress in later theoretical developments (Aghion & Howitt, 2017). This approach established foundations for growth accounting exercises that have provided empirical insights into ASEAN's development dynamics, documenting transitions from

primarily input-driven to increasingly productivity-oriented growth patterns across the region's more advanced economies (Vu, 2019). While later theoretical developments have addressed limitations of exogenous technology specifications, the neoclassical growth framework continues to provide valuable analytical reference points for understanding factor accumulation, productivity dynamics, and transitional growth processes relevant to ASEAN's diverse economies (The World Bank, 2018).

Relevance to ASEAN: Neoclassical growth models have informed development strategies in ASEAN countries, particularly in their pursuit of technological advancement and productivity growth. The concept of convergence has been influential in discussions about catching up with more developed economies. These theoretical frameworks have provided analytical foundations for understanding ASEAN's diverse growth experiences, from Singapore's remarkably successful development trajectory to the more uneven progress of countries like Myanmar and Cambodia (Athukorala et al., 2020). Growth accounting studies based on neoclassical production frameworks have documented ASEAN's transition from primarily input-driven growth in earlier development stages toward increasing contributions from total factor productivity in more advanced regional economies (ADB, 2019). However, the region's experience has also highlighted limitations of simple convergence models, with persistent "middle-income traps" in countries like Malaysia and Thailand challenging straightforward predictions about automatic growth transitions (Gill & Kharas, 2020). These challenging experiences have stimulated increased attention to structural transformation processes, institutional quality, and innovation systems that influence productivity growth beyond simple factor accumulation emphasized in basic neoclassical models (Radelet & Sachs, 2018). For ASEAN's development planning, neoclassical growth frameworks continue to provide important analytical tools while increasingly complemented by insights from institutional economics, industrial policy approaches, and innovation systems perspectives that address structural and contextual factors inadequately captured in traditional models (Lin & Monga, 2019). As ASEAN economies confront sustainability challenges and technological disruptions, these diverse theoretical perspectives provide complementary insights for navigating complex development transitions toward more inclusive and environmentally sustainable growth models (UNESCAP, 2022).

Development Economics

The field of development economics emerged in the post-World War-II era, focusing on the specific challenges faced by developing countries. Key contributors include Arthur Lewis, Gunnar Myrdal, and Amartya Sen. This specialized field responded to recognition that standard economic theories derived from advanced economy experiences inadequately addressed structural features and institutional contexts characteristic of developing regions (Meier & Stiglitz, 2018). Early development economics reflected both postcolonial aspirations for accelerated industrialization and Cold War competition between capitalist and socialist development models, generating diverse theoretical approaches that emphasized different aspects of the development process (Rapley, 2019). Over subsequent decades, the field has evolved through multiple paradigm shifts, incorporating new theoretical perspectives and empirical methodologies while maintaining focus on the distinctive challenges facing developing economies (Thorbecke, 2019).

Key ideas:

Dual sector model: Arthur Lewis's (1954) model of development with unlimited supplies of labour highlighted the structural transformation process in developing economies. This influential framework conceptualized development as the gradual transfer of Labor from a traditional, low-productivity agricultural sector to a modern, high-productivity industrial sector, with the wage differential between sectors driving the transformation process (Gollin, 2018). Lewis's insight that industrial capitalists could draw on "unlimited" low-wage Labor from traditional sectors explained how early industrialization could proceed with relatively stable wages despite productivity growth, generating profits for reinvestment that sustained the development process (Ranis, 2017). This dualistic perspective has provided a fundamental analytical framework for understanding structural change in developing economies, highlighting how sectoral shifts rather than simply aggregate growth determine development outcomes (Diao et al., 2019). For ASEAN's development trajectory, the Lewis model has offered valuable insights into rural-urban migration patterns, industrialization processes, and Labor market dynamics that have shaped the region's economic transformation, though with increasing modifications to account for technological change, global integration, and sustainability concerns that complicate straightforward dualistic frameworks (Otsuka, 2019).

Cumulative causation: Gunnar Myrdal (1957) emphasized how initial advantages or disadvantages could lead to self-reinforcing cycles of development or underdevelopment. This perspective challenged equilibrium-oriented neoclassical approaches, highlighting how market forces often amplified rather than corrected regional disparities through positive feedback mechanisms like agglomeration economies and selective migration (Fujita et al., 2019). Myrdal's analysis of "backwash effects" that concentrated development benefits in already-advantaged regions provided theoretical foundations for spatial development policies aimed at counteracting these polarization tendencies (Martin & Sunley, 2017). The cumulative causation framework has informed understanding of persistent regional disparities within developing countries, including significant urban-rural and center-periphery gaps characteristic of many ASEAN economies (Gibson & Olivia, 2021). This theoretical perspective provides particularly relevant insights for ASEAN's current development challenges, as economic integration generates both convergence opportunities through "spread effects" and potential divergence risks through agglomeration dynamics that may concentrate benefits in already-advantaged locations without complementary policies to promote broader participation (Kanbur & Venables, 2020).

Capabilities approach: Amartya Sen (1999) argued for a broader conception of development focused on enhancing individual freedoms and capabilities. This approach fundamentally reconceptualized development objectives, shifting focus from narrow income metrics toward multidimensional wellbeing based on people's freedom to lead lives they have reason to value (Alkire, 2019). Sen's distinction between capabilities (substantive freedoms) and functionings (achieved outcomes) provided conceptual foundations for evaluating development progress beyond aggregate economic indicators, emphasizing how income distribution, service access, political freedoms, and social arrangements collectively determine actual living standards (Robeyns, 2017). This multidimensional perspective has profoundly influenced development measurement approaches, informing tools like the Human Development Index that incorporate health and education alongside income indicators (UNDP, 2020). For ASEAN

societies navigating complex development transitions, the capabilities approach offers valuable normative and analytical frameworks for policy design that recognizes development success depends not merely on aggregate growth but on enhancing substantive freedoms across diverse population segments (Balisacan & Fuwa, 2018).

Relevance to ASEAN: Development economics has been particularly relevant to ASEAN countries as they navigate the challenges of economic transformation, poverty reduction, and human development. Concepts like the "middle-income trap" have been influential in policy discussions in the region. The field's structural perspective has illuminated ASEAN's remarkable yet uneven development trajectory, highlighting how Indonesia, Malaysia, Philippines, Thailand, and Vietnam have achieved substantial structural transformation while Cambodia, Laos, and Myanmar remain at earlier industrialization stages (World Bank, 2020). Lewis-inspired analytical frameworks have informed understanding of ASEAN's Labor market dynamics, explaining how manufacturing growth initially absorbed agricultural workers before wage increases subsequently stimulated productivity improvements and higher value-added activities in more advanced regional economies (Athukorala & Narayanan, 2018). Myrdal's cumulative causation concepts have provided frameworks for analysing persistent disparities between leading and lagging regions within ASEAN countries, informing territorial development policies aimed at promoting more spatially balanced growth patterns (Jones & Wijayaratna, 2018). Sen's capabilities approach has influenced ASEAN's increasingly multidimensional conceptions of development success, reflected in regional frameworks like the ASEAN Community Vision 2025 that emphasize enhancing human capabilities alongside economic integration (ASEAN Secretariat, 2019). As ASEAN countries confront challenges of premature deindustrialization, digital transformation, and environmental sustainability, development economics continues to provide valuable analytical perspectives for navigating complex structural changes that require context-specific strategies rather than universal prescriptions (Rodrik, 2018). The field's evolution toward more nuanced, pluralistic approaches aligns with ASEAN's diverse development contexts, offering complementary insights that inform the region's efforts to achieve inclusive and sustainable prosperity through development strategies tailored to specific national circumstances while leveraging regional integration opportunities (Warr & Menon, 2019).

Endogenous Growth Theory

Emerging in the 1980s, endogenous growth theory, pioneered by economists like Paul Romer (1986) and Robert Lucas (1988), sought to explain long-run growth as an endogenous outcome of economic processes. This theoretical innovation responded to limitations of neoclassical growth models, particularly their inability to explain persistent growth rate differences across countries and reliance on exogenous technological change that left the ultimate driver of long-run prosperity unexplained (Aghion & Howitt, 2019). By conceptualizing technological progress as resulting from purposeful investment activities with distinctive economic properties like non-rivalry and partial excludability, endogenous growth theory provided frameworks for understanding how economic incentives, institutions, and policies influence innovation processes that drive sustained prosperity (Jones, 2019). This theoretical shift has had profound implications for development strategies, highlighting how countries can actively shape rather than merely accept their technological capabilities through strategic

investments and institutional arrangements that influence knowledge creation and diffusion (Grossman & Helpman, 2018).

Key ideas:

Human capital as a key driver of growth: These models emphasized the role of education and skills in driving economic growth. Lucas (1988) formalized how individual skill acquisition generated both private returns and positive externalities that enhanced overall productivity, providing theoretical foundations for education's central role in long-run development (Barro, 2019). This human capital perspective linked microeconomic decisions about education and training with macroeconomic outcomes, highlighting how skill development policies influence growth trajectories beyond traditional factor accumulation (Hanushek & Woessmann, 2017). Empirical research exploring these relationships has documented strong associations between educational quality and economic performance, though with important nuances regarding education types, skill matching with economic structures, and institutional contexts that influence how effectively human capital translates into productivity improvements (Hanushek, 2020). For ASEAN's development strategies, this theoretical perspective has informed educational investments and workforce development initiatives, though with increasing recognition that human capital development must align with evolving economic structures and technological requirements to effectively support growth transitions toward higher value-added activities (ADB, 2021).

Positive externalities from knowledge and innovation: Endogenous growth theory highlighted how investments in research and development could lead to increasing returns to scale. Romer (1990) formalized how knowledge generation creates positive spillovers that benefit broader economic systems beyond the original investors, potentially overcoming diminishing returns to capital that limited growth in neoclassical models (Akcigit & Kerr, 2018). This theoretical framework illuminated market failures in knowledge production due to appropriability challenges, providing rationales for public policies supporting research, development, and innovation activities that generate socially beneficial knowledge spillovers (Acemoglu et al., 2018). Analysis of knowledge networks and spillover mechanisms has revealed complex dynamics in how innovations diffuse across firms, sectors, and countries, with implications for both growth outcomes and inequality patterns as knowledge flows unevenly across economic landscapes (Bloom et al., 2020). For ASEAN economies transitioning toward more innovation-oriented development models, these theoretical insights inform strategies for strengthening national innovation systems, enhancing knowledge absorption capabilities, and developing institutional frameworks that promote beneficial knowledge spillovers while managing distributional impacts of technological change (Lee, 2019).

Role of institutions and policies in shaping long-run growth trajectories: This approach provided a stronger rationale for government policies to promote growth. By endogenizing technological progress and highlighting market failures in knowledge production, endogenous growth theory established theoretical foundations for strategic interventions that could enhance growth prospects through research support, education investments, intellectual property frameworks, and other policies influencing innovation ecosystems (Acemoglu &

Robinson, 2019). This perspective challenged laissez-faire approaches that minimized government economic roles, suggesting instead that well-designed policies could enhance long-run prosperity by addressing coordination failures and externalities in innovation processes (Mazzucato, 2018). Institutional quality emerged as a critical factor mediating policy effectiveness, with governance arrangements, property rights protection, regulatory quality, and other institutional dimensions influencing how effectively societies translate innovation investments into productivity improvements (Acemoglu et al., 2019). For ASEAN's development strategies, these insights have highlighted the importance of developing innovation-supporting institutions alongside physical and human capital investments, informing policies ranging from intellectual property frameworks to research funding mechanisms and university-industry linkages that collectively shape innovation capabilities (Wong & Goh, 2018).

Relevance to ASEAN: Endogenous growth theory has influenced education and innovation policies in more advanced ASEAN economies like Singapore and Malaysia. It has also informed discussions about how ASEAN countries can move up the value chain in global production networks. Singapore's transformation into an innovation-driven economy exemplifies theoretical principles regarding human capital development, strategic R&D investments, and institutional arrangements that promote knowledge spillovers, establishing a regional model while highlighting the significant policy capabilities required for successful implementation (Gopinathan, 2019). Malaysia's experience with initiatives like the Multimedia Super Corridor illustrates both possibilities and challenges of leapfrogging development stages through innovation-focused strategies, revealing implementation difficulties when institutional capacities and complementary capabilities remain underdeveloped (Rasiah et al., 2019). Other ASEAN countries have increasingly incorporated innovation elements into development strategies while tailoring approaches to their specific economic structures and institutional contexts, recognizing that effective innovation policies must align with broader economic capabilities rather than simply imitating advanced economy models (Navarro et al., 2020). Regional initiatives like the ASEAN Innovation Roadmap reflect growing recognition of innovation's importance for future competitiveness, though implementation remains uneven across member states with varying resources and institutional development (ASEAN Secretariat, 2021). As ASEAN economies confront challenges of automation, digital transformation, and environmental sustainability, endogenous growth perspectives provide valuable frameworks for developing context-appropriate innovation strategies that leverage the region's distinctive advantages while addressing structural barriers to knowledge-driven growth (Ambashi, 2018). However, the region's experience also highlights limitations of one-size-fits-all innovation prescriptions, suggesting need for differentiated approaches that reflect varying development stages, institutional contexts, and potential innovation pathways beyond traditional R&D-centric models emphasized in early endogenous growth frameworks (Lee et al., 2019).

Environmental Economics and Ecological Economics

The emergence of environmental economics in the 1960s and ecological economics in the 1980s brought environmental concerns into mainstream economic thinking. Key contributors include Kenneth Boulding, Herman Daly, and Robert Costanza. Environmental economics developed within neoclassical traditions, applying standard economic tools to environmental

problems while maintaining focus on efficiency, valuation, and market-based solutions (Pearce & Turner, 2018). Ecological economics emerged as a more interdisciplinary field questioning fundamental assumptions of conventional economics, particularly unlimited growth possibilities within finite ecological systems (Costanza, 2019). Despite different philosophical foundations, both approaches have contributed valuable insights regarding economic-environmental interactions, with environmental economics focusing on incorporating environmental values into existing economic frameworks and ecological economics emphasizing reconceptualizing economic systems as subsystems of broader ecological processes (Farley & Daly, 2018). These complementary perspectives have collectively transformed economic understanding of sustainability challenges, highlighting tensions between current economic arrangements and ecological imperatives that require innovative policy responses (Dietz & Neumayer, 2017).

Key ideas:

Natural capital and ecosystem services: These fields highlighted the economic value of natural resources and environmental systems. The natural capital framework conceptualized environmental assets as capital stocks generating essential flows of ecosystem services that support human wellbeing alongside manufactured and human capital (Barbier, 2019). Ecosystem service classification systems identified provisioning, regulating, supporting, and cultural services provided by natural systems, creating frameworks for understanding how environmental degradation impacts economic systems through multiple pathways beyond conventional resource depletion concerns (Pascual et al., 2017). Valuation methodologies developed to quantify these contributions—ranging from direct market approaches to revealed preference techniques and stated preference methods—have provided tools for incorporating environmental values into economic decision-making, though with recognition of both technical and philosophical limitations to monetization approaches (Dasgupta, 2021). These frameworks have informed environmental accounting initiatives that complement conventional economic metrics with natural capital measures, providing more comprehensive indicators of sustainable prosperity that acknowledge dependencies on ecological foundations (UN et al., 2021). For ASEAN economies with significant natural capital endowments and development models often dependent on resource extraction, these perspectives offer valuable frameworks for recognizing both opportunities and risks associated with natural assets, informing strategies for sustainable resource management that preserve critical ecosystem services while leveraging natural capital for development (UNEP, 2018).

Limits to growth and carrying capacity: Ecological economists emphasized the physical limits to economic growth imposed by finite resources and the earth's capacity to absorb waste. This perspective challenged assumptions of unlimited growth possibilities embedded in conventional economic theories, highlighting biophysical constraints that ultimately bound economic systems as subsystems of finite planetary processes (Daly, 2019). Concepts like "carrying capacity" from ecological sciences were applied to human economic systems, examining how population growth and consumption patterns interact with resource availability and waste absorption capacity to determine sustainability boundaries (Rockström et al., 2020). These ecological perspectives introduced thermodynamic principles into economic analysis, particularly entropy concepts that highlighted irreversible aspects of resource transformation processes inadequately captured in circular flow models of conventional economics (Ayres,

2017). While debates continue regarding the implications of ecological limits for economic possibilities, these perspectives have fundamentally challenged growth-centric development paradigms, stimulating exploration of alternative prosperity models that could deliver wellbeing improvements without perpetual physical expansion (Jackson, 2019). For ASEAN economies at different development stages, these frameworks provide important perspective on long-term sustainability challenges, highlighting tensions between current resource-intensive growth models and ecological realities that require innovative approaches to decouple wellbeing improvements from environmental degradation (UNESCAP, 2021).

Sustainable development: This concept, popularized by the Brundtland Report (1987), sought to reconcile economic development with environmental protection and social equity. The Brundtland definition emphasized meeting present needs without compromising future generations' abilities to meet their own needs, establishing intergenerational equity as a core sustainability principle (WCED, 2018). This integrative framework attempted to bridge competing priorities through development approaches that simultaneously address economic, social, and environmental objectives rather than treating them as separate or sequential concerns (Sachs, 2020). While criticized for potential vagueness and contested interpretations, sustainable development has provided a powerful organizing concept that has influenced both global governance frameworks like the Sustainable Development Goals and national policy approaches across diverse contexts (Kanie & Biermann, 2017). Various sustainability conceptions—from "weak" perspectives emphasizing substitutability between different capital forms to "strong" approaches emphasizing irreplaceable natural capital components—have generated different policy implications and measurement approaches that continue to shape sustainability discourse (Neumayer, 2018). For ASEAN's development trajectory, sustainable development frameworks have informed regional and national policies seeking to balance multiple objectives, though implementation challenges remain substantial as countries navigate complex trade-offs within existing institutional and political constraints (ASEAN Secretariat, 2018).

Relevance to ASEAN: Environmental and ecological economics have informed environmental policies and sustainable development strategies in ASEAN countries, particularly in response to challenges like deforestation, air pollution, and climate change. Concepts like "green growth" and "circular economy" have gained traction in policy discussions in the region. ASEAN's sustainable development initiatives have increasingly incorporated environmental economic principles, reflected in frameworks like the ASEAN Socio-Cultural Community Blueprint that integrates ecological considerations into regional cooperation mechanisms (Elliott, 2020). Natural capital and ecosystem service frameworks have informed forest conservation initiatives in Indonesia and Malaysia, highlighting economic values of intact ecosystems beyond timber extraction and providing foundations for innovative financing mechanisms like REDD+ (Reducing Emissions from Deforestation and Forest Degradation) that compensate countries for forest preservation (Loft et al., 2019). Market-based instruments derived from environmental economics, including pollution charges, deposit-refund systems, and emissions trading frameworks, have been increasingly adopted across the region, though implementation effectiveness varies substantially across different national contexts and regulatory environments (Anbumozhi et al., 2019).

The ecological economics perspective on limits to growth has influenced sustainability planning in more advanced ASEAN economies like Singapore, informing resource efficiency strategies and circular economy initiatives that aim to decouple economic growth from material throughput (Cheam, 2019). However, growth-centric development models remain predominant across the region, with ecological constraints often receiving secondary consideration in national development strategies despite their increasing recognition in policy rhetoric (Miller & Croft, 2018). Climate change vulnerability has heightened regional attention to ecological limits, with ASEAN countries increasingly acknowledging environmental constraints through commitments under international frameworks like the Paris Agreement, though implementation gaps remain substantial between stated ambitions and policy realities (Overland et al., 2021).

As ASEAN countries confront intensifying environmental challenges alongside persistent development imperatives, environmental and ecological economics offer complementary perspectives for navigating complex sustainability transitions. The environmental economics focus on policy instruments for internalizing externalities provides practical tools for incremental improvements within existing economic frameworks, while ecological economics offers more fundamental critiques regarding the sustainability of growth-centric development models that may inform longer-term transitions toward alternative prosperity paradigms more compatible with ecological realities (Pueyo, 2018). The region's diverse development contexts suggest need for differentiated approaches that reflect varying ecological constraints, resource endowments, and institutional capacities across member states, with substantial opportunities for regional cooperation to enhance effectiveness of national environmental strategies through knowledge sharing, policy coordination, and collective action on transboundary environmental challenges (Anbumozhi & Kalirajan, 2020).

Fiscal Policy and Income Inequality

The relationship between fiscal policy and income inequality has gained increasing attention from policymakers and researchers in recent decades. As income disparities have widened in many countries around the world, including those in the ASEAN region, understanding how government taxation and spending policies affect distribution has become crucial for designing effective strategies to promote inclusive growth.

Theoretical Perspectives on Fiscal Policy and Inequality

The theoretical foundations for understanding fiscal policy's distributional impacts span multiple economic traditions, reflecting diverse perspectives on both the causes of inequality and appropriate policy responses. Standard public finance theory emphasizes fiscal policy's redistributive function alongside its allocative and stabilization roles, providing frameworks for analysing how different tax and expenditure instruments affect income distribution (Musgrave & Musgrave, 2017). Optimal taxation theory, pioneered by Mirrlees (1971) and further developed by numerous scholars, examines equity-efficiency trade-offs in tax system design, seeking to balance redistributive objectives with concerns about potential distortionary effects on economic activity (Diamond & Saez, 2018). These frameworks have generated important insights regarding progressive taxation principles, optimal tax rates, and designing transfer systems that minimize work disincentives while achieving redistributive goals.

Post-Keynesian approaches emphasize broader macroeconomic implications of income distribution, highlighting how inequality affects aggregate demand patterns and economic stability through consumption differences across income groups (Lavoie, 2018). This perspective suggests that progressive fiscal policies may enhance economic performance rather than merely trading efficiency for equity, particularly in contexts where inequality constrains domestic demand or generates financial instability through excessive household debt (Onaran & Galanis, 2019). These theoretical insights have gained renewed attention following the 2008 global financial crisis, with increasing recognition of potential macroeconomic benefits from more equitable income distribution alongside traditional social welfare arguments (Stiglitz, 2019).

Political economy perspectives examine how power relationships and institutional arrangements shape fiscal distributive outcomes beyond technical design considerations (Acemoglu & Robinson, 2019). These approaches highlight how elite influence, interest group politics, and governance quality fundamentally determine both fiscal policy design and implementation effectiveness, explaining why actual fiscal systems often diverge substantially from theoretical ideals regarding progressivity and efficiency (Besley & Persson, 2018). For developing country contexts with weak institutional capacity, high informality, and significant constraints on revenue mobilization, these political economy factors may be particularly influential in determining fiscal distributive impacts (Lustig, 2018).

Empirical Evidence on Fiscal Redistribution

Extensive empirical research has examined fiscal policy's redistributive impacts across different countries and time periods, generating several key findings relevant to ASEAN contexts. Studies using the Commitment to Equity (CEQ) methodology have provided comprehensive assessments of fiscal policy's distributional effects, decomposing impacts across different tax and expenditure instruments to identify their progressive or regressive nature (Lustig, 2018). These analyses consistently find that social spending, particularly on health, education, and targeted transfers, typically drives redistributive impacts in developing countries, while taxation plays a more modest role compared to advanced economies where progressive direct taxes contribute substantially to redistribution (Inchauste & Lustig, 2019).

Cross-country comparative studies document significant variation in fiscal redistribution effectiveness, with advanced economies generally achieving much greater inequality reduction through fiscal policies than developing and emerging market economies (Causa & Hermansen, 2019). The OECD countries typically reduce market income inequality (before taxes and transfers) by about one-third through fiscal policy, while developing regions achieve much smaller reductions, often less than 10 percent (Bastagli et al., 2018). These differences reflect both policy design choices and structural factors, including higher informality, administrative capacity constraints, and more limited fiscal resources in developing contexts that collectively constrain redistributive potential (Bird & Zolt, 2018).

Longitudinal studies examining fiscal redistribution trends have documented declining redistributive impacts in many advanced economies since the 1980s, coinciding with policy shifts including reduced progressivity in tax systems, welfare state retrenchment, and Labor market deregulation that collectively contributed to rising inequality (OECD, 2021). However, some developing regions, particularly in Latin America, have demonstrated increased fiscal redistribution capacity in recent decades through expanded social programs and improved

targeting mechanisms, suggesting potential for strengthening redistributive systems despite developmental constraints (Blofield et al., 2021).

Fiscal Policy Tools for Addressing Inequality

The literature identifies several key fiscal instruments for addressing inequality, with varying effectiveness and implementation feasibility across different development contexts.

Progressive income taxation represents a traditional redistributive tool, directly reducing disposable income disparities by imposing higher effective tax rates on higher-income individuals (Diamond & Saez, 2018). However, developing countries face significant challenges implementing effective progressive income taxation due to high informality, administrative capacity limitations, and political constraints that often restrict both statutory progressivity and compliance levels (Bird & Zolt, 2018). Property taxes offer potential for both revenue generation and addressing wealth inequality, but their implementation faces political resistance and administrative challenges related to valuation and enforcement, particularly in contexts with weak cadastral systems and property rights (Norregaard, 2019).

On the expenditure side, social spending represents the primary redistributive mechanism in most countries, with education, healthcare, and social protection programs typically generating the largest inequality reduction effects (Inchauste et al., 2018). Universal access to quality public services particularly benefits lower-income groups who cannot afford private alternatives, while cash transfer programs provide direct income support to vulnerable populations. Conditional cash transfers, which provide payments linked to specific behaviours like children's school attendance or healthcare utilization, have demonstrated particular effectiveness in reducing both current poverty and intergenerational inequality through human capital investments (Bastagli et al., 2019).

The design and implementation quality of fiscal instruments fundamentally determine their redistributive impact, with targeting efficiency, administrative costs, coverage rates, and benefit adequacy all influencing program effectiveness (Coady et al., 2018). Digital technologies increasingly offer opportunities to enhance both revenue collection and spending efficiency, enabling more sophisticated tax administration and better-targeted social programs that can strengthen fiscal systems' redistributive impact despite persisting capacity constraints (World Bank, 2022).

The ASEAN Context: Inequality Trends and Fiscal Responses

ASEAN countries exhibit substantial variation in inequality levels and trends, reflecting diverse development trajectories, economic structures, and policy approaches. Using the Gini coefficient, inequality levels range from relatively high in countries like Malaysia (0.41) and the Philippines (0.44) to moderate in Vietnam (0.35) and Cambodia (0.36) (World Bank, 2021). Several ASEAN countries have experienced increasing inequality in recent decades despite significant economic growth, highlighting the challenges of ensuring inclusive development outcomes (Zhuang et al., 2019).

Fiscal redistributive capacity varies substantially across ASEAN economies, reflecting differences in tax collection effectiveness, spending priorities, and administrative capabilities. Singapore achieves significant redistribution through targeted social spending despite relatively low overall tax levels, demonstrating how strategic expenditure allocation can

enhance distributional outcomes even without extensive tax-based redistribution (Rao, 2019). Malaysia has gradually strengthened its social protection system while maintaining fiscal discipline, particularly through subsidy rationalization that redirected resources toward more progressive spending categories (World Bank, 2019). Thailand's universal healthcare scheme represents a notable success in expanding service access while reducing catastrophic health expenditures that previously drove inequality (OECD, 2019).

However, fiscal redistribution capacity remains limited in many ASEAN countries compared to advanced economies and even other developing regions. Tax revenue as a percentage of GDP remains relatively low in most ASEAN countries, constraining overall fiscal capacity for both redistribution and public service provision (ADB, 2021). Progressive taxation remains challenging due to high informality, narrow tax bases, and significant tax evasion that collectively limit revenue collection from higher-income groups (Jinjarak & Nair, 2018). Social protection systems in many ASEAN countries remain fragmentary and limited in coverage, with substantial gaps particularly for informal workers who constitute large portions of the workforce in countries like Indonesia, Vietnam, and the Philippines (ILO, 2019).

Recent policy innovations across the region demonstrate growing commitment to addressing inequality through fiscal measures. Indonesia has expanded its social assistance programs substantially, particularly through the PKH conditional cash transfer program that reaches over 10 million households with targeted benefits linked to education and health outcomes (World Bank, 2020). The Philippines has implemented significant tax reforms through its Tax Reform for Acceleration and Inclusion (TRAIN) package, which reduced personal income taxes for lower-income groups while raising excise taxes on products consumed disproportionately by higher-income households (Philippines Department of Finance, 2018). Vietnam has prioritized expanding health insurance coverage toward universality while strengthening targeted assistance for ethnic minority communities that face persistent disadvantages (UNDP, 2020).

Challenges and Opportunities for Fiscal Redistribution in ASEAN

ASEAN countries face several common challenges in strengthening fiscal redistribution capacity. Revenue mobilization remains difficult due to economic structures with high informality, administrative capacity limitations, and political constraints that restrict tax policy options (ADB, 2018). Regional tax competition for mobile investment has potentially contributed to declining corporate tax rates, reducing revenue from businesses that might otherwise fund redistributive programs (Chaisse & Ji, 2020). Targeting effectiveness represents another challenge, with many social programs facing significant inclusion and exclusion errors that reduce their redistributive impact and fiscal efficiency (World Bank, 2020).

Despite these challenges, several opportunities exist for enhancing fiscal redistribution across ASEAN. Digital technologies offer promising tools for improving both revenue collection and spending efficiency, enabling more sophisticated tax administration and better-targeted social protection systems despite capacity constraints (Capgemini, 2019). Property taxation remains underdeveloped in most ASEAN countries, offering potential for both revenue generation and addressing wealth inequality through improved valuation systems and coverage expansion (Norregaard, 2019). Regional cooperation mechanisms could potentially address harmful tax competition while facilitating knowledge sharing regarding successful redistribution strategies adapted to developing country contexts (ERIA, 2019).

The COVID-19 pandemic has heightened attention to inequality issues while demonstrating possibilities for expanded social protection, with many ASEAN countries implementing unprecedented emergency measures that reached previously excluded populations (Gentilini et al., 2022). These crisis responses potentially create opportunities for permanent system strengthening, transforming temporary relief measures into sustainable social protection infrastructure that can enhance resilience to future shocks while addressing persistent inequality (OECD, 2021). As ASEAN economies navigate post-pandemic recovery and longer-term structural transitions, fiscal policy innovation will remain essential for achieving more inclusive development outcomes that enable broader participation in economic prosperity across diverse population segments.

2.3 Inclusive Growth and Climate Resilience in ASEAN

Economic Growth and Inequality in ASEAN

ASEAN countries have experienced rapid economic growth in recent decades, but this growth has often been accompanied by rising inequality. Studies by Kanbur et al. (2014) and Zhuang et al. (2010) have highlighted the complex relationship between growth and inequality in the region. This tension between aggregate economic expansion and distributional outcomes reflects broader patterns observed across developing regions, where market-driven growth often generates uneven benefits despite significant poverty reduction achievements (Bourguignon, 2018). The region's experience challenges simplistic narratives about growth automatically benefiting all segments of society, highlighting instead how specific growth patterns, structural characteristics, and policy choices fundamentally shape distributional outcomes alongside aggregate performance (Kanbur, 2020). Understanding these nuanced relationships is essential for designing development strategies that can deliver both economic dynamism and inclusive outcomes, particularly as ASEAN economies navigate complex structural transformations amid technological disruption, environmental pressures, and demographic transitions (Jomo, 2019).

Key findings:

Rapid growth has reduced absolute poverty but often increased relative inequality: While millions have been lifted out of poverty, the benefits of growth have not been evenly distributed. ASEAN's economic expansion since the 1990s has dramatically reduced extreme poverty, with the proportion of people living below the international poverty line falling from approximately 47% in 1990 to less than 10% by 2018 (ADB, 2020). However, this remarkable achievement in absolute poverty reduction has been accompanied by widening relative disparities in many countries, reflecting both the pattern of growth and insufficient redistributive mechanisms to ensure broader participation in economic gains (Rama et al., 2019). This divergence between absolute and relative welfare metrics highlights the multidimensional nature of inclusive development, suggesting that complementary approaches addressing both poverty reduction and distributional equity are necessary for sustainable and socially cohesive development outcomes (Ravallion, 2019). For ASEAN societies navigating development transitions, these patterns raise important questions about how to maintain growth momentum while enhancing its inclusive characteristics through policies that expand economic opportunities and strengthen redistributive mechanisms across diverse population segments (Balakrishnan et al., 2021).

Economic transformation has created winners and losers: The shift from agriculture to manufacturing and services has led to significant disparities between urban and rural areas, and between skilled and unskilled workers. Structural transformation processes have generated substantial productivity gains while simultaneously creating new forms of disadvantage as economic activity increasingly concentrates in urban centres and rewards higher-skilled workers (Lewis et al., 2020). Spatial inequality has increased across most ASEAN countries, with leading regions—typically major urban centres—pulling ahead of lagging regions through agglomeration dynamics that concentrate economic opportunities, infrastructure, and services in already-advantaged locations (Gibson & Olivia, 2020). Educational disparities have become increasingly consequential for economic outcomes as skill-biased technological change raises returns to higher education while reducing opportunities for workers with limited qualifications (ADB, 2018). These divergent outcomes reflect how structural transformation inherently involves both creative and destructive processes that generate simultaneous advancement and dislocation, requiring carefully designed policies to manage transition costs while expanding opportunities for broader participation in emerging economic activities (Rodrik, 2018). ASEAN's experience highlights how distributional challenges accompany even successful economic transformations, necessitating proactive policy approaches that address adjustment burdens while building capabilities that enable wider participation in higher-productivity sectors (UNESCAP, 2018).

Inequality poses risks to social stability and future growth prospects: High levels of inequality can lead to social tensions and may ultimately undermine economic growth by reducing social mobility and human capital development. Beyond normative concerns, mounting evidence suggests that excessive inequality threatens economic performance itself through multiple channels, including reduced human capital investment among disadvantaged groups, inefficient resource allocation due to credit market imperfections, diminished social cohesion that undermines collective action capacity, and political polarization that complicates policy implementation (Berg et al., 2018). Recent empirical research indicates that societies with more equitable income distributions tend to experience longer growth episodes and greater macroeconomic stability, challenging earlier views that equity-efficiency trade-offs necessarily constrain policy options (Ostry et al., 2019). For ASEAN countries seeking sustainable growth trajectories, these insights suggest that addressing inequality represents not merely a social objective but an economic imperative for maintaining growth momentum and political stability amid complex development transitions (IMF, 2020). As the region confronts rising expectations among expanding middle classes alongside persistent disadvantage among marginalized communities, crafting inclusive development strategies becomes increasingly essential for preserving social cohesion and political legitimacy that underpin stable economic environments (Balisacan & Fuwa, 2019).

Country-specific examples:

Indonesia: Despite strong economic growth, the Gini coefficient increased from 0.30 in 2000 to 0.41 in 2012, before declining slightly to 0.38 in 2019 (World Bank, 2021). As the region's largest economy, Indonesia's experience illustrates both challenges and potential strategies

for addressing inequality alongside growth. The inequality surge coincided with resource-boom conditions and rapid urbanization that disproportionately benefited higher-skilled urban workers and asset owners, while agricultural communities and informal workers experienced more limited gains (Yusuf et al., 2020). Recent modest inequality reductions reflect expanded social protection programs, including conditional cash transfers and national health insurance that have enhanced redistribution effectiveness, though significant gaps remain in coverage and benefit adequacy (OECD, 2019). Regional disparities remain pronounced between Java and outer islands, reflecting persistent infrastructure gaps, public service disparities, and administrative centralization that concentrates economic opportunities despite decentralization reforms (Hill, 2021). Indonesia's experience highlights both possibilities for implementing redistributive policies even in complex developing contexts and the challenges of addressing deeply rooted structural inequalities that require sustained policy attention across multiple dimensions (World Bank, 2020).

Philippines: The country has struggled with persistently high inequality, with a Gini coefficient of 0.44 in 2018, one of the highest in Southeast Asia (World Bank, 2021). The Philippines exemplifies how historical patterns of concentrated asset ownership, limited land reform, and elite political influence can produce persistent inequality despite periods of significant economic growth (Balisacan & Hill, 2018). The country's economic structure features substantial dualism between high-productivity formal sector activities concentrated in metropolitan regions and low-productivity informal activities that employ most workers under precarious conditions with limited social protection (ADB, 2019). Recent efforts to address these disparities include expansion of the Pantawid Pamilyang Pilipino Program (4Ps), a conditional cash transfer program reaching over 4 million households with education and health-linked benefits, though broader structural constraints on social mobility remain significant (Acosta & Velarde, 2018). The pandemic has potentially exacerbated existing inequalities through disproportionate impacts on informal workers and low-income communities, highlighting the importance of strengthening social protection systems to enhance resilience against future shocks while addressing persistent distributional challenges (Philippines Statistics Authority, 2021).

Vietnam: While inequality has increased during its rapid economic growth, Vietnam has managed to keep it relatively low compared to its neighbours, with a Gini coefficient of 0.35 in 2018 (World Bank, 2021). Vietnam's relatively inclusive growth pattern reflects several distinctive features of its development trajectory, including early land redistribution that created a relatively egalitarian agricultural base, broad-based manufacturing growth that generated substantial formal employment opportunities, and significant public investment in education and healthcare that expanded capability development across diverse population segments (McCaig & Pavcnik, 2018). The country's export-oriented industrialization strategy has generated jobs across skill levels, though urban-rural disparities have widened and ethnic minority communities continue to face significant disadvantages despite targeted programs aimed at lagging regions (Kozel, 2019). Recent evidence suggests inequality may be higher than official statistics indicate when incorporating informal income sources and wealth disparities, highlighting measurement challenges that complicate inequality assessments across the region (Benjamin et al., 2018). Nevertheless, Vietnam's experience demonstrates possibilities for maintaining relatively equitable outcomes during rapid structural

transformation through policy approaches that combine market-oriented growth with strategic investments in human development and spatial connectivity (Rama et al., 2018).

Climate Change Impacts in ASEAN

ASEAN countries are particularly vulnerable to climate change impacts due to their geography, economic structure, and population distribution. Islam (2017) identifies several channels through which climate change affects economic outcomes in the region. The region's vulnerability reflects multiple overlapping factors, including extensive coastlines with high population concentrations, significant dependence on climate-sensitive natural resources, and limited adaptive capacity in many communities due to development constraints (ADB, 2021). Southeast Asia's temperature rise is projected to exceed global averages, potentially reaching 3-4°C above pre-industrial levels by 2100 under high-emission scenarios, with particularly severe implications for agricultural productivity, Labor effectiveness, and human health (IPCC, 2022). These climate risks interact with existing development challenges, including rapid urbanization, infrastructure deficits, and governance constraints that collectively complicate adaptation efforts across diverse national contexts (Hijioka et al., 2019). The economic costs of unmitigated climate change in Southeast Asia could reach 11% of regional GDP by 2100 according to ADB estimates, with disproportionate impacts on poorer countries and communities that have contributed least to global emissions (ADB, 2021).

Key climate impacts:

Rising temperatures reducing productivity: High temperatures can reduce labour productivity, particularly in agriculture and outdoor work. Labor productivity losses from heat stress could reach 13-24% in Southeast Asia by 2085 under high-emission scenarios, reflecting both physiological limitations on human performance in extreme heat and reduced working hours during hottest periods (ILO, 2019). These impacts disproportionately affect outdoor workers in agriculture, construction, and manufacturing who typically have lower incomes and limited adaptation options through workplace cooling or schedule adjustments (Kjellstrom et al., 2019). Reduced agricultural yields under higher temperatures threaten both food security and rural livelihoods, with rice yields potentially declining 20-50% by 2100 in countries like Thailand and Vietnam without successful adaptation measures (Hoang et al., 2018). Urban heat island effects in rapidly growing ASEAN cities compound temperature increases, creating particularly severe conditions in informal settlements with inadequate housing quality, limited greenspace, and insufficient cooling infrastructure (Estoque et al., 2020). These temperature impacts create complex policy challenges that span multiple domains, requiring coordinated adaptation strategies across agricultural systems, urban planning, occupational safety, and social protection to address interconnected vulnerabilities (UNESCAP, 2019).

Sea level rise threatening coastal communities: Many of ASEAN's largest cities and economic centres are located in coastal areas vulnerable to sea level rise. The region could experience sea-level rise of 0.4-0.7 meters by 2100 even under moderate emission scenarios, with potential displacement of tens of millions of people and significant economic assets in low-lying coastal zones (IPCC, 2022). Major urban centres including Bangkok, Jakarta, Ho Chi Minh City, and Manila face substantial inundation risks that threaten critical infrastructure, industrial zones, and residential areas, potentially requiring massive investments in protective

measures or managed retreat from highest-risk locations (Kulp & Strauss, 2019). Coastal ecosystems including mangroves, coral reefs, and seagrass beds that provide natural protection and support fisheries face degradation from rising seas alongside other anthropogenic pressures, reducing both their protective services and economic contributions to coastal communities (Friess et al., 2019). Saltwater intrusion into aquifers and agricultural lands represents another serious impact, threatening freshwater supplies for urban populations and reducing agricultural productivity in coastal regions crucial for regional food security (Hak et al., 2019). These coastal vulnerabilities create particularly complex governance challenges given the need for coordinated action across multiple jurisdictions, sectors, and timeframes to implement effective adaptation strategies amid significant uncertainty about precise impact trajectories (Revi et al., 2020).

Erratic weather patterns disrupting agriculture: Changes in rainfall patterns and increased frequency of extreme weather events pose significant risks to agricultural production. Precipitation variability is projected to increase across Southeast Asia, with both more intense rainfall events and longer dry periods creating challenging conditions for agricultural systems designed around historical climate patterns (IPCC, 2022). These changing conditions threaten agricultural productivity through multiple pathways, including direct crop damage from extreme events, increased pest and disease pressure, reduced water availability during critical growing periods, and heightened uncertainty that complicates planting decisions and risk management (Kontgis et al., 2019). Small-scale farmers face particular challenges adapting to these changing conditions due to limited financial resources, restricted access to technology and information, and constrained diversification options that collectively reduce adaptive capacity despite substantial local knowledge (Cruz et al., 2019). Beyond primary production impacts, these disruptions affect broader food systems through supply chain interruptions, price volatility, and quality issues that threaten food security across both rural and urban communities (Zhai et al., 2020). Addressing these agricultural vulnerabilities requires integrated approaches spanning improved climate information services, water management infrastructure, crop breeding for stress tolerance, financial risk management tools, and social protection systems that collectively enhance resilience across diverse farming systems and agroecological zones (World Bank, 2020).

Environmental degradation impacting public health: Air and water pollution, exacerbated by climate change, have significant health and economic costs. Climate change interacts with existing environmental health challenges through multiple pathways, including increased ground-level ozone formation under higher temperatures, changing patterns of water-borne and vector-borne diseases, reduced water quality during droughts and floods, and heightened exposure to air pollutants under certain atmospheric conditions (Ebi et al., 2021). These environmental health impacts generate substantial economic costs through healthcare expenditures, productivity losses, and premature mortality that collectively reduce both individual wellbeing and economic output (OECD, 2019). Southeast Asia already experiences some of the world's highest air pollution exposure levels, with climate change potentially exacerbating these conditions through increased wildfires, dust generation during droughts, and changing atmospheric circulation patterns that concentrate pollutants (Koplitz et al., 2018). Water-related health risks are similarly significant, with climate change affecting both water quantity and quality through altered precipitation patterns, increased runoff during

extreme rainfall, and reduced dilution capacity during low-flow periods (Hofste et al., 2019). Addressing these environmental health challenges requires integrated approaches that simultaneously target climate resilience and pollution reduction through coordinated policies spanning energy systems, transportation, industrial practices, and public health infrastructure (WHO, 2021).

Olsson (2014) finds that climate change disproportionately affects disadvantaged groups, potentially exacerbating existing inequalities. This is particularly relevant in ASEAN countries, where large populations still depend on climate-sensitive sectors like agriculture and fisheries. This distributional dimension of climate impacts reflects both differential exposure patterns—with marginalized communities often occupying higher-risk locations with limited protective infrastructure—and constrained adaptive capacity due to economic limitations, restricted information access, and limited political voice in adaptation planning processes (Thomas et al., 2019). Vulnerable groups including informal settlers in flood-prone urban areas, small-scale farmers in drought-affected regions, and fishing communities facing changing marine conditions often lack insurance protection, financial reserves, or alternative livelihood options that could buffer climate shocks (Eckstein et al., 2021). Historical patterns of disadvantage interact with climate vulnerabilities through multiple reinforcing mechanisms, creating potential poverty traps as repeated climate impacts deplete already-limited assets among vulnerable households while simultaneously reducing public service access through infrastructure damage in marginalized communities (Hallegatte et al., 2020). These equity dimensions highlight the importance of integrating social protection considerations into climate resilience planning, ensuring that adaptation strategies address not only aggregate climate risks but also distributional concerns that could otherwise exacerbate existing patterns of advantage and disadvantage (Barbier & Hochard, 2018).

Country-specific examples:

Vietnam: The Mekong Delta, Vietnam's rice bowl, is highly vulnerable to sea level rise and saltwater intrusion, threatening food security and livelihoods. This vital agricultural region produces over 50% of Vietnam's rice and 70% of its aquaculture products while supporting livelihoods for approximately 18 million people, creating significant economic and food security implications from climate impacts (Smajgl et al., 2018). Recent drought and saltwater intrusion events have already caused substantial agricultural losses, with the 2016 and 2020 episodes affecting hundreds of thousands of hectares and causing economic damages exceeding $1 billion (World Bank, 2021). The Vietnamese government has developed a comprehensive adaptation strategy for the region, transitioning from traditional "resistance" approaches focused on preventing saltwater intrusion toward more flexible "adaptation" approaches that accommodate changing conditions through adjusted agricultural systems and livelihood diversification (Vietnamese Ministry of Planning and Investment, 2019). These adaptation efforts include infrastructure investments in water management systems, shifts toward more salt-tolerant crop varieties and production systems, and enhanced water use efficiency measures that collectively aim to maintain agricultural productivity under changing climate conditions (Chapman & Darby, 2019). The Mekong Delta case illustrates both the significant challenges facing climate-vulnerable agricultural regions and potential adaptation pathways that combine technological innovation, institutional coordination, and economic diversification to enhance resilience amid unavoidable climate changes (Sebesvari et al., 2020).

Philippines: The country's exposure to tropical cyclones, which are expected to become more intense with climate change, poses significant economic and social risks. The Philippines experiences an average of 20 tropical cyclones annually, with climate projections indicating potentially reduced frequency but increased intensity under warming scenarios (Knutson et al., 2020). These extreme weather events generate substantial direct economic damages alongside longer-term development impacts through infrastructure destruction, education disruption, health impacts, and livelihood losses that can trap vulnerable households in poverty cycles (Thomas et al., 2018). The economic impacts are substantial, with typhoon damages averaging 0.5-1% of GDP annually and individual major events like 2013's Typhoon Haiyan causing damages exceeding $5 billion (Philippines Climate Change Commission, 2020). Adaptation efforts include both structural measures like improved infrastructure standards and early warning systems, and non-structural approaches including ecosystem-based adaptation, diversified livelihood programs, and enhanced disaster risk financing mechanisms (Villarin et al., 2018). The Philippines experience highlights the importance of adopting comprehensive disaster risk management approaches that integrate immediate preparedness and response capabilities with longer-term resilience building across multiple sectors and governance levels (Francisco et al., 2019).

Indonesia: As the world's largest archipelagic state, Indonesia faces significant risks from sea level rise and extreme weather events. Deforestation and peatland degradation contribute to the country's high greenhouse gas emissions. The nation's 17,000 islands include extensive low-lying coastal areas where 60% of the population resides, creating substantial exposure to sea-level rise and coastal flooding that threatens both urban centres and rural communities (Case et al., 2019). Jakarta exemplifies these coastal challenges, with the city experiencing rapid subsidence—primarily due to groundwater extraction—that compounds climate-driven sea-level rise, potentially requiring relocation of the capital functions to reduce disaster risk exposure (Esteban et al., 2020). Indonesia's position as a major greenhouse gas emitter due to land-use change and energy sector emissions creates a complex domestic climate policy landscape, balancing mitigation responsibilities with adaptation imperatives and development priorities (Indonesian Ministry of Environment and Forestry, 2019). Recent initiatives to reduce land-based emissions through improved peatland management and reduced deforestation have shown progress, though significant implementation challenges remain in addressing underlying drivers of land conversion amid competing development pressures (Nurdianto & Resosudarmo, 2019). Indonesia's experience illustrates the interconnected nature of adaptation and mitigation challenges in many developing contexts, requiring integrated approaches that simultaneously address immediate climate vulnerabilities while transitioning toward lower-carbon development pathways that can contribute to global mitigation efforts (Bowen et al., 2021).

Thailand: The 2011 floods, which caused over $45 billion in economic damages, highlighted Thailand's vulnerability to climate-related disasters (World Bank, 2012). This catastrophic event—affecting manufacturing centres crucial to global supply chains while inundating extensive agricultural lands and urban areas including parts of Bangkok—revealed systemic vulnerabilities in infrastructure, land-use planning, and disaster management systems that have stimulated significant policy reforms (Marks & Thomalla, 2019). The floods disrupted not only Thailand's economy but global production networks for electronics and automotive

sectors, demonstrating how climate impacts in one location can generate ripple effects throughout interconnected economic systems (Haraguchi & Lall, 2019). Subsequent adaptation investments have included major infrastructure improvements in the Chao Phraya river basin, enhanced early warning systems, revised industrial zoning regulations, and strengthened insurance mechanisms to transfer catastrophic risk (Thai Ministry of Natural Resources and Environment, 2020). Thailand's experience exemplifies how extreme events can catalyze policy responses while highlighting the substantial economic value of preventive investments in climate resilience that can reduce future disaster losses through strategic infrastructure and institutional enhancements (Surminski & Tanner, 2018).

Fiscal Policy Responses in ASEAN

ASEAN countries have employed various fiscal policy tools to address issues of inclusive growth and climate resilience. Hein and Truger (2012) argue that redistributive fiscal policies can promote more equal growth outcomes. However, the effectiveness of these policies in the ASEAN context remains a subject of debate. The region's experience reflects broader challenges in designing and implementing fiscal policies that simultaneously address distributional concerns, climate resilience, and macroeconomic stability amid constraints including limited revenue mobilization capacity, administrative limitations, and political economy factors that often complicate reform implementation (Anbumozhi & Kimura, 2018). Despite these constraints, several ASEAN countries have developed innovative fiscal approaches that demonstrate possibilities for enhancing both inclusion and sustainability, though with significant variation in comprehensive implementation (OECD, 2018). Recent fiscal responses to the COVID-19 pandemic have further highlighted both possibilities and limitations of countercyclical policy in the region, with countries deploying unprecedented fiscal measures to address the crisis while simultaneously revealing persistent gaps in social protection coverage and fiscal space limitations that constrained response effectiveness in some contexts (Abiad et al., 2022).

Key policy approaches:

Progressive taxation systems: Some ASEAN countries have attempted to make their tax systems more progressive to reduce inequality. For example, Thailand introduced a new top income tax rate of 35% in 2013 (PWC, 2013). Progressive taxation represents a traditional approach to addressing income inequality, directly reducing disposable income disparities by imposing higher effective tax rates on higher-income individuals (Diamond & Saez, 2018). However, implementation effectiveness varies substantially across ASEAN, reflecting both policy design differences and administrative capacity constraints that influence compliance levels and actual progressivity beyond statutory provisions (Bird & Zolt, 2018). Several ASEAN countries have pursued income tax reforms aimed at enhancing progressivity while simultaneously simplifying tax structures and broadening bases to improve revenue performance, recognizing dual objectives of fairness and fiscal sustainability (Indonesia Ministry of Finance, 2020). Property taxation remains underdeveloped across most ASEAN countries despite its potential for addressing wealth inequality and generating sustainable local government revenues, with implementation challenges including valuation difficulties, outdated cadastral systems, and political resistance from propertied interests (Norregaard, 2019). Recent initiatives to strengthen property tax administration in countries like Indonesia, Thailand, and Vietnam demonstrate growing recognition of this revenue source's importance,

though substantial implementation challenges persist in achieving both revenue and equity objectives (World Bank, 2019).

Targeted social spending programs: Conditional cash transfer programs, such as the Philippines' Pantawid Pamilyang Pilipino Program (4Ps), aim to reduce poverty and increase human capital investment (World Bank, 2020). Social spending represents the primary redistributive fiscal instrument in most ASEAN countries, with education, healthcare, and social protection programs generating the largest inequality reduction effects (Inchauste et al., 2018). Conditional cash transfer programs have expanded significantly across the region, combining immediate poverty reduction through income support with longer-term human capital development through education and health conditionalities (ADB, 2019). These programs have demonstrated substantial welfare impacts, with evidence from the Philippines 4Ps showing reduced poverty incidence, increased school enrolment, and improved health outcomes among beneficiary households, though questions remain regarding long-term sustainability and graduation pathways (Philippine Institute for Development Studies, 2020). Beyond targeted transfers, universal service provision in health and education represents another important redistributive channel, with Thailand's Universal Health Coverage scheme demonstrating how comprehensive service access can substantially reduce both out-of-pocket expenditures and catastrophic health costs that previously drove inequality (OECD, 2020). Social protection coverage remains incomplete across most ASEAN countries, with particular gaps for informal workers, migrants, and other vulnerable groups that face exclusion from employment-linked social insurance schemes despite facing significant insecurity (ILO, 2021).

Investment in climate-resilient infrastructure: Countries like Vietnam have increased investment in flood protection and climate-resilient agriculture (ADB, 2020). Infrastructure investment represents a crucial fiscal tool for enhancing climate resilience while potentially generating co-benefits for inclusive growth through improved service access, reduced disaster vulnerability, and employment creation during both construction and operation phases (Bhattacharya et al., 2019). ASEAN countries have increasingly incorporated climate resilience considerations into infrastructure planning and budgeting processes, recognizing that physical assets designed for historical climate conditions may prove inadequate under changing environmental parameters (UNESCAP, 2020). These investments span multiple sectors, including water management systems to address changing precipitation patterns, coastal protection infrastructure to mitigate sea-level rise impacts, climate-smart agricultural systems to maintain productivity under changing conditions, and resilient transport networks that can withstand more frequent extreme weather events (SEA-UKCRI, 2019). Financing these substantial investment needs remains challenging, with fiscal constraints limiting public investment capacity while private financing mechanisms for adaptation remain underdeveloped compared to mitigation-focused instruments like green bonds (ASEAN Secretariat, 2021). Several ASEAN countries have established dedicated climate funds or budget tagging systems to track resilience-related expenditures, enhancing transparency and potentially improving resource allocation for adaptation priorities amid competing fiscal demands (Bird et al., 2018).

Green subsidies and environmental taxes: Singapore's carbon tax, introduced in 2019, is an example of using fiscal policy to address climate change (NEA Singapore, 2021). Environmental fiscal reforms represent increasingly important policy tools for addressing climate change and other environmental challenges while potentially generating revenue for other sustainable development priorities (Pigato, 2019). Several ASEAN countries have reduced environmentally harmful subsidies, particularly in energy sectors where fossil fuel subsidies have historically consumed substantial budget resources while disproportionately benefiting wealthier households and encouraging carbon-intensive consumption patterns (ADB, 2019). Indonesia's fuel subsidy reforms beginning in 2014 represent a notable success, reducing fiscal costs while redirecting resources toward more targeted social programs and infrastructure investments with potentially greater distributional and developmental benefits (Burke et al., 2019). Environmental taxation remains relatively limited across most ASEAN countries compared to OECD economies, though recent developments including Singapore's carbon tax and Thailand's excise restructuring to incorporate environmental objectives demonstrate growing interest in market-based environmental instruments (OECD, 2018). Implementation of comprehensive environmental fiscal reforms requires careful attention to distributional impacts and competitiveness concerns, particularly in contexts where vulnerable households depend on energy-intensive consumption patterns and industries face international competition that complicates unilateral carbon pricing (Dorband et al., 2019).

Challenges in implementing effective fiscal policies:

Limited fiscal space: Many ASEAN countries face constraints in government revenue and high levels of public debt, limiting their ability to implement expansive fiscal policies. Tax-to-GDP ratios remain relatively low across most ASEAN countries compared to OECD averages, constraining overall fiscal capacity for both redistribution and public service provision (ADB, 2021). These revenue constraints reflect multiple factors, including economic structures with large informal sectors that elude taxation, administrative capacity limitations that reduce enforcement effectiveness, generous tax incentives that narrow tax bases, and political economy factors that complicate revenue mobilization from economic elites (World Bank, 2019). The COVID-19 pandemic has further strained fiscal positions through the dual impact of reduced revenues during economic contractions and increased expenditure needs for health responses and economic support measures, potentially constraining fiscal space for inclusive and climate-resilient investments during recovery periods (IMF, 2021). Despite these constraints, several ASEAN countries have implemented significant domestic resource mobilization reforms in recent years, strengthening tax administration systems, rationalizing tax incentives, and expanding environmental taxation in efforts to enhance fiscal sustainability while supporting inclusive development objectives (Philippines Department of Finance, 2018).

Administrative capacity: Implementing complex fiscal policies requires strong institutional capacity, which varies across ASEAN countries. Administrative constraints affect both revenue collection and expenditure management effectiveness, with particular challenges in targeting social programs, managing climate-related investments, and implementing sophisticated environmental fiscal instruments that require substantial technical expertise and information systems (ADB, 2018). Digital technologies increasingly offer opportunities to enhance administrative capacity despite institutional constraints, enabling more sophisticated taxpayer monitoring, improved beneficiary identification for social programs, and enhanced public financial management systems that collectively strengthen fiscal policy implementation

despite capacity limitations (World Bank, 2020). Singapore exemplifies strong administrative capacity that enables implementation of complex fiscal instruments including congestion pricing, sophisticated property tax systems, and carbon taxation with relatively low compliance costs, while countries like Myanmar and Cambodia face more fundamental challenges in basic revenue collection and expenditure management that constrain policy options (Jones, 2019). Regional capacity building initiatives through platforms like the ASEAN Forum on Taxation provide mechanisms for knowledge sharing and technical assistance that can help address these administrative constraints, though institutional development remains a long-term process requiring sustained investment beyond technical solutions alone (OECD, 2019).

Political economy considerations: Vested interests and political pressures can hinder the implementation of progressive fiscal reforms. Fiscal policy decisions fundamentally involve distributional choices that create winners and losers, generating political contestation that shapes both policy design and implementation effectiveness beyond technical considerations alone (Besley & Persson, 2018). Powerful economic interests often resist progressive taxation measures that would increase their tax burden, while subsidy reforms face opposition from both industry beneficiaries and consumer groups concerned about potential price increases despite the often regressive nature of many subsidy programs (Victor, 2019). Electoral incentives can discourage long-term investments in climate resilience that generate future benefits at immediate political cost, particularly in contexts with short electoral cycles and limited public awareness of climate risks that reduce political rewards for preventive expenditures (Robinson, 2020). Transparency initiatives, stakeholder engagement processes, and strategic sequencing of reforms can potentially help navigate these political economy challenges, creating broader constituencies for inclusive and sustainable fiscal policies through careful attention to distributional impacts and compensation mechanisms for potentially affected groups (Inchauste & Victor, 2020). Despite these constraints, policy entrepreneurs within government, civil society pressure, and external factors including international commitments and crisis responses have created reform opportunities that have enabled significant fiscal policy innovations across several ASEAN countries despite challenging political economy contexts (Hallegate et al., 2018).

2.4 Theoretical Frameworks for Integrating Inclusive Growth and Climate Resilience

The integration of inclusive growth and climate resilience objectives represents one of the most significant policy challenges facing ASEAN countries. This section examines theoretical frameworks that attempt to reconcile these potentially competing priorities, providing conceptual foundations for the development of integrated policy approaches. These frameworks have emerged from diverse disciplinary perspectives, reflecting the inherently multidimensional nature of sustainable development that spans economic, social, and environmental domains (Sachs, 2020). While traditional economic models often treated environmental considerations as external constraints or afterthoughts to growth processes, these integrative frameworks explicitly incorporate ecological dimensions as fundamental components of sustainable prosperity rather than optional considerations (Raworth, 2018). Similarly, equity dimensions have evolved from peripheral concerns addressed primarily

through compensatory measures toward central elements of development models that recognize distributional outcomes as intrinsic to sustainability rather than separate social objectives (Leach et al., 2018). For ASEAN policymakers navigating complex trade-offs amid resource constraints, these theoretical frameworks offer valuable conceptual foundations for developing context-appropriate policies that can simultaneously advance multiple sustainable development objectives while acknowledging potential tensions that require strategic balancing (Anbumozhi et al., 2020).

Green Growth Models

The concept of "green growth" attempts to reconcile economic growth with environmental sustainability. The OECD (2011) defines green growth as "fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies." This framework emerged in response to growing recognition that conventional growth patterns generated significant environmental externalities that ultimately undermined the ecological foundations of economic prosperity itself (Barbier, 2019). Green growth approaches challenge the notion that environmental protection necessarily constrains economic development, instead highlighting potential complementarities and synergistic relationships between environmental sustainability and economic dynamism through innovation, efficiency improvements, and structural shifts toward more sustainable production and consumption patterns (Bowen & Hepburn, 2018). While maintaining growth as a central objective, green growth models emphasize qualitative aspects of economic expansion rather than purely quantitative metrics, recognizing that development pathways fundamentally shape both environmental impacts and future economic possibilities (Hallegatte et al., 2019).

The green growth paradigm has gained significant traction in international policy discourse, endorsed by organizations including the World Bank, UNEP, and OECD while influencing national development strategies across diverse country contexts (Hickel & Kallis, 2020). However, substantial debates remain regarding its adequacy for addressing sustainability challenges, with critics questioning whether relative decoupling of growth from environmental impacts is sufficient for absolute sustainability within planetary boundaries, particularly given rebound effects and consumption growth that may offset efficiency improvements (Hickel & Kallis, 2020). Despite these theoretical tensions, green growth frameworks have provided valuable policy orientation for many developing countries seeking to avoid environmental mistakes of earlier industrializers while maintaining economic advancement necessary for poverty reduction and enhanced living standards (UNESCAP, 2019).

Key elements of green growth models:

Decoupling economic growth from resource use and environmental impacts: This core principle aims to break the historical correlation between GDP growth and environmental degradation through technological innovation, structural economic changes, and improved resource management (Ward et al., 2018). Decoupling can occur in relative terms (reducing environmental impact per unit of economic output) or absolute terms (reducing total environmental impact while the economy continues to grow)—with absolute decoupling representing the more demanding sustainability criterion (Jackson, 2019). Empirical evidence suggests that relative decoupling has occurred for certain environmental indicators in some

contexts, particularly local air pollutants and land-use efficiency, though absolute decoupling of carbon emissions and material footprints from growth remains elusive at global scales despite progress in specific countries (Haberl et al., 2020). This decoupling challenge is particularly significant for rapidly industrializing ASEAN economies, where material consumption and emissions trajectories remain strongly coupled with economic expansion despite efficiency improvements and technological adoption (Schandl et al., 2019). The decoupling concept provides an organizing principle for sustainability transitions while highlighting measurement challenges regarding consumption-based versus production-based environmental accounting that fundamentally affect assessments of progress toward green growth objectives (Wiedmann et al., 2020).

Investing in renewable energy and clean technologies: Green growth models emphasize strategic investments in technological solutions that can simultaneously deliver environmental benefits and economic opportunities through new markets, cost savings, and innovation spillovers (Acemoglu et al., 2019). Renewable energy represents a paradigmatic example, with rapidly declining costs for solar and wind power creating economic opportunities while reducing carbon emissions and local pollution associated with fossil fuel dependence (IRENA, 2021). Beyond energy, clean technology investments span transportation systems, industrial processes, building technologies, agricultural practices, and waste management approaches that collectively aim to enhance resource efficiency while reducing environmental impacts across economic sectors (IEA, 2020). These investments require supportive policy frameworks that address market failures, reduce investment risks, and create incentives for technological adoption through instruments ranging from carbon pricing and renewable energy standards to public procurement policies and targeted research support (Rodrik, 2018). For ASEAN economies, clean technology investments offer potential opportunities to leapfrog pollution-intensive development stages while building competitive advantages in emerging industries, though with implementation challenges related to financing, technical capacity, and coordination across fragmented innovation systems (ERIA, 2019).

Promoting resource efficiency and circular economy principles: Green growth approaches emphasize transforming linear "take-make-dispose" economic models toward circular systems that maintain resources within productive use through reuse, recycling, remanufacturing, and regenerative processes (Geissdoerfer et al., 2020). Circular economy principles aim to design out waste and pollution, keep products and materials in use, and regenerate natural systems through approaches that combine product redesign, innovative business models, and supportive policy frameworks (Ellen MacArthur Foundation, 2019). These approaches offer significant resource productivity opportunities through strategies like industrial symbiosis (where waste from one process becomes input for another), product-service systems that substitute service provision for material ownership, and regenerative agricultural practices that enhance soil productivity while sequestering carbon (Stahel, 2019). For ASEAN economies with rapidly growing material consumption, circular approaches offer potential pathways to deliver improved living standards with reduced resource requirements and environmental impacts, though requiring significant transformations in production systems, consumption patterns, and waste management infrastructure that represent substantial implementation challenges (Anbumozhi & Kim, 2018). Resource efficiency improvements can generate immediate economic benefits through cost savings and enhanced

productivity while simultaneously reducing environmental pressures, creating potential "win-win" opportunities that align economic and environmental objectives in the short term while enabling deeper systemic transitions over longer timeframes (UNEP, 2018).

Valuing natural capital and ecosystem services: Green growth models incorporate environmental assets into economic decision-making through natural capital accounting and ecosystem service valuation approaches that make visible the economic contributions of environmental systems typically overlooked in conventional growth metrics (Dasgupta, 2021). These frameworks highlight how ecosystem services including water purification, flood protection, carbon sequestration, and pollination provide substantial economic value despite their limited representation in market transactions (Costanza et al., 2017). Natural capital accounting systems complement traditional economic indicators with metrics that track environmental assets and their contribution to economic activity, addressing information gaps that have historically led to undervaluation of natural resources in development decisions (UN et al., 2021). These approaches inform policies that internalize environmental externalities through market-based instruments, regulatory frameworks, and investment decisions that better reflect full social costs and benefits including environmental dimensions (UNEP, 2018). For ASEAN economies with significant natural capital endowments, these valuation approaches can strengthen the economic case for conservation while identifying opportunities for sustainable natural resource management that maintains ecosystem services essential for both economic resilience and human wellbeing (ASEAN Secretariat, 2019).

Relevance to ASEAN: Several ASEAN countries have adopted green growth strategies. For example, Vietnam's Green Growth Strategy (2012) aims to reduce greenhouse gas emissions while promoting economic restructuring towards sustainable development (Government of Vietnam, 2012). Vietnam's approach exemplifies how green growth frameworks can provide organizing principles for national development planning, establishing targets across energy efficiency, renewable energy adoption, and green industrialization while addressing implementation through specific action plans and institutional arrangements (Zimmer et al., 2019). The strategy helped mobilize international climate finance and technical assistance while providing a framework for policy coordination across ministries previously operating with limited environmental integration (Vietnam Ministry of Planning and Investment, 2019). Cambodia similarly developed a National Green Growth Roadmap followed by a more comprehensive Green Growth Strategy and Action Plan that established institutional mechanisms including a National Council for Green Growth to coordinate implementation across government agencies (Kingdom of Cambodia, 2018).

The Philippines' adoption of a Green Jobs Act in 2016 represented a more targeted approach, providing tax incentives for enterprises generating employment in environmental sectors while establishing skills training programs aligned with green industry needs (Philippines Climate Change Commission, 2019). Singapore's Sustainable Singapore Blueprint and subsequent Green Plan 2030 demonstrate a more comprehensive approach in an advanced economy context, integrating sustainability considerations across urban planning, transportation, energy, waste management, and water systems through coordinated policy frameworks with specific implementation pathways (Singapore Ministry of Sustainability and the Environment, 2021). The city-state's carbon tax implementation in 2019 further exemplifies market-based green growth instruments, establishing price signals for carbon emissions while recycling

revenue toward clean technology investments and competitiveness measures for affected industries (National Environment Agency Singapore, 2020).

Despite these policy developments, implementation challenges remain substantial across ASEAN, with gaps between strategic plans and operational realities reflecting institutional capacity constraints, competing economic priorities, and coordination difficulties across fragmented governance systems (OECD, 2019). Green growth remains more institutionalized in planning documents than consistently implemented in sectoral policies, with economic ministries often continuing conventional development approaches despite sustainability commitments in national strategies (Jones, 2018). Nevertheless, these frameworks have stimulated important policy innovations while providing conceptual foundations for more integrated approaches to economic and environmental objectives that represent significant evolution from earlier development paradigms focused primarily on conventional growth metrics (UNESCAP, 2020).

Inclusive Green Growth

Building on the green growth concept, "inclusive green growth" explicitly incorporates social equity concerns. Hallegatte et al. (2012) argue that green growth policies can be designed to benefit lower-income groups through job creation, improved public health, and enhanced resilience to environmental shocks. This framework responds to criticisms that green growth approaches often neglected distributional dimensions, potentially exacerbating existing inequalities through cost burdens on vulnerable groups, transition impacts on fossil-dependent communities, or regressive effects of certain environmental policies (Schmalensee & Stavins, 2019). Inclusive green growth recognizes that environmental sustainability and social equity should be pursued simultaneously rather than sequentially, reflecting growing evidence that distributional outcomes fundamentally affect environmental policy feasibility, effectiveness, and sustainability through their influence on political support, compliance behaviour, and implementation quality (Hughes & Paterson, 2019). By explicitly incorporating equity dimensions into environmental and economic policy design, this framework aims to generate broader stakeholder support for sustainability transitions while ensuring their benefits and costs are distributed fairly across society (Islam, 2020).

The inclusive green growth paradigm aligns with broader sustainable development frameworks, particularly the Sustainable Development Goals that explicitly integrate economic, social, and environmental objectives within a unified agenda (Kanie & Biermann, 2017). This integrated approach acknowledges the interdependence between different dimensions of sustainability, recognizing that social exclusion can undermine environmental stewardship while environmental degradation often disproportionately affects already-disadvantaged communities, creating potential vicious cycles that require coordinated policy responses addressing both equity and environmental concerns simultaneously (Ostrom, 2019). For ASEAN countries navigating complex development transitions amid significant inequality and environmental pressures, inclusive green growth frameworks offer valuable conceptual guidance for designing policies that can deliver multiple sustainability objectives while managing potential trade-offs through careful attention to distributional impacts and compensatory mechanisms (Anbumozhi et al., 2020).

Key aspects of inclusive green growth:

Ensuring that the benefits of green investments are equitably distributed: Inclusive approaches emphasize designing environmental initiatives to generate advantages for disadvantaged groups through targeted program design, spatial considerations, and complementary policies that enhance access to emerging opportunities (Fankhauser & Jotzo, 2018). This may involve locating renewable energy projects in underserved communities, designing public transportation systems that prioritize connectivity for lower-income neighbourhoods, implementing community forestry initiatives that generate livelihood benefits alongside conservation objectives, or developing green affordable housing that reduces both housing costs and energy expenditures for vulnerable households (Ürge-Vorsatz et al., 2018). Beyond project-level distribution, inclusive approaches consider systemic aspects including ownership structures in green sectors, access to finance for smaller enterprises in environmental industries, and participation in decision-making processes regarding sustainability investments that collectively determine who captures benefits from green economy transitions (Robins et al., 2019). For ASEAN societies with significant informal sectors and rural populations, ensuring equitable benefit distribution requires particular attention to extending green economy opportunities beyond formal urban contexts to include agricultural communities, informal workers, and peripheral regions that might otherwise remain excluded from emerging environmental industries and services (UNESCAP, 2019).

Addressing potential negative impacts of environmental policies on vulnerable groups: Inclusive frameworks explicitly acknowledge that environmental policies may generate disproportionate burdens on disadvantaged groups without careful design and complementary measures (Dorband et al., 2019). Carbon pricing illustrates these distributional challenges, as energy price increases can be regressive without compensatory mechanisms due to higher energy expenditure shares among lower-income households despite their typically lower absolute carbon footprints (Klenert & Mattauch, 2019). Similarly, regulations affecting resource-dependent livelihoods—from fishing restrictions to forest conservation—may generate substantial costs for communities with limited alternative income sources despite potentially broader societal benefits from environmental protection (Barbier & Hochard, 2018). Inclusive approaches address these challenges through various mechanisms including targeted exemptions, phased implementation that allows adaptation time, revenue recycling from environmental taxes toward progressive spending or direct compensation, and complementary programs that enhance adaptive capacity among affected communities (Jakob et al., 2018). These strategies aim to ensure that environmental transitions enhance rather than undermine equity objectives, recognizing that fairness considerations fundamentally shape both the political feasibility and ethical acceptability of sustainability policies (Chancel & Piketty, 2018).

Promoting green jobs and skills development: Employment represents a crucial nexus between environmental and social objectives, with inclusive approaches emphasizing decent work opportunities in emerging green sectors while supporting just transitions for workers in declining carbon-intensive industries (ILO, 2018). Green job creation spans diverse sectors including renewable energy, energy efficiency, sustainable agriculture, ecosystem restoration, circular economy activities, and environmental services that collectively offer substantial employment potential during sustainability transitions (Pollin et al., 2019). However, realizing inclusive employment outcomes requires specific policy attention to job quality, skills matching, geographical distribution, and accessibility for disadvantaged groups who might otherwise remain excluded from these opportunities despite aggregate green employment

growth (Bowen et al., 2018). Skills development represents a particularly important dimension, requiring coordinated education and training initiatives aligned with evolving Labor market needs in environmental sectors to prevent skills mismatches while enabling broader participation in the green economy (Martinez-Fernandez et al., 2018). For ASEAN countries with young populations and significant Labor market pressures, green jobs offer potential pathways for absorbing new workforce entrants into productive employment while advancing environmental objectives, though requiring strategic investment in technical and vocational training systems that align with emerging sustainability sectors (ASEAN Secretariat, 2021).

Enhancing access to clean energy and sustainable transportation for all: Inclusive approaches emphasize universal access to essential environmental services and infrastructure that fundamentally shape both living standards and ecological footprints (Sovacool et al., 2018). Clean energy access illustrates these interconnected dimensions, as distributed renewable solutions can simultaneously address energy poverty in remote communities without grid access while avoiding carbon-intensive development pathways associated with diesel generators or traditional biomass (Baptista & Plananska, 2017). Similarly, sustainable transportation initiatives offer opportunities to enhance mobility for underserved populations through affordable public transit, non-motorized infrastructure, and transit-oriented development patterns that reduce both emissions and transportation costs that often constitute significant burdens for lower-income households (Jennings, 2021). These service accessibility dimensions extend to water, sanitation, waste management, and other environmental infrastructure that provides essential services while reducing ecological impacts through resource-efficient design (van den Berg & Danilenko, 2017). For rapidly urbanizing ASEAN societies, these infrastructure choices fundamentally shape both inclusion outcomes and environmental trajectories, highlighting the importance of prioritizing universal access principles alongside sustainability considerations in urban planning and service delivery systems (Roberts et al., 2019).

Relevance to ASEAN: The inclusive green growth framework is particularly relevant for ASEAN countries seeking to balance rapid economic development with social equity and environmental sustainability. This integrative approach resonates with ASEAN's development context, where persistent inequality, significant environmental pressures, and continued growth imperatives create complex policy challenges requiring multidimensional solutions (OECD, 2018). Malaysia's Eleventh and Twelfth Malaysia Plans exemplify this integrated approach, incorporating "inclusive green growth" as an explicit development principle while establishing implementation mechanisms through green technology financing schemes, inclusive education initiatives focused on sustainability skills, and targeted programs for greening small and medium enterprises that collectively aim to ensure broader participation in the country's sustainability transition (Malaysia Economic Planning Unit, 2020).

Indonesia has similarly incorporated inclusive green growth principles into its Medium-Term Development Plan, balancing conventional economic targets with commitments to enhance natural resource governance, expand social forestry initiatives benefiting local communities, and implement green financing mechanisms that can channel capital toward environmentally sustainable and socially inclusive investments (UNESCAP, 2019). The Philippines' National Climate Change Action Plan demonstrates integrated thinking through its emphasis on enhancing adaptive capacity among vulnerable communities alongside mitigation measures and green economy initiatives, recognizing the interconnected nature of climate resilience,

poverty reduction, and economic transformation (Philippines Climate Change Commission, 2020).

At regional levels, ASEAN has incorporated elements of inclusive green growth thinking into frameworks including the ASEAN Socio-Cultural Community Blueprint 2025, which explicitly links environmental, social, and economic objectives while emphasizing equitable access to opportunities, enhanced resilience among vulnerable groups, and sustainable management of natural resources essential for long-term prosperity (ASEAN Secretariat, 2018). The ASEAN Working Group on Climate Change similarly adopts integrated approaches that connect mitigation and adaptation with considerations of vulnerable communities, acknowledging the region's high climate exposure alongside persistent development challenges that require coordinated policy responses (ASEAN Secretariat, 2020).

Despite these policy developments, implementation of truly integrated approaches remains challenging across ASEAN, with institutional fragmentation often separating environmental, social, and economic portfolios despite rhetorical commitments to policy coherence (Jones & Balaam, 2020). Fiscal constraints further complicate implementation, with limited resources requiring difficult trade-offs between competing priorities despite theoretical complementarities between environmental and social objectives (ADB, 2021). Nevertheless, inclusive green growth frameworks have stimulated important policy innovations while providing conceptual foundations for more holistic approaches to sustainable development that increasingly influence ASEAN's policy landscape at both national and regional levels (UNESCAP, 2020).

Just Transition

The concept of a "just transition" focuses on ensuring that the shift to a low-carbon economy is fair and inclusive, particularly for workers and communities dependent on carbon-intensive industries. This framework emerged from Labor movement concerns regarding potential distributional impacts of environmental policies, evolving into a broader approach for addressing social dimensions of sustainability transitions (Stevis & Felli, 2020). While sharing equity concerns with inclusive green growth, just transition frameworks place particular emphasis on process dimensions including participation, procedural justice, and power relations that shape both policy design and implementation outcomes (Evans & Phelan, 2018). This approach recognizes that sustainability transitions fundamentally involve structural economic changes that create both winners and losers, requiring explicit attention to managing transition impacts while ensuring new opportunities are accessible to affected workers and communities rather than primarily benefiting already-advantaged groups (Newell & Mulvaney, 2019).

The just transition concept has gained significant institutional recognition, incorporated into the Paris Agreement preamble while influencing policy developments across diverse contexts from coal-dependent regions in Europe and North America to developing countries navigating complex energy transitions (Piggot et al., 2020). International Labor organizations have played important roles in advancing these frameworks, developing specific guidelines for just transition implementation while building coalitions with environmental movements around shared interests in sustainability pathways that enhance rather than undermine worker wellbeing (ILO, 2018). For ASEAN countries with significant fossil fuel production, carbon-intensive industries, and informal sectors that may be affected by climate policies, just transition frameworks offer valuable guidance for managing social dimensions of

decarbonization while building broader constituencies for environmental action (Oei et al., 2020).

Key elements of just transition frameworks:

Social dialogue and stakeholder engagement in policy development: Just transition approaches emphasize participatory processes that enable affected workers, communities, and other stakeholders to meaningfully influence transition planning rather than merely receiving compensation for decisions made without their input (Stevis et al., 2018). This procedural justice dimension recognizes that legitimate and effective transition strategies require incorporating diverse knowledge and perspectives, particularly from those most affected by economic restructuring who bring crucial contextual understanding alongside normative claims for inclusion (Brugnach et al., 2017). Practical mechanisms include multi-stakeholder commissions that develop regional transition strategies, formal consultation processes with affected communities, Labor representation in climate policy development, and participatory planning approaches for economic diversification initiatives that collectively enhance both the quality and legitimacy of transition pathways (Masson-Delmotte et al., 2018). These participatory processes require attention to power imbalances that may limit effective participation despite formal inclusion, necessitating capacity building, information access, and procedural safeguards that enable meaningful engagement across diverse stakeholder groups with varying resources and technical capacity (Schlosberg et al., 2019). For ASEAN societies with varying democratic traditions and civil society development, implementing effective stakeholder engagement represents both an important aspiration and significant challenge that requires context-sensitive institutional innovations reflecting diverse political landscapes across the region (Nasir et al., 2020).

Skills development and retraining programs for affected workers: Human capital development represents a central component of just transition strategies, enabling workers from declining sectors to access emerging opportunities through education, training, and skills certification aligned with Labor market needs in growing industries (Virginie & Pai, 2018). These initiatives span formal academic programs, technical and vocational training, on-the-job learning opportunities, and competency recognition systems that collectively enhance Labor mobility across sectors while reducing transition costs for individual workers (Martinez-Fernandez et al., 2018). Effective skills strategies require forecasting future workforce needs in growing green sectors, identifying transferable competencies from declining industries, and developing targeted programs that bridge specific skills gaps while accommodating diverse learning needs across different worker populations (ILO, 2019). These workforce development approaches are particularly important for workers with industry-specific skills that may become less valuable during sectoral transitions, requiring complementary measures addressing both technical and adaptive capabilities necessary for successful career changes (Calzadilla & Mauger, 2018). For ASEAN countries with emerging environmental industries and significant workforce development challenges, skills programs offer potential mechanisms for enhancing transition equity while addressing broader human capital limitations that constrain both economic and environmental performance across the region (ERIA, 2020).

Investment in diversifying local economies: Economic diversification strategies aim to develop new sources of prosperity in regions historically dependent on carbon-intensive industries, reducing vulnerability to decarbonization impacts while creating alternative growth pathways (Caldecott et al., 2018). These approaches typically combine strategic infrastructure investments, entrepreneurship support, innovation initiatives, and targeted incentives for emerging industries that collectively aim to develop new economic specializations aligned with low-carbon pathways (Healy & Barry, 2019). Effective diversification requires building on existing regional assets including workforce skills, industrial capabilities, natural resources, and geographical advantages rather than imposing unsuitable development models disconnected from local contexts (Coenen et al., 2019). Place-based strategies recognize that affected regions have distinctive development potentials requiring tailored approaches rather than standardized prescriptions, with implementation typically requiring multilevel governance arrangements that coordinate resources across local, regional, and national institutions (Atteridge & Strambo, 2020). For ASEAN countries with significant fossil fuel production—including Indonesia, Malaysia, Brunei, and Vietnam—these diversification perspectives offer valuable frameworks for developing transition strategies that can maintain economic prosperity while reducing carbon dependency, though with implementation challenges related to institutional coordination, investment mobilization, and overcoming path dependencies in established industrial regions (Oei et al., 2020).

Social protection measures to support those affected by economic transitions: Safety net mechanisms provide crucial support for workers, households, and communities navigating disruptive economic changes associated with sustainability transitions (Markkanen & Anger-Kraavi, 2019). These measures include unemployment insurance, early retirement programs, income support, healthcare continuation, housing assistance, and other social benefits that collectively reduce transition hardships while maintaining living standards during adjustment periods (Abraham, 2019). Beyond temporary relief, comprehensive approaches include complementary active Labor market policies that facilitate reemployment through job search assistance, mobility support, placement services, and employment subsidies that encourage hiring in affected regions (Vogt-Schilb & Hallegatte, 2018). These social protection dimensions acknowledge that market mechanisms alone often generate significant transition costs for vulnerable groups despite potential aggregate benefits from environmental policies, requiring explicit redistributive measures to ensure justice during structural economic changes (Newell & Mulvaney, 2019). For ASEAN countries with varying social protection systems—from Singapore's relatively comprehensive arrangements to more limited coverage in less developed member states—strengthening safety nets represents an important dimension of just transition planning, though with implementation challenges related to fiscal constraints, administrative capacity, and significant informality that complicates program delivery through conventional social insurance mechanisms (ILO, 2021).

Relevance to ASEAN: As ASEAN countries seek to reduce their reliance on fossil fuels and carbon-intensive industries, the just transition framework can help address potential social and economic disruptions. This approach has particular significance for regional economies with substantial fossil fuel production and use, including Indonesia and Malaysia as significant coal exporters, Brunei as an oil-dependent economy, and Vietnam with substantial coal power generation alongside various carbon-intensive manufacturing sectors (ADB, 2021).

Indonesia's situation illustrates these transition challenges, as the world's largest coal exporter faces potential economic impacts from declining global demand alongside environmental imperatives to reduce domestic coal consumption currently generating substantial employment across mining regions, transportation systems, and power generation facilities (Atteridge et al., 2018). The country's renewable energy transition offers potential new opportunities but raises significant questions regarding skills matching, geographical alignment between job losses and new employment, and community impacts in regions economically dependent on fossil fuel production (Burke et al., 2018).

Malaysia similarly confronts transition challenges as a significant petroleum producer and exporter, with state-owned Petronas contributing substantially to government revenue and economic activity while supporting extensive domestic supply chains that would be affected by decarbonization (Malaysia Department of Statistics, 2020). The country's New Energy Policy has begun addressing transition considerations through skills development initiatives, research programs supporting industrial diversification, and renewable energy investments that aim to create alternative economic opportunities while reducing carbon dependency, though with ongoing implementation challenges reflecting complex stakeholder interests and significant path dependencies in established energy systems (Malaysia Ministry of Energy, Science, Technology, Environment and Climate Change, 2019).

Vietnam's rapid coal expansion over the past decade creates potential transition challenges as climate commitments and renewable cost reductions drive future shifts toward cleaner energy systems, affecting workers and communities across the country's coal mining regions and power generation facilities (Jakob et al., 2020). The country's Just Transition Partnership represents an innovative approach to managing these changes, mobilizing international support for accelerated coal phaseout while developing comprehensive plans for affected workers and communities that combine social protection, skills development, and regional economic diversification strategies (OECD, 2022).

Regional initiatives addressing just transition remain limited despite these national-level developments, with ASEAN frameworks only beginning to incorporate explicit attention to transition equity alongside broader climate and environmental commitments (ASEAN Secretariat, 2021). The ASEAN Plan of Action for Energy Cooperation (APAEC) Phase II references social dimensions of energy transitions but provides limited specific guidance for managing workforce and community impacts from shifting energy systems (ASEAN Centre for Energy, 2020). Similarly, the ASEAN Taxonomy for Sustainable Finance acknowledges just transition considerations but offers limited operational frameworks for incorporating social dimensions into climate finance decisions beyond general principles (ASEAN Secretariat, 2021).

These limitations reflect broader implementation challenges for just transition approaches across ASEAN, including institutional fragmentation between environmental, economic, and social policy domains; limited fiscal resources for comprehensive transition support; and political economy factors that often prioritize short-term economic considerations over longer-term sustainability planning (Sovacool et al., 2020). Nevertheless, just transition frameworks offer valuable conceptual guidance for ASEAN policymakers navigating complex sustainability transitions, providing principles and practices that can enhance both the social acceptability and political feasibility of decarbonization pathways across the region's diverse economic and institutional contexts (Atteridge & Strambo, 2020).

2.5 Fiscal Policy Instruments for Inclusive and Sustainable Development

Fiscal policy represents one of government's most powerful tools for addressing both inclusive growth and climate resilience objectives. This section examines specific fiscal instruments that can advance these dual goals, exploring their theoretical foundations, implementation considerations, and applications within the ASEAN context. The development of these integrated fiscal approaches reflects growing recognition that environmental and social objectives require coordinated policy responses rather than separate interventions that may generate contradictory outcomes or missed synergies (OECD, 2020). While traditional fiscal frameworks often treated environmental considerations as secondary concerns addressed through specialized instruments, integrated approaches incorporate sustainability principles throughout fiscal systems—from revenue collection and expenditure prioritization to intergovernmental transfers and fiscal risk management (Cottrell et al., 2019). Similarly, equity dimensions have evolved from purely compensatory approaches toward systematic integration of distributional analyses throughout fiscal policy design and implementation, recognizing how revenue and expenditure decisions fundamentally shape social outcomes alongside their macroeconomic and environmental impacts (Lustig, 2018). For ASEAN countries navigating complex development transitions with limited fiscal resources, these integrated approaches offer potential pathways for addressing multiple sustainable development objectives through strategic fiscal policy design (Anbumozhi & Kalirajan, 2020).

Environmental Fiscal Reforms

Environmental fiscal reforms involve shifting the tax burden from labour and capital to environmentally harmful activities. Ekins et al. (2011) argue that such reforms can yield a "double dividend" of environmental improvement and economic efficiency. This approach addresses the fundamental market failure of unpriced environmental externalities while potentially generating economic benefits through reduced distortionary taxation of productive activities like employment and investment (Pigato, 2019). Environmental fiscal reforms encompass comprehensive restructuring of fiscal systems to better align economic incentives with environmental objectives, moving beyond isolated eco-taxes toward integrated approaches that consider interactions across tax instruments, expenditure programs, and broader fiscal governance arrangements (OECD, 2018). While primarily aimed at environmental objectives, these reforms can generate significant economic and social co-benefits by encouraging innovation, improving resource efficiency, reducing pollution-related health costs, and potentially creating new employment in environmental sectors (Vogt-Schilb et al., 2019).

The theoretical foundations for environmental fiscal reforms draw from environmental economics principles regarding externality correction through price signals that better reflect social costs of environmentally harmful activities (Sterner, 2017). Pigouvian taxation approaches aim to internalize these external costs, establishing price levels that ideally reflect marginal environmental damages and thereby incentivizing efficient abatement decisions across economic actors (Tietenberg & Lewis, 2019). Beyond static efficiency gains, these market-based approaches aim to stimulate dynamic innovation responses that drive technological advances and structural economic changes toward more sustainable production and consumption patterns over time (Acemoglu et al., 2019). For developing countries like those in ASEAN, environmental fiscal reforms offer potential pathways for avoiding pollution-

intensive development trajectories while generating revenue for public investments essential for sustainable development (Bird & Zolt, 2018).

Key instruments:

Carbon taxes and emissions trading systems: These market-based mechanisms establish explicit prices for greenhouse gas emissions, creating incentives for emission reductions throughout the economy while generating revenue that can support broader climate objectives (World Bank, 2021). Carbon taxes impose direct charges on fossil fuels based on their carbon content, providing price certainty while allowing quantity flexibility, while emissions trading systems establish quantity limits and allow market trading to determine resulting prices (Aldy & Stavins, 2018). Both approaches aim to incorporate climate externalities into economic decision-making across production and consumption activities, though with different design features regarding price certainty, administrative requirements, and sectoral coverage that influence their suitability across different economic and institutional contexts (Cramton et al., 2019). Implementation considerations include determining appropriate price levels, establishing effective monitoring systems, addressing competitiveness concerns for trade-exposed industries, and designing revenue recycling mechanisms that influence both economic and distributional outcomes (Metcalf, 2019). For ASEAN economies at different development stages, these carbon pricing approaches require careful adaptation to specific economic structures, administrative capacities, and political feasibility constraints, with potential for phased implementation that gradually expands coverage and price levels as implementation capacity develops (ADB, 2018).

Removal of environmentally harmful subsidies: Subsidy reform represents another key component of environmental fiscal restructuring, eliminating or reducing government support for environmentally damaging activities that distort markets while consuming substantial public resources (Kojima, 2017). Fossil fuel subsidies represent the most significant category, with global subsidies reaching approximately $5.9 trillion annually when including both explicit price supports and implicit subsidies from unpriced externalities and preferential tax treatment (IMF, 2021). Subsidy elimination offers triple benefits of reduced environmental harm, improved fiscal space, and enhanced market efficiency, though with significant implementation challenges related to distributional impacts, political resistance from beneficiary groups, and economic adjustment costs during transition periods (Inchauste & Victor, 2019). Successful reforms typically involve phased approaches with transparent communication, complementary measures addressing impacts on vulnerable groups, and strategic timing that leverages conducive conditions like low international energy prices or fiscal crises that enhance reform feasibility (Rentschler & Bazilian, 2017). For ASEAN countries with significant subsidy programs, particularly in energy sectors, reform experiences demonstrate both substantial opportunities for fiscal and environmental gains and the importance of careful design to address distributional and political economy concerns that have derailed previous reform attempts (ADB, 2019).

Taxes on resource extraction and pollution: These fiscal instruments address specific environmental impacts beyond carbon emissions, including mining, forestry, fisheries, water use, air pollution, waste generation, and other activities generating negative externalities

(Sterner & Coria, 2018). Natural resource taxation aims to capture economic rents from resource extraction while incentivizing sustainable management practices, typically through royalties, severance taxes, resource rent taxes, or auction systems for extraction rights that balance revenue generation with environmental protection objectives (Daniel et al., 2018). Pollution charges similarly price environmentally harmful emissions to air, water, and soil, creating incentives for cleaner production processes while generating revenue for environmental remediation or other public purposes (OECD, 2017). Effectiveness depends on appropriate rate structures that reflect environmental damages, reliable monitoring systems that verify compliance, and enforcement capacity that ensures payment, presenting particular challenges in developing contexts with limited administrative resources and significant informal economic activity (Gilingham & Keen, 2020). For ASEAN countries with significant natural resource sectors and growing pollution challenges, these targeted instruments offer important tools for addressing specific environmental pressures while potentially generating substantial revenue from resource rents currently captured inadequately through existing fiscal arrangements (UNESCAP, 2019).

Green subsidies for clean technologies and practices: While most environmental fiscal reforms focus on correcting negative externalities through taxation or subsidy removal, positive incentives for sustainable activities play complementary roles in addressing market failures and barriers to adoption for emerging environmental technologies and practices (Meckling et al., 2017). These incentives include research and development support, investment tax credits, accelerated depreciation for clean technologies, production subsidies for renewable energy, and various targeted programs that reduce costs or enhance returns for environmentally beneficial activities across sectors (Acemoglu et al., 2018). Green subsidies can be particularly important during early deployment phases when emerging technologies face scale disadvantages, learning curve challenges, and infrastructure gaps relative to established alternatives, potentially justifying temporary support to overcome these barriers and achieve cost reductions through market growth (Stern & Stiglitz, 2022). However, these instruments require careful design to avoid inefficiency, capture by special interests, and lock-in of suboptimal technologies, ideally incorporating phase-out provisions linked to performance milestones, competitive allocation mechanisms that minimize costs, and regular evaluation processes that ensure continued justification as technologies mature (Meckling & Allan, 2020). For ASEAN countries seeking to accelerate clean technology adoption and sustainable practice implementation, targeted subsidies offer important complementary tools alongside corrective taxation, though with significant design challenges to ensure cost-effectiveness and avoid wasteful spending given limited fiscal resources (ASEAN Centre for Energy, 2019).

Examples from ASEAN: Singapore's carbon tax and Malaysia's renewable energy feed-in tariff are examples of environmental fiscal reforms in the region. Singapore implemented Southeast Asia's first economy-wide carbon tax in 2019, establishing a rate of S$5 per tonne of CO_2-equivalent emissions from facilities exceeding 25,000 tonnes annually, with planned increases to S$25 per tonne by 2024 and potentially S$50-80 per tonne by 2030 (National Environment Agency Singapore, 2021). This modest initial price reflected competitiveness concerns for the export-oriented economy, with revenue recycling supporting both industrial energy efficiency investments and broader climate initiatives that aim to enhance long-term competitiveness

through early adaptation to carbon constraints (Singaporean Ministry of Finance, 2020). The carbon tax complements Singapore's broader sustainability initiatives, including restructured vehicle taxation based on emissions performance, water pricing reforms reflecting scarcity values, and waste management charges that collectively represent a relatively comprehensive environmental fiscal approach despite moderate initial price levels (Tan, 2020).

Malaysia's renewable energy development through feed-in tariffs represents a different approach, providing guaranteed payments for renewable electricity generation that have stimulated substantial solar deployment while transitioning toward more market-based auction systems as the sector matures (Energy Commission of Malaysia, 2021). This incentive program complemented broader fiscal measures including investment tax allowances for energy efficiency, import duty exemptions for renewable equipment, and various green technology financing schemes that collectively aim to accelerate Malaysia's clean energy transition through targeted support mechanisms (Malaysian Green Technology and Climate Change Centre, 2020). However, Malaysia's simultaneous maintenance of significant fossil fuel subsidies illustrates implementation challenges for comprehensive environmental fiscal reforms, as countervailing incentives persist despite rhetorical commitments to sustainable energy transitions (Malaysia Ministry of Finance, 2021).

Thailand's experience with environmental fiscal measures spans excise tax restructuring to incorporate emissions factors in vehicle taxation, a progressive water tariff system that better reflects resource values, and waste charges that have improved solid waste management while generating municipal revenue (World Bank, 2019). Vietnam has similarly implemented a range of environmental protection taxes on fossil fuels, certain chemicals, and plastic bags, though with relatively modest rates that limit their environmental effectiveness despite generating significant revenue for environmental protection activities (Vietnam Ministry of Finance, 2019). Indonesia's repeated fuel subsidy reform efforts illustrate both possibilities and challenges of environmental fiscal restructuring, with significant progress in reducing gasoline and diesel subsidies since 2014 despite continued support for kerosene and electricity that maintains substantial distortions in energy markets (Burke et al., 2019).

These varied experiences across ASEAN demonstrate both increasing adoption of environmental fiscal principles and significant implementation gaps between theoretical ideals and practical realities. Political economy constraints, administrative capacity limitations, competitiveness concerns, and distributional considerations continue shaping reform trajectories, resulting in partial implementation that maintains contradictory incentives across fiscal systems despite growing environmental integration (Monkelbaan, 2021). Nevertheless, these developments represent important progress from earlier approaches that treated environmental objectives as entirely separate from core fiscal policy, potentially creating foundations for more comprehensive reforms as capacity develops and political support strengthens for environmental fiscal restructuring (OECD, 2019).

Pro-Poor Environmental Fiscal Policies

Building on environmental fiscal reforms, pro-poor environmental fiscal policies explicitly consider distributional impacts and aim to benefit lower-income groups. This integrated approach addresses potential tensions between environmental and equity objectives,

recognizing that environmental policies may generate regressive impacts without careful design that considers differential effects across income groups (Dorband et al., 2019). Pro-poor approaches acknowledge that environmental taxation can disproportionately burden lower-income households who typically spend larger portions of their income on energy and other environmentally taxed necessities despite having smaller absolute environmental footprints (Klenert & Mattauch, 2019). By explicitly incorporating equity considerations into environmental fiscal design, these approaches seek to achieve both environmental improvements and enhanced social outcomes through strategic policy integration that leverages potential complementarities while managing inevitable trade-offs (Fankhauser & Jotzo, 2018).

The theoretical foundations for pro-poor environmental fiscal approaches draw from both welfare economics regarding distributional impacts and political economy insights about policy sustainability (Stiglitz, 2018). Welfare analysis provides frameworks for evaluating how different fiscal instruments affect household wellbeing across income distribution, identifying potentially regressive impacts that may require compensation through complementary measures (Inchauste & Lustig, 2019). Political economy perspectives highlight how distributional outcomes fundamentally shape public acceptance and political sustainability of environmental policies, suggesting that addressing equity concerns represents not merely a normative objective but a practical necessity for maintaining support for environmental fiscal reforms over time (Klenert et al., 2018). For ASEAN countries with significant poverty and inequality alongside growing environmental challenges, these integrated approaches offer potential pathways for advancing multiple sustainable development objectives while building broader constituencies for environmental action (Anbumozhi et al., 2020).

Key approaches:

Using revenue from environmental taxes to fund social programs: Revenue recycling represents a central mechanism for addressing distributional concerns while maintaining environmental incentives, directing income from environmental taxation toward social programs that benefit lower-income households disproportionately affected by price increases (Metcalf, 2019). These approaches maintain environmental price signals necessary for incentivizing behavioural and technological changes while using revenue for progressive redistribution that can potentially make lower-income households better off despite higher environmental prices (Williams et al., 2018). Implementation options include expanded social protection programs, increased funding for public services disproportionately used by lower-income groups, reduced taxes on necessities, or strengthened safety nets that collectively enhance progressive outcomes from fiscal systems (OECD, 2021). Design considerations include targeting effectiveness, administrative costs, visibility of benefits that affects political support, and timing alignment between revenue generation and compensatory spending that influences transition impacts (Rentschler & Bazilian, 2017). For ASEAN countries with varying social protection systems, revenue recycling offers important tools for enhancing equity outcomes from environmental fiscal reforms, though with implementation challenges related to administrative capacity, program coverage, and coordination across government agencies responsible for revenue collection and social spending (UNESCAP, 2019).

Providing targeted subsidies or cash transfers to offset increased energy costs for low-income households: Targeted compensation addresses regressive impacts of environmental pricing by providing direct financial support to vulnerable households most affected by price increases

on essential goods (Vogt-Schilb & Hallegatte, 2018). These approaches include means-tested energy subsidies that provide discounted rates for qualifying households, direct cash transfers linked to energy price increases, or voucher systems that maintain consumption access while preserving marginal price signals that encourage conservation (Coady et al., 2018). Targeting mechanisms vary in administrative complexity and effectiveness, ranging from geographic approaches and categorical eligibility to proxy means testing and self-selection mechanisms that identify intended beneficiaries with varying precision and administrative requirements (Brown et al., 2018). Effective design balances targeting accuracy with implementation feasibility, recognizing that complex targeting systems may prove administratively infeasible in contexts with limited institutional capacity despite their theoretical advantages for minimizing leakage to non-intended beneficiaries (Jellema et al., 2018). For ASEAN countries implementing environmental fiscal reforms, these targeted approaches offer important tools for protecting vulnerable households while maintaining environmental incentives, though requiring substantial administrative capacity to implement effectively in contexts with significant informality and limited beneficiary registration systems (Rentschler & Bazilian, 2017).

Investing in public transportation and energy efficiency in low-income communities: Infrastructure investments that reduce environmental resource dependence among vulnerable groups represent another important pro-poor approach, providing structural alternatives that enable lower-income households to maintain living standards with reduced environmental impact (Ürge-Vorsatz et al., 2018). Public transportation investments particularly benefit lower-income communities with limited vehicle ownership, reducing transportation costs while simultaneously reducing emissions compared to private vehicle alternatives (Roberts et al., 2019). Similarly, energy efficiency improvements in social housing, appliance replacement programs for low-income households, and distributed renewable energy for underserved communities can substantially reduce energy expenditures while advancing climate objectives through reduced fossil fuel consumption (Reames, 2019). These infrastructure approaches complement pricing reforms by expanding adaptation options available to vulnerable groups, recognizing that environmental pricing effectiveness depends on availability of affordable alternatives that enable behavioural responses beyond simply reducing consumption of essential services (Fankhauser & Jotzo, 2018). For ASEAN countries with significant infrastructure deficits, these investment approaches offer potentially transformative pathways for advancing both social and environmental objectives, though requiring substantial capital resources and implementation capacity that may constrain feasibility in fiscally constrained contexts (ADB, 2021).

Examples from ASEAN: Indonesia's fuel subsidy reform in 2015 included cash transfers to low-income households to mitigate the impact of higher fuel prices (ADB, 2015). This major policy shift eliminated most gasoline subsidies and substantially reduced diesel support, representing one of the region's most significant environmental fiscal reforms with approximate savings exceeding 10% of government expenditure (Burke et al., 2019). Recognizing potential hardships for vulnerable households, the government implemented complementary social protection measures including direct cash transfers to over 15 million low-income households, expanded health insurance coverage for poor families, and educational assistance programs that collectively aimed to protect vulnerable groups while maintaining the efficiency and environmental benefits from subsidy reduction (Inchauste & Victor, 2019). This episode illustrates both possibilities and challenges of pro-poor

environmental fiscal reform, as the compensation package enhanced political feasibility and social protection while implementation faced significant challenges including targeting errors, delivery delays, and coordination difficulties across agencies responsible for different program components (Rentschler & Bazilian, 2017). Nevertheless, the reform succeeded in maintaining significant price corrections despite these implementation difficulties, demonstrating the importance of complementary social measures for sustaining environmental policy changes amid legitimate equity concerns (Chelminski, 2018).

Thailand's approach to environmentally linked social protection includes progressive electricity tariff structures that provide lower rates for small consumers while incorporating higher rates for larger users, combining social objectives with conservation incentives in utility pricing (Thailand Ministry of Energy, 2020). The country's energy conservation program similarly includes targeted components for lower-income households, providing subsidized energy-efficient appliances and lighting that reduce electricity costs while advancing climate objectives through reduced consumption (Energy Conservation Fund of Thailand, 2021). These programs demonstrate possibilities for designing environmental policies with progressive features embedded directly within instruments rather than relying entirely on separate compensation mechanisms, though coverage limitations and implementation challenges have restricted their distributional impact despite conceptual alignment with pro-poor principles (OECD, 2019).

The Philippines' Pantawid Pamilyang Pilipino Program (4Ps) illustrates connections between social protection and climate resilience, as this conditional cash transfer system reaching over 4 million households has increasingly incorporated disaster response components that provide additional support during climate-related emergencies that disproportionately affect program beneficiaries (World Bank, 2020). The program's regular transfers enhance baseline resilience among vulnerable households while special disbursements during disasters provide timely support that reduces negative coping strategies like asset liquidation or consumption reduction that could otherwise generate long-term poverty impacts from environmental shocks (Philippines Department of Social Welfare and Development, 2020). This integration between social protection and climate response exemplifies how existing program infrastructure can support multiple objectives when designed with appropriate flexibility and coverage to reach environmentally vulnerable populations (ADB, 2018).

Regional patterns in pro-poor environmental fiscal approaches remain uneven across ASEAN, with significant variation in both policy design and implementation effectiveness (Sovacool, 2018). More developed members including Singapore and Malaysia have established relatively comprehensive mechanisms for addressing distributional concerns in environmental policy, including utility rebate programs, targeted assistance for vulnerable households, and progressive pricing structures that collectively enhance equity outcomes from environmental measures (OECD, 2019). Less developed members including Cambodia, Laos, and Myanmar face more fundamental challenges in implementing integrated approaches due to limited fiscal resources, administrative constraints, and underdeveloped social protection systems that complicate compensation delivery despite recognition of its importance for sustainable environmental policies (UNESCAP, 2020). These diverse experiences highlight both possibilities for enhancing distributional outcomes from environmental fiscal reforms and persistent implementation challenges that require context-specific solutions reflecting varying institutional capacities and fiscal constraints across the region (Jones, 2018).

Green Budgeting

Green budgeting involves systematically integrating environmental and climate considerations into fiscal policy-making processes. The OECD (2021) defines it as "using the tools of budgetary policy-making to help achieve environmental goals." This comprehensive approach moves beyond individual environmental fiscal instruments toward institutionalizing sustainability considerations throughout budget cycles—from strategic planning and resource allocation to execution monitoring and evaluation (World Bank, 2021). Green budgeting approaches recognize that aligning public finance with environmental objectives requires systematic changes to budgetary institutions, processes, and information systems rather than merely adopting isolated green policies within otherwise unchanged fiscal governance arrangements (UNDP, 2018). By enhancing transparency regarding environmental implications of fiscal decisions, these approaches aim to improve policy coherence, strengthen accountability for environmental outcomes, and ultimately shift resource allocation patterns toward more sustainable pathways through better-informed budgetary decisions (Schuler, 2020).

The theoretical foundations for green budgeting draw from both public financial management principles regarding transparency, accountability, and effectiveness, and environmental governance perspectives on policy integration and mainstreaming (OECD, 2017). These approaches acknowledge that fiscal decisions fundamentally shape environmental outcomes through multiple channels including direct environmental spending, broader sectoral investments with significant ecological implications, tax provisions affecting resource use patterns, and public procurement decisions that influence market development for sustainable products and services (Bird & Zolt, 2018). By making these connections more visible and incorporating them into core budget processes, green budgeting aims to reduce unintended environmental consequences from fiscal decisions while enhancing positive contributions toward sustainability objectives (UNEP, 2019). For ASEAN countries seeking to strengthen environmental governance amid significant fiscal constraints, these approaches offer potential mechanisms for improving resource allocation efficiency and policy coherence despite limited overall fiscal space (ADB, 2021).

Key elements:

Environmental impact assessments of budget measures: These analytical tools systematically evaluate potential environmental implications of budget proposals before adoption, identifying both positive and negative impacts that might otherwise remain unexamined during fiscal decision-making (Cottrell et al., 2019). Assessment approaches vary in scope and methodology, ranging from qualitative screening tools that broadly categorize measures based on environmental implications to sophisticated quantitative analyses that monetize environmental impacts for direct comparison with other economic considerations (UNEP, 2019). Implementation options include mandatory assessments for proposals exceeding certain thresholds, voluntary guidelines encouraging environmental consideration, or integrated frameworks incorporating environmental alongside economic and social impact analysis within unified assessment processes (World Bank, 2020). For ASEAN countries with varying analytical capacities, pragmatic approaches might begin with simplified screening tools focusing on major budget items before gradually developing more comprehensive assessment capabilities as institutional experience develops (OECD, 2021). These prospective assessments complement retrospective evaluation tools that examine actual

rather than anticipated impacts, collectively enhancing information available to decision-makers regarding environmental dimensions of fiscal choices throughout budget cycles (Sterck, 2019).

Tagging and tracking of climate-related expenditures: These monitoring mechanisms systematically identify, classify, and measure budget allocations related to climate change mitigation and adaptation, enhancing transparency regarding government contributions toward climate objectives (Bird et al., 2018). Climate budget tagging systems typically establish classification methodologies that categorize spending according to primary purpose, contribution type (mitigation, adaptation, or both), and relevance weight for activities partially addressing climate alongside other objectives (World Bank, 2021). Implementation approaches include manual review processes where designated officials apply classification criteria to budget items, automated systems that incorporate climate markers into budget classification codes, or hybrid approaches combining technological solutions with human review for quality assurance (Amin et al., 2018). These tracking systems enable governments to measure progress against climate finance commitments, identify gaps requiring additional resources, evaluate alignment between stated priorities and actual allocations, and communicate climate contributions to both domestic and international stakeholders (UNDP, 2019). For ASEAN countries engaging with international climate finance mechanisms, these systems provide important accountability tools while potentially strengthening access to external resources by demonstrating capacity to monitor and report climate expenditures according to international standards (UNFCCC, 2019).

Long-term fiscal sustainability analysis incorporating climate risks: These analytical approaches expand traditional fiscal sustainability assessments to incorporate climate-related risks and opportunities that may substantially affect future government finances beyond conventional macroeconomic considerations (Agarwal & Chakraborty, 2019). Climate-inclusive fiscal risk assessments examine multiple impact channels including disaster response costs from extreme weather events, infrastructure damage requiring increased maintenance or replacement expenditure, reduced tax revenue from climate-affected economic sectors, potential sovereign borrowing cost increases reflecting climate vulnerability, and contingent liabilities from public insurance or guarantee programs covering climate-related losses (IMF, 2020). Implementation methodologies include scenario analysis examining fiscal implications under different climate pathways, stress testing evaluating budget resilience to specific climate shocks, and long-term fiscal modelling incorporating gradual climate impacts alongside demographic and other structural trends affecting public finances (Cevik & Jalles, 2021). These expanded analytical approaches enhance fiscal planning by identifying potential vulnerabilities requiring preventive measures, informing climate-resilient infrastructure investment decisions, and potentially strengthening the case for near-term adaptation expenditures that reduce future fiscal costs despite immediate budget pressures (Baur et al., 2021). For ASEAN countries with high climate exposure, these forward-looking approaches offer important planning tools for enhancing fiscal resilience amid increasing climate impacts, though requiring significant analytical capacity development in finance ministries traditionally focused on shorter-term fiscal metrics (ADB, 2020).

Relevance to ASEAN: While green budgeting practices are still emerging in ASEAN countries, they offer potential for more integrated and sustainable fiscal policy-making. The Philippines has pioneered climate budget tagging in the region, implementing a system that tracks climate-related expenditures across national government agencies and local government units since 2015 (Philippines Climate Change Commission, 2019). This system classifies activities as primarily climate-focused or contributing to climate objectives alongside other priorities, enabling comprehensive tracking that identified approximately 7% of the national budget supporting climate objectives in recent years (Philippines Department of Budget and Management, 2020). The Philippines experience demonstrates both possibilities and challenges of climate budget tracking, as implementation required substantial capacity building, methodology refinement, and system adjustments to overcome initial data quality issues and agency compliance challenges despite strong legal mandates through the Climate Change Act (Bird et al., 2018). Nevertheless, the system has significantly enhanced transparency regarding climate expenditures while informing resource allocation discussions during budget preparation, demonstrating practical benefits that have sustained implementation despite administrative complexities (World Bank, 2020).

Indonesia has similarly developed climate budget tagging systems as part of broader performance-based budgeting reforms, establishing methodologies for identifying, classifying, and measuring climate-relevant expenditures across ministries (Indonesia Ministry of Finance, 2019). The system incorporates both mitigation and adaptation dimensions while distinguishing between dedicated climate activities and broader development expenditures with climate co-benefits, providing nuanced understanding of how different budget components contribute to climate objectives (UNDP, 2018). This tagging approach complements Indonesia's green planning initiatives, including requirements for environmental considerations in development plans and specific climate targets within medium-term development frameworks that collectively enhance policy coherence between planning and budgeting processes (Indonesia Ministry of National Development Planning, 2020). However, implementation remains work in progress, with ongoing challenges in methodology standardization, inter-ministerial coordination, and data quality that limit the system's effectiveness despite significant progress in establishing institutional frameworks for climate budget integration (OECD, 2019).

Cambodia has begun developing climate expenditure tracking capabilities through its Climate Public Expenditure Review process, establishing methodological frameworks for identifying climate-relevant spending while building capacity for eventual integration into regular budget processes (Cambodia Ministry of Economy and Finance, 2019). Vietnam has similarly initiated green budgeting elements through environmental impact screening for major projects, climate criteria within public investment guidelines, and initial efforts toward climate budget classification that collectively represent early steps toward more comprehensive green budgeting approaches (Vietnam Ministry of Planning and Investment, 2019). These developments remain limited compared to more advanced international practices but demonstrate growing regional interest in strengthening connections between budgetary processes and environmental objectives (UNESCAP, 2020).

Regional support mechanisms for green budgeting development include capacity building through the ASEAN Working Group on Climate Change, technical assistance from development partners including UNDP and World Bank on climate finance tracking methodologies, and knowledge sharing platforms that exchange experience on environmental fiscal reforms across member states (ASEAN Secretariat, 2020). These collaborative

approaches potentially accelerate individual country progress through lesson sharing, methodology standardization, and technical support that address capacity constraints limiting green budgeting adoption despite its recognized benefits for enhancing policy coherence and resource allocation effectiveness (UNESCAP, 2019).

Despite these promising developments, green budgeting implementation faces significant challenges across ASEAN, including limited technical capacity within finance ministries regarding environmental assessment, competing reform priorities that constrain attention to green budgeting innovations, coordination difficulties between environmental and financial institutions with different organizational cultures and objectives, and data limitations that complicate environmental impact analysis (OECD, 2021). Nevertheless, green budgeting approaches offer important potential benefits for ASEAN countries navigating complex sustainability transitions with limited fiscal resources, providing institutional mechanisms for enhancing policy coherence and improving resource allocation efficiency through better alignment between stated environmental priorities and actual budget decisions (World Bank, 2020). As climate pressures intensify and environmental considerations become increasingly central to economic development, these integrated fiscal governance approaches will likely gain greater prominence in regional public financial management despite current implementation limitations (Miller, 2019).

2.6 Conceptual Framework

To address these complex, interlinked challenges of the research topic, this thesis draws upon and integrates several key paradigms, as depicted in Figure 1.

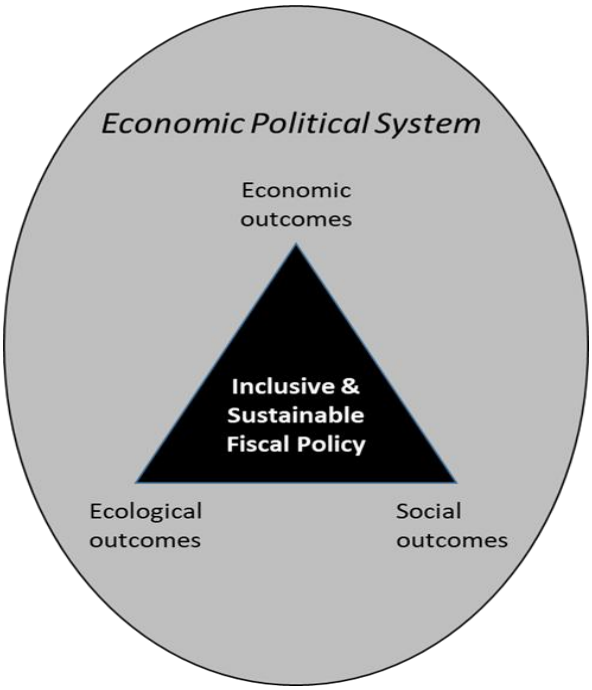

Figure 1: Research paradigms of inclusive and sustainable fiscal policy - source: authors

Inclusive Growth: As a quality measure of economic output, inclusive growth aims to maximize prosperity for all while reducing inequalities in income, wealth, and economic opportunity (Sabir, 2019). It goes beyond traditional measures of economic growth to consider the

distribution of economic benefits across society. Inclusive growth is closely linked to improved socio-economic outcomes and stability (Qureshi et al., 2019). In the ASEAN context, achieving inclusive growth means ensuring that the benefits of economic development reach all segments of society, including marginalized groups and rural communities. The concept represents a fundamental shift from the conventional "growth first, redistribute later" approach that characterized earlier development paradigms (Klasen, 2018). Inclusive growth frameworks acknowledge the bidirectional relationship between equity and economic performance, recognizing that excessive inequality can undermine the sustainability of growth itself through mechanisms such as reduced social cohesion, political instability, and inefficient human capital allocation (Berg & Ostry, 2017). This understanding has gained particular salience in the post-2008 global economic landscape, as policymakers increasingly recognize that growth patterns matter as much as growth rates in determining societal well-being (Ianchovichina & Lundström, 2016). The multidimensional nature of inclusive growth necessitates attention to both processes and outcomes, ensuring that marginalized populations not only receive benefits from economic expansion but also participate meaningfully in economic decision-making and wealth creation (Ramos et al., 2020). For ASEAN economies navigating structural transformation amid rapid technological change, inclusive growth strategies must address the distributional impacts of digitalization, automation, and integration into global value chains that may otherwise exacerbate existing socioeconomic divides (Menon, 2020).

Climate Change Resilience: Another qualitative aspect of economic output, climate change resilience focuses on preserving the natural environment while building resilience to environmental instabilities and their socio-economic consequences (Quak, 2019). For ASEAN countries, many of which are highly vulnerable to climate change impacts, building resilience is crucial for long-term sustainability. This includes adapting infrastructure, agricultural practices, and economic systems to withstand climate-related shocks. Climate resilience extends beyond reactive adaptation to encompass transformative capacity that enables socio-ecological systems to evolve in response to changing environmental conditions (Folke et al., 2021). This conceptualization moves beyond narrow definitions of resilience as the ability to "bounce back" from disruptions toward a more dynamic understanding of resilience as the capacity to "bounce forward" through innovation and systemic transformation (Mochizuki et al., 2018). The interdependence between human and natural systems in determining resilience outcomes is particularly evident in ASEAN countries, where livelihoods remain tightly coupled with natural resource availability and ecosystem services (Djalante et al., 2020). The uneven distribution of climate vulnerabilities within societies introduces an equity dimension to resilience that intersects with broader inclusive growth objectives, as marginalized communities often face disproportionate exposure to climate hazards while possessing limited adaptive capacity (Thomas et al., 2019). Strengthening climate resilience therefore requires attention to both biophysical and socioeconomic factors, including infrastructure design, financial mechanisms, governance arrangements, and knowledge systems that collectively determine a society's adaptive capacity (Pelling & Garschagen, 2019).

Sustainable Fiscal Policy: This research proposes a framework for sustainable fiscal policy that integrates both inclusive growth and climate change resilience. It argues that pro-equity

policies can reduce inequality while pro-green policies can achieve climate change resilience, leading to sustainable outcomes (United Nations, 2020). This integrated approach is particularly relevant for ASEAN countries as they navigate the complex trade-offs between economic growth, social equity, and environmental sustainability. Sustainable fiscal policy transcends conventional public finance frameworks by explicitly incorporating environmental externalities and distributional considerations into fiscal decision-making (Heine et al., 2019). This reconceptualization challenges the artificial separation between fiscal, social, and environmental policies that has historically characterized government operations, advocating instead for systemic integration that recognizes their fundamental interdependence (OECD, 2021). Operationalizing sustainable fiscal policy requires innovative approaches to revenue mobilization, expenditure prioritization, and fiscal risk management that align public financial flows with sustainable development objectives (Buchner et al., 2017). Environmental fiscal reforms represent a particularly promising pathway, offering the potential to simultaneously address market failures, generate revenue, and create incentives for sustainable production and consumption patterns (Pigato, 2019). Beyond specific instruments, sustainable fiscal policy entails transformative governance arrangements that enhance policy coherence across sectors and levels of government while strengthening accountability mechanisms for long-term outcomes (Monkelbaan, 2018). For ASEAN economies with diverse fiscal capacities and institutional contexts, adopting sustainable fiscal policies necessitates context-sensitive approaches that reflect varying stages of development while advancing shared regional sustainability objectives (Jha et al., 2018).

Intergenerational Equity: The concept of intergenerational equity underpins this research, recognizing that current fiscal and environmental policies have long-term implications for future generations. This principle is particularly relevant in the ASEAN context, where rapid development must be balanced with long-term sustainability concerns. Intergenerational equity provides an ethical foundation for sustainable fiscal policy by emphasizing the moral obligations of current generations to preserve opportunities for future generations (Page, 2018). This normative framework challenges conventional economic approaches that heavily discount future costs and benefits, potentially leading to systematic undervaluation of long-term environmental assets and overexploitation of natural resources (Stern, 2018). The intergenerational dimensions of climate change are especially pronounced, as the temporal disconnect between greenhouse gas emissions and their full climatic impacts creates an asymmetric relationship between those who primarily benefit from carbon-intensive activities and those who will bear the costs of resulting climate disruptions (Shue, 2022). Operationalizing intergenerational equity in fiscal policy requires mechanisms to represent future interests in current decision-making processes, potentially through institutional innovations such as dedicated sustainability funds, constitutional environmental provisions, or independent oversight bodies with explicit intergenerational mandates (Boston, 2017). For ASEAN countries experiencing rapid demographic transitions and accelerating environmental change, intergenerational considerations are increasingly relevant to fiscal sustainability assessments that must account for evolving dependency ratios, pension liabilities, infrastructure needs, and natural capital depreciation (ADB, 2018). These interconnected challenges necessitate fiscal frameworks that balance immediate development imperatives with long-term stewardship responsibilities, recognizing that sustainable prosperity depends on maintaining the ecological foundations upon which future economic activity ultimately depends (Barbier & Burgess, 2017).

2.7 Research Gaps

Based on this comprehensive literature review, three key research gaps have been identified that limit our understanding of how fiscal policy can simultaneously address inclusive growth and climate resilience objectives in ASEAN. These gaps reflect broader challenges in sustainable development research, where disciplinary boundaries, methodological limitations, and data constraints have often impeded truly integrated analysis of complex socio-ecological systems (Bai et al., 2019). Addressing these research gaps requires not only additional empirical studies but also conceptual innovations and methodological advancements that can better capture the multidimensional nature of sustainability transitions (Leach et al., 2018). For policymakers seeking evidence-based approaches to complex sustainable development challenges, these research limitations represent significant constraints on designing effective interventions that can navigate inevitable trade-offs while maximizing synergies across economic, social, and environmental objectives (Sachs et al., 2021). The following sections elaborate on these key research gaps and their implications for advancing knowledge regarding sustainable fiscal policy in the ASEAN context.

Gap 1: Integrated Analysis of Inclusive Growth and Climate Resilience

While there is substantial literature on inclusive growth and climate change separately, there is limited research that integrates these issues within a fiscal policy framework, particularly in the ASEAN context (Jupesta et al., 2011). Most existing studies focus on either social equity or environmental sustainability, without fully exploring the potential synergies and trade-offs between these objectives. This compartmentalization reflects broader disciplinary divides between social and environmental sciences that have historically developed distinct theoretical frameworks, methodological approaches, and policy prescriptions despite growing recognition of fundamental interconnections between social and ecological systems (Liu et al., 2018). For fiscal policy analysis specifically, this division has resulted in parallel research streams addressing either redistributive impacts of fiscal instruments or their environmental effects, with limited attention to potential interactions between these dimensions that might create either reinforcing benefits or problematic contradictions requiring policy attention (Cottrell et al., 2019).

The limitations of this siloed approach become particularly evident when examining climate policy impacts on vulnerable groups, as distributional effects fundamentally shape both the political feasibility and ethical acceptability of environmental policies yet often receive insufficient attention in climate-focused research (Schlosberg et al., 2017). Similarly, social policy analysis frequently overlooks environmental implications despite mounting evidence that ecological conditions fundamentally affect wellbeing outcomes across different population segments, with disadvantaged groups often facing disproportionate exposure to environmental hazards while simultaneously possessing limited adaptive capacity to manage changing conditions (Chancel, 2020). These research limitations constrain policy development by providing incomplete understanding of how fiscal instruments affect multiple sustainability dimensions, potentially leading to unintended consequences or missed opportunities for designing interventions that simultaneously advance both social and environmental objectives (Stern & Stiglitz, 2021).

Gap 2: Multilateral Policy Coordination

The role of multilateral policy coordination in addressing inequality and climate change in ASEAN is underexplored. Given the transboundary nature of these challenges, understanding how ASEAN countries can cooperate to achieve better outcomes is crucial (Ciplet, 2015). This research gap reflects broader limitations in our understanding of international cooperation on complex global challenges, where theoretical frameworks from international relations and global governance studies often struggle to explain empirical patterns of cooperation and conflict across different issue domains and geopolitical contexts (Bernstein & van der Ven, 2019). For ASEAN specifically, the region's distinctive institutional characteristics—including its emphasis on consensus, non-interference principles, and flexible implementation approaches—create particular dynamics in multilateral coordination that may differ significantly from other regional contexts where cooperation theories have been primarily developed and tested (Nesadurai, 2018).

The limitations of current research on multilateral coordination are particularly evident regarding complex sustainability challenges that span multiple policy domains and governance levels, requiring integrated approaches across traditionally separate issue areas like trade, investment, environment, and social policy (Biermann et al., 2017). Climate change and inequality represent paradigmatic examples of these complex challenges, as both phenomena involve transboundary dimensions that create collective action problems alongside deeply embedded domestic political considerations that complicate international coordination despite potential mutual benefits from cooperative approaches (Keohane & Victor, 2016). These coordination challenges become especially pronounced when addressing interactions between climate and inequality issues, as distributional concerns fundamentally shape international climate negotiations while environmental pressures increasingly influence development trajectories and social outcomes across interconnected economies (Klinsky et al., 2017). Understanding these complex dynamics requires research approaches that can analyse multi-level governance arrangements while accounting for both power asymmetries and institutional legacies that shape coordination possibilities beyond rational cooperation theories focused primarily on mutual interests (Newell, 2019).

Gap 3: National Policy Integration

There is a lack of research on how ASEAN countries can integrate various policy objectives – economic growth, social equity, and environmental sustainability – into a coherent fiscal policy framework (Laukkonen et al., 2009). Most existing studies focus on individual policy instruments rather than comprehensive policy packages. This research gap reflects broader challenges in understanding policy integration processes, where theoretical frameworks from public administration and policy studies often struggle to explain why integration efforts frequently fail despite widespread recognition of their importance for addressing complex challenges that span traditional sectoral boundaries (Tosun & Lang, 2017). For sustainable development specifically, policy integration faces particular difficulties given fundamental tensions between different objectives, institutionalized fragmentation across government agencies, and political economy factors that often prioritize immediate economic concerns over longer-term social and environmental considerations despite rhetorical commitments to integrated approaches (Nilsson et al., 2018).

The limitations of current research on policy integration are especially pronounced regarding fiscal frameworks, which fundamentally shape broader policy possibilities yet often receive

insufficient attention in sustainable development literature focused primarily on sectoral interventions rather than underlying fiscal foundations that enable or constrain implementation across multiple domains (Bird, 2018). This gap becomes particularly problematic when addressing complex sustainability transitions that require coordinated transformations across energy systems, transportation networks, industrial structures, and consumption patterns that collectively determine both social and environmental outcomes beyond what isolated sectoral policies can achieve independently (Köhler et al., 2019). Understanding these integration challenges requires research approaches that can analyse both technical policy design considerations and political economy factors that fundamentally shape integration possibilities beyond rational planning theories that inadequately capture implementation realities amid competing priorities and interests across different government agencies and stakeholder groups (Rogge & Reichardt, 2016).

Despite the growing recognition of the importance of Sustainable Fiscal Policy, there is limited research on integrated fiscal policy concepts to address the pressing inclusive growth and climate change mitigation issues in ASEAN context. This gap is particularly notable given the region's economic significance and environmental vulnerability. The absence of comprehensive analytical frameworks that capture the complex interrelationships between fiscal instruments, distributional outcomes, and environmental impacts represents a significant impediment to evidence-based policymaking in ASEAN member states (Anbumozhi et al., 2020). While international organizations have increasingly emphasized the importance of policy coherence for sustainable development, the translation of these general principles into context-specific fiscal strategies remains underdeveloped, especially for middle-income economies navigating complex structural transformations (OECD, 2019). Academic and policy discourse on fiscal sustainability in Southeast Asia has historically prioritized conventional metrics of fiscal space and debt sustainability, with limited attention to broader conceptions of sustainability that incorporate environmental externalities and distributional dynamics (Jha et al., 2019). This conceptual limitation has practical consequences, as it constrains the development of innovative fiscal approaches that could simultaneously address economic, social, and environmental objectives.

Existing literature has largely focused on either inclusive growth or climate change mitigation in isolation. For instance, Anand et al. (2013) examined inclusive growth in developing Asia, including some ASEAN countries, but did not extensively consider environmental factors. Conversely, Overland et al. (2017) studied ASEAN energy cooperation and its implications for climate change mitigation but did not deeply explore the inclusive growth dimension. This siloed approach reflects broader disciplinary boundaries between development economics, environmental economics, and public finance that have impeded integrated analysis (Barbier & Burgess, 2020). The compartmentalization of research agendas mirrors institutional fragmentation within governments, where finance ministries, social welfare departments, and environmental agencies often operate with limited coordination and sometimes conflicting objectives (Monkelbaan, 2019). Even within the growing literature on environmental fiscal reform, there remains insufficient attention to the distributional implications of green fiscal instruments, particularly in developing and emerging market contexts where informal economic activity is prevalent and administrative capacity may be constrained (Cottrell et al., 2018). Similarly, research on inclusive fiscal policies has often neglected their environmental

implications, potentially overlooking important synergies and trade-offs between social and ecological objectives (Schlegelmilch et al., 2017).

Furthermore, while there is a growing body of work on sustainable development in ASEAN (e.g., Anbumozhi & Kimura, 2018), the specific role of fiscal policy in simultaneously addressing inequality and climate change remains underexplored. This gap is significant because fiscal policy is a key lever through which governments can influence both economic outcomes and environmental sustainability. The analytical frameworks needed to evaluate fiscal policies through a multidimensional sustainability lens are still evolving, with particular challenges in quantifying environmental externalities, assessing distributional impacts across diverse socioeconomic groups, and modelling complex interaction effects between different policy instruments (Dorband et al., 2019). The absence of comprehensive empirical studies examining the combined social and environmental impacts of fiscal reforms in ASEAN countries limits policymakers' ability to design effective intervention strategies tailored to specific national contexts (Haffoudhi & Bellakhal, 2020). This research deficit is especially problematic given the region's distinctive characteristics, including its export-oriented development model, high vulnerability to climate impacts, and complex political economy considerations that shape the feasibility of various fiscal reform options (Bierbom et al., 2021). As ASEAN economies navigate post-pandemic recovery pathways and establish medium-term fiscal frameworks, there is an urgent need for integrated analytical approaches that can inform policy design to ensure that fiscal consolidation efforts do not undermine either social inclusion or environmental sustainability objectives (Dikau et al., 2021).

This thesis addresses these research gaps by developing an integrated framework that explicitly considers the interconnections between fiscal policy, inclusive growth, and climate resilience in the ASEAN context. By synthesizing insights from public finance, development economics, and environmental economics, this research contributes to a more holistic understanding of sustainable fiscal policy that acknowledges both synergies and trade-offs between social and environmental objectives (Zucman, 2019). The empirical analysis of fiscal policy impacts across multiple dimensions of sustainability provides valuable evidence for policymakers seeking to optimize the design of fiscal instruments to achieve inclusive and climate-resilient development outcomes (Jakob et al., 2020). Moreover, by situating the analysis within the specific institutional, economic, and environmental contexts of ASEAN member states, this research generates regionally relevant insights that can inform both national policy formulation and regional cooperation initiatives aimed at advancing sustainable development throughout Southeast Asia (Howe & Sims, 2021). As ASEAN economies work toward fulfilling their commitments under the Paris Agreement and the Sustainable Development Goals, this integrated approach to fiscal policy analysis offers a valuable framework for identifying policy pathways that can simultaneously advance economic, social, and environmental objectives in a coherent and synergistic manner.

2.8 Research Questions

To address the identified research gap and contribute to both academic understanding and policy development, this thesis is structured around one general research question and three specific research questions:

General Research Question:

How can fiscal policies in ASEAN member economies, through redistribution of national income, achieve stability, inclusive economic growth, and sustainable development simultaneously?

This overarching question encapsulates the core challenge facing ASEAN policymakers: how to design fiscal policies that can balance multiple, sometimes competing, objectives. It recognizes the central role of fiscal policy in shaping economic outcomes and the potential for innovative policy design to achieve synergies between inclusive growth and climate resilience. The framing of this question acknowledges the multifunctional nature of contemporary fiscal systems that must simultaneously fulfil allocative, distributional, and stabilization functions while addressing emerging sustainability imperatives (Musgrave & Musgrave, 2017). Within this broad inquiry lies a fundamental tension between conventional economic orthodoxy that often prioritizes fiscal prudence and macroeconomic stability, and emerging paradigms that emphasize the transformative potential of strategic fiscal interventions to advance structural economic, social, and environmental transitions (Stiglitz, 2019). The question implicitly challenges the notion that these objectives necessarily involve zero-sum trade-offs, instead inviting exploration of potential complementarities and synergistic relationships between different dimensions of sustainable development (Dasgupta, 2021). By focusing specifically on redistribution mechanisms, the question directs attention to the political economy dynamics of fiscal reform, recognizing that the distribution of costs and benefits across different societal groups fundamentally shapes the feasibility and sustainability of policy interventions (Acemoglu & Robinson, 2022). For ASEAN economies with diverse political systems, administrative capacities, and development priorities, the question invites context-sensitive analysis that acknowledges both common regional challenges and distinctive national circumstances that influence optimal policy approaches (Kanbur, 2020).

Specific Research Questions:

RQ1*: What are the main drivers and impediments of climate change and inequality issues in ASEAN arising from externalities of economic activity, and how are governments addressing these issues at policy, regional, and global levels?*

This question aims to provide a comprehensive understanding of the root causes of inequality and climate change in the ASEAN context. It recognizes that these challenges are often the result of externalities from economic activities – costs or benefits that affect parties not directly involved in the transactions causing them. By identifying these drivers and impediments, the research can inform more targeted and effective policy interventions. The framing around externalities situates the analysis within environmental economics and welfare theory, drawing attention to market failures that result in socially suboptimal outcomes when private costs and benefits diverge from social costs and benefits (Coase, 2019). This theoretical lens provides analytical clarity while facilitating examination of potential corrective mechanisms through fiscal instruments that can internalize these externalities (Nordhaus, 2019). The question's emphasis on identifying both drivers and impediments acknowledges the complex causal pathways through which economic activities generate unequal and environmentally harmful outcomes, including technological choices, institutional arrangements, power dynamics, and path dependencies that can perpetuate unsustainable patterns despite their recognized

disadvantages (Aghion et al., 2019). By examining these structural determinants, the research moves beyond symptomatic treatments to address root causes of sustainability challenges facing ASEAN societies (Raworth, 2018).

The question also examines current government responses at multiple levels:

At the policy level: Assessing national policies and programs aimed at addressing inequality and climate change. This includes examination of domestic fiscal, regulatory, and investment frameworks that shape distributive outcomes and environmental impacts, with attention to both policy design features and implementation contexts that influence effectiveness (Howlett, 2019). The analysis encompasses both explicitly redistributive and environmental policies as well as ostensibly neutral policies in areas such as infrastructure, education, and energy that nevertheless have significant implications for both equality and sustainability outcomes (Mkandawire, 2020).

At the regional level: Examining ASEAN-wide initiatives and cooperation mechanisms. This component recognizes the transboundary nature of many environmental challenges and the potential efficiency gains from coordinated regional approaches to addressing shared sustainability concerns (Anbumozhi, 2018). It explores formal ASEAN frameworks such as the ASEAN Socio-Cultural Community Blueprint and the ASEAN Cooperation on Environment, as well as informal coordination mechanisms and knowledge-sharing platforms that facilitate policy learning across member states (Naungayan, 2020).

At the global level: Considering ASEAN countries' engagement with international agreements and global efforts to address these challenges. This aspect examines how ASEAN member states navigate global governance frameworks such as the Paris Agreement, Sustainable Development Goals, and international tax cooperation initiatives, analysing both their formal commitments and substantive implementation efforts (Biermann, 2018). It explores how global norms and standards influence domestic policy choices, as well as how ASEAN countries collectively articulate their interests and priorities in international forums addressing climate and inequality challenges (Vihma, 2021).

RQ2: *To what extent do existing policies and programs implemented by ASEAN Member States proactively mitigate climate change and inequality issues, and to what extent do AMS governments engage in multilateral policy coordination?*

This question builds on the first by evaluating the effectiveness of current policy responses. It involves a critical assessment of existing policies and programs, examining their design, implementation, and outcomes. The question also considers the degree of policy coordination among ASEAN countries, recognizing that many of these challenges require regional cooperation to address effectively. The evaluative framing of this question invites empirical assessment of policy effectiveness against normative criteria of sustainability, equity, and resilience, moving beyond descriptive accounts to critically examine whether current approaches are adequate to address the scale and urgency of challenges facing the region (Hajer et al., 2022). The explicit focus on proactive mitigation directs attention to anticipatory governance mechanisms that aim to prevent or minimize adverse outcomes rather than merely responding to crises after they emerge, reflecting growing recognition of the importance of preventive approaches in both social and environmental policy domains (Boston, 2017). The temporal dimension implicit in this formulation acknowledges the intertemporal trade-offs inherent in sustainability governance, where short-term costs may be

necessary to secure long-term benefits that extend beyond conventional political and economic planning horizons (Hepburn, 2018).

By examining policy coordination alongside substantive policy content, this question recognizes the importance of governance arrangements and institutional architectures in determining collective capacity to address complex sustainability challenges (Ostrom, 2018). The focus on multilateral coordination reflects the reality that many environmental and social challenges transcend national boundaries and jurisdictional competencies, requiring collaborative approaches that overcome collective action problems while respecting sovereignty concerns (Abbott & Snidal, 2018). The question invites analysis of both formal coordination mechanisms established through ASEAN frameworks and informal networks, knowledge exchanges, and policy diffusion processes that facilitate regional convergence around sustainability practices (Bernstein & Cashore, 2022). By examining variation in coordination patterns across different policy domains and member states, the research can identify enabling conditions and constraints that influence the feasibility and effectiveness of regional approaches to sustainability governance (Kahler, 2017). This comparative dimension provides valuable insights into the political economy factors that shape opportunities for deeper integration and more ambitious collective action to address shared climate and inequality challenges facing ASEAN societies (Vergragt et al., 2018).

RQ3: a) How can fiscal policy balance socio-economic stability and sustainable development goals with pro-equity and pro-green qualities in a sustainable fiscal policy model? b) How can an effective mitigation mechanism be integrated at regional and global levels through multilateral policy coordination and at the local level through policy integration?

This two-part question is forward-looking, aiming to develop a framework for sustainable fiscal policy in ASEAN. Part (a) focuses on the design of fiscal policies that can simultaneously promote economic stability, social equity, and environmental sustainability. It involves exploring innovative policy instruments and mechanisms that can achieve multiple objectives. The explicit recognition of potentially competing objectives—socioeconomic stability, equity, and environmental sustainability—acknowledges the complex trade-offs that policymakers face when designing fiscal interventions with multiple intended outcomes (Rode et al., 2019). This framing invites exploration of both potential synergies where single instruments can advance multiple objectives simultaneously, and complementary policy packages where different instruments address distinct dimensions of sustainability while minimizing negative interaction effects (Barbier & Burgess, 2020). The emphasis on "balance" reflects recognition that perfect optimization across all objectives may be unrealistic, suggesting instead a satisficing approach that seeks acceptable thresholds across multiple criteria rather than maximization of any single dimension (Simon, 2018). By specifically referencing a "sustainable fiscal policy model," the question signals intention to develop a conceptual framework with analytical rigor and practical applicability that can guide policy design across different ASEAN contexts (Costanza & Kubiszewski, 2017).

Part (b) considers the implementation of such policies, recognizing that effective mitigation of inequality and climate change requires action at multiple levels. It explores how local, regional,

and global policy coordination can enhance the effectiveness of sustainable fiscal policies. This implementation-focused component acknowledges that even well-designed policies may fail to achieve intended outcomes if not effectively translated into practice through appropriate governance arrangements, administrative procedures, and coordination mechanisms (Peters & Pierre, 2018). The multi-level perspective reflects the reality that sustainability challenges manifest across different spatial scales, from localized environmental degradation and community-level inequalities to global climate systems and international economic structures that influence distributive outcomes (Cash et al., 2020). This framing invites analysis of vertical integration between governance levels and horizontal integration across policy domains, recognizing that fragmented approaches often produce suboptimal results due to negative spillovers, duplicated efforts, or contradictory interventions (Hooghe & Marks, 2019). The emphasis on "effective mitigation" underscores the results-oriented focus of this inquiry, moving beyond procedural assessments of policy adoption or implementation processes to examine substantive impacts on environmental and social outcomes that ultimately determine the value of policy interventions (Daly et al., 2019). By addressing both coordination across jurisdictions and integration across policy domains, this question engages with fundamental governance challenges that often undermine sustainability efforts despite substantial investments and formal commitments (Meadowcroft & Steurer, 2022).

Addressing these questions, this thesis aims to provide a comprehensive analysis of the challenges facing ASEAN countries in achieving inclusive and sustainable development, as well as offering practical policy recommendations for addressing these challenges. The integrated framework developed through this research contributes to emerging scholarship on sustainability governance while providing actionable insights for policymakers navigating complex socio-ecological transitions in Southeast Asia. By connecting theoretical advances in sustainable development with empirical evidence from diverse ASEAN contexts, this thesis enhances understanding of both the universal principles and context-specific considerations that shape effective responses to interconnected climate and inequality challenges. The significance of this contribution extends beyond academic discourse to inform practical policy design at multiple governance levels, potentially influencing development trajectories across one of the world's most economically dynamic and environmentally significant regions.

2.9 Conclusion

This comprehensive literature review has traced the evolution of economic thought relevant to inclusive growth and climate resilience, from classical economics to modern environmental economics. It has highlighted the unique challenges faced by ASEAN countries in pursuing inclusive and sustainable growth and explored emerging theoretical frameworks and policy instruments for addressing these challenges. The review demonstrates the profound evolution in economic thinking regarding both equity and environmental dimensions of development, from early paradigms that treated these concerns as peripheral considerations to

contemporary frameworks that position them as central elements of sustainable prosperity (Stiglitz et al., 2019). This conceptual evolution reflects growing recognition that narrow conceptions of economic progress focused primarily on aggregate growth metrics inadequately capture the multidimensional nature of human wellbeing that ultimately depends on both social cohesion and ecological sustainability alongside material advancement (Raworth, 2018). For ASEAN countries navigating complex development transitions amid significant inequality and environmental pressures, these evolving frameworks offer important conceptual foundations for reimagining prosperity beyond conventional growth metrics while acknowledging legitimate aspirations for improved living standards across diverse populations (ASEAN Secretariat, 2020).

The review reveals that while ASEAN countries have made significant progress in economic development, they face persistent challenges in ensuring that growth is both inclusive and environmentally sustainable. The region's vulnerability to climate change adds urgency to the need for integrated policy approaches that can address multiple objectives simultaneously. ASEAN's remarkable economic expansion has generated substantial benefits, lifting millions from poverty while establishing the region as a significant global economic player with rapidly developing industrial capacity, technological capabilities, and human capital (ADB, 2021). However, this impressive aggregate performance masks complex distributional patterns, with benefits unevenly distributed across countries, regions, sectors, and population segments in ways that generate persistent exclusion despite overall advancement (Jomo, 2019). Simultaneously, the development path has created significant environmental pressures through deforestation, biodiversity loss, air and water pollution, carbon emissions, and other ecological impacts that threaten both regional ecosystems and human wellbeing dependent on their services (UNEP, 2020). These challenges occur against a backdrop of exceptional climate vulnerability, with the region facing disproportionate exposure to sea-level rise, intensifying storms, changing precipitation patterns, and other climate impacts that create existential threats to coastal communities, agricultural systems, urban infrastructure, and economic activities across multiple sectors (IPCC, 2022). This combined challenge of addressing inequality amid accelerating climate impacts represents perhaps the defining policy challenge for ASEAN in coming decades, requiring innovative approaches that can navigate complex trade-offs while identifying strategic interventions offering synergistic benefits across multiple sustainability dimensions (Anbumozhi & Kalirajan, 2020).

The theoretical frameworks of green growth, inclusive green growth, and just transition offer promising avenues for integrating economic, social, and environmental concerns. However, their application in the ASEAN context requires careful consideration of local conditions and constraints. These frameworks provide valuable conceptual foundations for reimagining development pathways that can simultaneously address multiple objectives rather than treating them as separate or sequential concerns requiring inevitable trade-offs (Hallegatte et al., 2019). Green growth approaches challenge the notion that environmental protection necessarily constrains economic advancement, highlighting instead potential complementarities through efficiency improvements, technological innovation, and structural economic changes that can deliver prosperity with reduced ecological impacts (Bowen & Hepburn, 2018). Inclusive green growth frameworks extend this thinking to explicitly incorporate distributional dimensions, recognizing that sustainability transitions must address equity concerns to remain both politically viable and ethically acceptable amid significant adjustment costs and benefits that may otherwise distribute regressively without careful policy design (Fankhauser & Jotzo, 2018). Just transition approaches further emphasize procedural

dimensions and power relations that fundamentally shape both the distribution of transition impacts and the design of policy responses, highlighting the importance of meaningful participation by affected communities in developing transition strategies rather than imposing solutions without their involvement (Newell & Mulvaney, 2019).

While these frameworks offer valuable orientation for ASEAN's sustainability transitions, their application requires careful contextualization to reflect the region's distinctive characteristics rather than uncritically applying models developed for different socioeconomic and environmental contexts (Sovacool, 2019). The region's development diversity—spanning high-income Singapore through middle-income Malaysia and Thailand to lower-income Cambodia, Laos, and Myanmar—necessitates differentiated approaches reflecting varying priorities, capacities, and constraints across member states despite shared regional challenges (UNESCAP, 2019). Similarly, ASEAN's high climate vulnerability, significant natural capital, export-oriented economic models, and distinctive governance arrangements all shape the feasibility and effectiveness of different transition strategies, requiring careful adaptation of general frameworks to specific regional realities rather than one-size-fits-all prescriptions disconnected from implementation contexts (Anbumozhi et al., 2020). This contextual understanding underlies the importance of developing regionally appropriate sustainability frameworks that build on universal principles while acknowledging ASEAN's particular development situation and institutional landscape (ASEAN Secretariat, 2018).

Fiscal policy emerges as a key tool for promoting inclusive and sustainable development, with environmental fiscal reforms, pro-poor environmental policies, and green budgeting offering potential pathways for ASEAN countries. However, the effectiveness of these instruments in the ASEAN context remains an area ripe for further research. Fiscal systems represent particularly important leverage points for sustainability transitions given their fundamental influence on economic incentives, resource allocation patterns, distributional outcomes, and investment decisions that collectively shape development trajectories across multiple dimensions (Cottrell et al., 2019). Environmental fiscal reforms offer mechanisms for correcting market failures regarding environmental externalities while potentially generating revenue for other sustainable development priorities, though requiring careful design to address equity concerns, competitiveness impacts, and implementation challenges that influence their effectiveness beyond theoretical design considerations (Pigato, 2019). Pro-poor environmental approaches explicitly incorporate distributional dimensions into environmental policy design, using revenue recycling, targeted compensation, and strategic infrastructure investments to ensure that sustainability transitions enhance rather than undermine social equity while maintaining necessary environmental price signals (Rentschler & Bazilian, 2017). Green budgeting initiatives further integrate environmental considerations throughout fiscal governance systems, enhancing transparency regarding sustainability impacts while systematically incorporating environmental objectives into resource allocation decisions beyond isolated green policy instruments (OECD, 2021).

For ASEAN countries specifically, these fiscal approaches offer important potential tools for navigating complex sustainability transitions, though with significant adaptation needs to reflect the region's distinctive circumstances including varying fiscal capacities, significant informality limiting conventional tax instrument effectiveness, export-oriented economic models creating competitiveness concerns, and implementation challenges related to administrative constraints and political economy factors that influence reform feasibility beyond technical design considerations (Bird & Zolt, 2018). Early applications of these approaches across the region—including Singapore's carbon tax, Indonesia's subsidy

reforms, the Philippines' climate budget tagging, and various renewable energy incentive programs—demonstrate both possibilities and challenges of environmental fiscal implementation in ASEAN contexts, providing valuable learning opportunities while highlighting persistent gaps between theoretical ideals and implementation realities (UNESCAP, 2020). Understanding these implementation dynamics represents a crucial research priority for enhancing fiscal policy effectiveness in addressing ASEAN's complex sustainability challenges, requiring empirical investigation that can identify context-specific success factors and constraints beyond general theoretical frameworks that may inadequately capture regional particularities (Monkelbaan, 2021).

The identified research gaps provide a clear rationale for this study's focus on developing an integrated fiscal policy framework that addresses both inequality and climate change in the ASEAN context. By addressing these gaps, this research aims to contribute to both academic understanding and practical policy-making in the region, offering pathways towards more inclusive, resilient, and sustainable development in ASEAN countries. The limited integrated analysis of inclusive growth and climate resilience within fiscal policy frameworks represents a significant knowledge gap that constrains evidence-based policymaking despite growing recognition of fundamental interdependencies between economic, social, and environmental dimensions of sustainable development (Sachs et al., 2019). Similarly, insufficient understanding of multilateral coordination mechanisms limits ASEAN's capacity to address transboundary dimensions of sustainability challenges that individual countries cannot effectively manage alone, despite potential collective benefits from coordinated approaches that avoid destructive competition while enhancing policy effectiveness through regional cooperation (Nesadurai, 2018). The research gap regarding national policy integration further constrains sustainability governance by limiting understanding of how countries can overcome institutional fragmentation, competing priorities, and implementation barriers to develop truly coherent approaches across traditionally separate policy domains despite rhetorical commitments to integration (Jordan & Lenschow, 2018).

Addressing these research gaps requires both theoretical innovations that can better conceptualise complex socio-ecological systems and empirical investigations that can identify context-specific implementation factors beyond general principles disconnected from practical realities (Bai et al., 2019). By developing integrated frameworks that explicitly examine interactions between different sustainability dimensions, analysing both constraints and opportunities for enhanced regional coordination, and identifying viable pathways for policy integration amid real-world governance constraints, this research aims to provide both conceptual advancements and practical insights that can inform more effective approaches to ASEAN's complex sustainability challenges (ASEAN Secretariat, 2020). This contribution has both scholarly significance in advancing integrated sustainability science and practical importance for policymakers seeking evidence-based approaches to navigating complex trade-offs amid resource constraints and competing priorities that characterize real-world governance contexts beyond theoretical ideals (Leach et al., 2018).

As ASEAN countries continue to navigate the challenges of the 21st century, the need for integrated, evidence-based approaches to fiscal policy has never been greater. This study seeks to contribute to this critical endeavour by providing a comprehensive analysis of the potential for fiscal policy to promote both inclusive growth and climate resilience in the ASEAN region. The region stands at a crucial juncture, with development decisions in coming decades fundamentally shaping both social cohesion and environmental sustainability for generations ahead amid accelerating climate impacts, technological disruptions, demographic transitions,

and geopolitical realignments that collectively create complex policy challenges requiring innovative responses beyond conventional approaches (ADB, 2021). Fiscal policy represents a particularly important lever for addressing these challenges given its fundamental influence on incentive structures, resource allocation patterns, and distributional outcomes that collectively shape development trajectories across multiple dimensions (IMF, 2021). By developing more integrated approaches to fiscal policy that can simultaneously address economic, social, and environmental objectives, ASEAN countries can potentially forge development pathways that deliver broadly shared prosperity while preserving ecological foundations necessary for long-term wellbeing amid planetary boundaries that ultimately constrain all human activities regardless of economic or political arrangements (Raworth, 2018).

This research aims to support this critical transition by providing both conceptual frameworks and empirical evidence regarding how fiscal policy can be leveraged to promote sustainability transitions that enhance human wellbeing while addressing critical environmental challenges facing the region and indeed the planet (Steffen et al., 2021). By combining theoretical insight with practical policy guidance, the study seeks to bridge persistent gaps between sustainability science and implementation practice that have often limited the real-world impact of research despite its potential contributions to addressing humanity's most pressing challenges in the 21st century and beyond (Clark & Harley, 2020). Through this integrated approach to sustainable fiscal policy, the research aims to contribute to ASEAN's ongoing efforts to forge development pathways that truly deliver on the promise of prosperity for all, now and for future generations.

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3 CHAPTER THREE: STYLISED FACTS

3.1 Introduction

This chapter presents a comprehensive analysis of the stylized facts shaping inclusive and sustainable fiscal policy in ASEAN, with a comparative focus on the Nordic countries as a gold standard for sustainability and inclusivity. The Association of Southeast Asian Nations (ASEAN) represents one of the most economically dynamic and demographically diverse regions in the global economy yet, faces significant challenges in balancing growth objectives with social equity and environmental sustainability (Jha et al., 2020). The Nordic model, characterized by its robust welfare systems, progressive taxation, and early adoption of climate-conscious policies, offers valuable insights despite the considerable contextual differences between the regions (Andersen et al., 2019).

By examining historical and political contexts, macroeconomic trends, fiscal policy and inequality, and climate change and environmental policies, we aim to provide a robust foundation for understanding the challenges and opportunities facing ASEAN in pursuing inclusive growth and climate resilience. The historical trajectory of fiscal policy development in both regions has been shaped by distinct political economies, colonial legacies in Southeast Asia, and the consensus-oriented governance traditions of Scandinavia, creating divergent institutional frameworks for addressing common challenges (Booth, 2019). These historical contingencies have profound implications for contemporary policy options and constraints.

The macroeconomic landscape of ASEAN exhibits remarkable heterogeneity, with member states ranging from high-income Singapore to lower-middle-income economies like Cambodia and Myanmar. This economic diversity necessitates nuanced approaches to fiscal policy that account for varying levels of state capacity, economic structure, and development priorities (Menon & Melendez, 2017). In contrast, the Nordic economies demonstrate greater homogeneity in their economic structures and development levels, facilitating more coordinated and comprehensive approaches to inclusive growth and environmental protection (Midttun & Witoszek, 2021).

Inequality within ASEAN has followed complex patterns, with rapid economic growth often accompanied by widening disparities in income, wealth, and opportunity. The relationship between fiscal policy instruments—taxation, transfers, and public expenditure—and distributional outcomes requires careful examination against the backdrop of changing economic structures and global integration (Kanbur et al., 2022). The Nordic experience with reconciling market dynamism and social cohesion through fiscal mechanisms offers potential lessons, though direct policy transfer must account for institutional and cultural specificities (Holmberg & Rothstein, 2020).

Climate change presents an existential threat to many ASEAN member states, particularly those with extensive coastlines, large agricultural sectors, and densely populated urban centres vulnerable to extreme weather events. Fiscal policy responses to environmental challenges must balance mitigation and adaptation priorities while addressing distributional concerns, as climate impacts and transition costs often fall disproportionately on disadvantaged populations (Anbumozhi & Kalirajan, 2017). The Nordic countries' experiences with carbon taxation, renewable energy investment, and green fiscal reforms provide valuable precedents, albeit in contexts of higher average incomes and stronger institutional frameworks (Mundaca & Markandya, 2016).

This analysis will serve as a crucial backdrop for the development of an integrated fiscal policy framework that addresses both inequality and climate change in the ASEAN context. By systematically comparing and contrasting the ASEAN and Nordic approaches, we can identify potential pathways for policy innovation that respects regional particularities while drawing on global best practices. The dual challenges of inequality and climate change are fundamentally interconnected, requiring coordinated fiscal responses that leverage synergies and manage trade-offs across multiple policy domains (Islam & Winkel, 2017). Through this chapter's detailed examination of stylized facts, we establish the empirical and conceptual groundwork for subsequent analysis of specific policy instruments and reform strategies.

3.2 The Nordic Model: A Gold Standard for Inclusive and Sustainable Growth

The Nordic countries, comprising Denmark, Finland, Iceland, Norway, and Sweden, have demonstrated for decades that inclusive outcomes and environmental preservation can be achieved alongside sustainable prosperity. These nations consistently lead global indices of inclusive and sustainable growth, including measures of inequality (GINI) and emissions (CO2 per capita). Their success offers valuable insights for other regions, including ASEAN, in balancing economic growth with social equity and environmental sustainability.

The Nordic model is characterized by a unique blend of socialist and capitalist principles, often referred to as a "socialist-capitalistic market economy" (Scase, 2016). This model features a strong welfare state with high levels of social protection, high labour union participation, progressive taxation systems, and a strong emphasis on environmental sustainability. The welfare state provides comprehensive social services, including free education, universal healthcare, and generous unemployment benefits, which contribute to high levels of social mobility and economic security. This distinctive economic architecture has evolved over decades of democratic negotiation and compromise, resulting in what Andersen and Björklund (2022) describe as "capitalism with a human face" – a system that harnesses market dynamism while constraining its tendency toward social polarization.

The institutional foundations of Nordic economic success extend beyond welfare provisions to encompass strong Labor market institutions, sophisticated cooperative arrangements between government, industry, and Labor unions, and robust democratic governance (Kvist et al., 2021). The tripartite coordination among these stakeholders has facilitated remarkable adaptability in the face of economic restructuring and globalization pressures. As Kettunen (2018) argues, the Nordic countries have managed to maintain their distinctive social models while successfully integrating into global markets through continuous institutional innovation and policy learning. This adaptability has been crucial in allowing these economies to weather economic storms while preserving their commitment to inclusivity and sustainability.

The success of this model is evident in the comparative performance of Nordic countries across various indicators. In terms of income inequality, the Nordic countries boast an average GINI coefficient of 0.26 in 2019, significantly lower than the ASEAN average of 0.38 (World Bank, 2021). This lower level of inequality is attributed to their progressive taxation systems and comprehensive social welfare programs, which effectively redistribute wealth and provide equal opportunities for all citizens. The redistributive capacity of Nordic fiscal systems

operates through multiple channels, including highly progressive income taxation, substantial wealth taxes, comprehensive social insurance, and universal public services that benefit citizens across the income spectrum (Barth et al., 2021). Importantly, these redistributive mechanisms have been maintained despite significant economic liberalization in recent decades, demonstrating that equity and market efficiency can be complementary rather than contradictory policy objectives.

Environmental sustainability is another area where Nordic countries excel. In 2018, the average CO2 emissions per capita in Nordic countries was 5.1 metric tons, compared to 7.2 for ASEAN countries (World Bank, 2021). This superior environmental performance is the result of stringent environmental regulations, significant investments in renewable energy, and a strong cultural emphasis on ecological preservation. The Nordic approach to environmental governance has been characterized by what Eckersley (2020) terms "ecological modernization" – the strategic integration of environmental objectives into core economic policy rather than treating them as peripheral concerns. This integration is evident in pioneering policies such as Sweden's carbon tax introduced in 1991, Finland's circular economy roadmap, and Denmark's aggressive transition to wind power (Mundaca et al., 2019). The Nordic Council of Ministers has further institutionalized this commitment through its Vision 2030 framework, which explicitly links sustainable development goals with economic competitiveness strategies (Nordic Council of Ministers, 2020).

The Nordic countries also consistently rank high in human development indices. In 2019, they achieved an average Human Development Index (HDI) score of 0.94, compared to 0.72 for ASEAN countries (UNDP, 2020). This high HDI score reflects the region's success in combining economic prosperity with social development and environmental sustainability. The multidimensional nature of Nordic development extends beyond material prosperity to encompass what Stiglitz et al. (2018) term "quality of life economics" – approaches that prioritize well-being, social connection, and environmental quality alongside traditional economic metrics. Educational attainment in Nordic countries is particularly impressive, with high levels of both excellence and equity in educational outcomes (OECD, 2019). These achievements in human development contribute to knowledge-intensive economies capable of maintaining high wages and social standards in a competitive global environment.

The success of the Nordic model stands in stark contrast to the Anglo-Saxon cluster economies, such as the United States and the United Kingdom. These countries are characterized by liberal capitalist market economies with less government intervention (Kaufmann, 2013). While they have often produced strong economic growth, this growth has been less inclusive, and these nations have taken a more passive stance on inequality and climate change issues (Paris 2019, G20, World Economic Forum 2020). The divergent trajectories of these economic models highlight what Hall and Soskice (2001) identified as "varieties of capitalism" – the persistence of distinctive national economic models despite globalization pressures toward convergence. Thelen (2019) further elaborates that the Nordic countries' distinctive path represents a "coordinated market economy" where institutional complementarities between welfare systems, Labor markets, and corporate governance generate both efficiency and equity advantages compared to more liberal market models.

The comparison between Nordic and Anglo-Saxon models provides a valuable framework for analysing ASEAN's development path and potential policy directions. While direct replication of the Nordic model may not be feasible or desirable given ASEAN's unique context, there are valuable lessons to be learned from the Nordic approach to balancing economic growth, social

equity, and environmental sustainability. The Nordic experience demonstrates the importance of what Rodrik (2018) terms "institutional prerequisites" for inclusive growth – strong state capacity, social trust, and democratic accountability. As ASEAN countries navigate their development trajectories, selective adaptation rather than wholesale adoption of Nordic policies may offer a pragmatic approach to addressing the twin challenges of inequality and environmental degradation while respecting regional economic and cultural particularities.

3.3 Historical and Political Context of ASEAN

The historical and political evolution of ASEAN has significantly shaped its approach to economic development, inequality, and environmental policy. Understanding this context is crucial for appreciating the current challenges and opportunities facing the region in its pursuit of inclusive and sustainable growth.

The colonial legacy plays a significant role in ASEAN's development trajectory. Many ASEAN countries were colonized by European powers, which profoundly influenced their economic and political structures. This colonial experience left lasting impacts on institutions, economic systems, and social structures, which continue to influence policy-making in the region today. The extractive economic institutions established during the colonial period oriented national economies toward resource exploitation and primary commodity exports, creating structural dependencies that persist in modified forms (Acemoglu & Robinson, 2012). As Reid (2015) documents, colonial powers implemented distinct administrative systems across Southeast Asia, from the British indirect rule in Malaya to French centralization in Indochina, resulting in divergent state capacities and governance traditions that continue to shape fiscal policy possibilities. The uneven development of educational systems, infrastructure, and bureaucratic competence under colonial rule created initial conditions that have influenced subsequent development trajectories across the region (Booth, 2019).

In the post-independence era, many ASEAN countries initially adopted communist or socialist ideologies with central planning, often under military or autocratic rule. This period was characterized by protectionist policies and state-led development strategies, which resulted in slow economic progress and social instability in many cases. The legacy of this era can still be seen in the strong role that states play in economic planning and development in many ASEAN countries. Nationalist economic policies often aimed at building self-sufficient economies and reducing dependence on former colonial powers, though with varying degrees of success (Thompson, 2018). The divergent ideological orientations during this period—from Thailand's market-oriented authoritarianism to Vietnam's centrally planned economy—established institutional path dependencies that continue to influence current policy approaches to inequality and environmental management (Pempel, 2021). These varying experiences with state-led development have produced differentiated capacities for implementing ambitious fiscal reforms across the region.

The formation of ASEAN in 1967 marked a significant turning point in the region's history. Initially focused on reducing geopolitical tensions and promoting regional stability (Yoshimatsu, 2006), ASEAN has evolved to play a crucial role in economic cooperation and integration. The organization has been instrumental in promoting intra-regional trade and investment, as well as presenting a unified voice in international forums. The "ASEAN Way" of consensus-building, non-interference, and flexible engagement has facilitated cooperation

among countries with diverse political systems and development levels (Acharya, 2017). However, as Nesadurai (2017) argues, this approach has also limited ASEAN's ability to develop binding regional mechanisms for addressing transboundary challenges such as environmental degradation and economic inequality. The institutional structure of ASEAN, characterized by limited supranational authority and strong protection of national sovereignty, creates both constraints and opportunities for coordinated fiscal approaches to shared challenges.

Towards the end of the 20th century and into the early 21st century, ASEAN countries began to shift towards more market-oriented economies. This period saw the adoption of what Case (2013) describes as a "state-owned capitalism model," whereby the state plays a key role in developing strategic sectors of the economy. This approach has led to rapid economic growth in many ASEAN countries but has also been criticized for sometimes prioritizing growth over equity and environmental concerns. The Asian Financial Crisis of 1997-1998 served as a watershed moment, prompting reassessment of development strategies and greater attention to institutional quality and financial governance (Haggard, 2018). The varying responses to this crisis—from Malaysia's capital controls to Indonesia's IMF-led reforms—revealed different conceptions of the state's role in managing economic crises and protecting vulnerable populations (Pepinsky, 2020). The subsequent period of export-oriented industrialization and global economic integration accelerated growth but often exacerbated spatial and social inequalities within countries (Jones, 2016).

During this transition to market economies, the region witnessed complex interactions between economic liberalization and political systems. While some countries experienced democratization alongside economic opening, others maintained authoritarian political structures while liberalizing their economies (Hewison & Rodan, 2018). These diverse political trajectories have influenced fiscal policy choices, with implications for both inequality outcomes and environmental management. As Hutchison et al. (2021) demonstrate, the political representation of different societal interests in policy-making processes has significantly shaped the distributive consequences of economic growth across ASEAN countries, with varying degrees of elite capture and popular influence. The emergence of what Robison and Hadiz (2017) term "oligarchic capitalism" in several ASEAN economies has created particular challenges for implementing progressive taxation and environmental regulations that might constrain powerful economic interests.

In recent years, there has been a growing recognition within ASEAN of the need to address issues of inclusive growth and climate change. The ASEAN Economic Community (AEC) Blueprint 2025 explicitly acknowledges these issues among its top priorities, to be addressed urgently at the country and regional level with global coordination (Maria et al., 2017). This shift represents a significant evolution in ASEAN's policy focus and provides a foundation for more integrated approaches to economic, social, and environmental challenges. The ASEAN Socio-Cultural Community Blueprint 2025 further demonstrates this commitment by emphasizing human development, social justice, and environmental sustainability as core regional objectives (ASEAN Secretariat, 2018). However, the translation of these regional commitments into national policies remains uneven, influenced by domestic political economies and varying state capacities (Triwibowo, 2022).

The implications of this historical and political context for current policy are multifaceted. The legacy of state intervention continues to influence economic policy-making, with many ASEAN governments still playing a significant role in directing economic development. The transition

from exclusive to more inclusive growth strategies is ongoing, with countries at different stages of this process. Additionally, the challenge of balancing regional cooperation with national interests remains a key consideration in ASEAN policy-making. The distributed sovereignty model of ASEAN cooperation creates both opportunities and limitations for addressing transboundary challenges like climate change, which require coordinated fiscal responses (Ba, 2019). As ASEAN countries contend with both domestic and international pressures for more progressive social and environmental policies, their historical experiences and political institutions will continue to shape the feasibility and form of fiscal reforms aimed at inclusive and sustainable development (Stubbs, 2020).

3.4 Macroeconomic Trends in ASEAN

ASEAN economies have experienced rapid growth and structural transformation over the past few decades, driven by factors such as foreign direct investment (FDI), trade liberalization, and demographic changes. These macroeconomic trends provide crucial context for understanding the challenges and opportunities in pursuing inclusive growth and climate resilience in the region.

Foreign Direct Investment and Trade

Foreign Direct Investment (FDI) has played a crucial role in the economic development of ASEAN countries. The region has seen strong FDI inflows, particularly in countries like Vietnam, driven largely by growth in the manufacturing sector. Vietnam has continued to attract very large FDI inflows relative to its GDP, particularly from Japanese and Korean companies expanding their manufacturing operations into the country. This has been encouraged by the privatization of some state-owned enterprises, reduction in red tape, and improved administrative procedures (IMF 2018e). Vietnam's success in FDI attraction represents what Thomsen (2019) describes as a "strategic coupling" of national development objectives with multinational production networks, facilitated by targeted policy interventions and institutional reforms. The country's increasing integration into global value chains has accelerated technology transfer and industrial upgrading, though questions remain about the depth of domestic linkages and technological spillovers (Nguyen & Nguyen, 2021).

However, FDI trends have not been uniform across the region. For instance, Thailand has seen a decline in FDI in recent years, largely due to political uncertainty. In Indonesia, the surge in commodity prices between 2010 and 2013 and improvements in the business environment have supported an increase in FDI inflows. These divergent patterns reflect what Mirza and Giroud (2020) identify as the "heterogeneous investment climate" across ASEAN, with varying regulatory environments, infrastructure quality, and political stability creating differential attractiveness to foreign investors. The sectoral composition of FDI also varies significantly, with resource-rich countries like Indonesia receiving substantial investment in extractive industries, while countries like Malaysia and Singapore attract more investment in high-value manufacturing and services (UNCTAD, 2021).

Trade patterns in ASEAN have evolved significantly over the past few decades. While the USA, Europe, and Japan remain important export destinations, their relative importance has declined as intra-regional trade and exports to China have grown. This shift has been

supported by the establishment of the ASEAN Free Trade Area in 1992, which reduced tariffs, often to zero, on most manufactured products that originate within ASEAN. The growing economic integration with China represents what Kimura and Chen (2018) term the "reconfiguration of Asian production networks," with China increasingly serving as both a final market and a source of intermediate inputs for ASEAN manufacturers. This reorientation has significant implications for the region's vulnerability to external shocks and bargaining power in international economic relations (Athukorala, 2019).

ASEAN countries participate in global value chains in varying capacities. Malaysia, Thailand, and Vietnam have become important downstream producers in global value chains, particularly in the electronics industry. These countries import significant amounts of components for their electronics industries, similar to China and Korea. As a result, the domestic value-added component of their exports is relatively small. In contrast, the Philippines has a lower imported content in its exports, reflecting the size of its services export sector and its position earlier in the electronics value chain. Indonesia, with its significant commodity exports, is positioned upstream in global value chains, similar to other resource-rich economies. These differentiated positions within global production networks have important implications for value capture, technological learning, and economic upgrading prospects (Lee et al., 2018). As Frederick and Gereffi (2016) argue, the ability of ASEAN economies to move into higher value-added activities within these chains will be crucial for sustaining growth and addressing inequality in the coming decades.

Structural Transformation

ASEAN economies have undergone significant structural transformation over the past half-century. The share of agriculture in GDP has declined by around 20% since 1970, although it still accounts for 10 to 18% of output in 2016 (RBA 2016). This is higher than in more developed Asian economies, and a large share of employment in many ASEAN countries remains in agriculture. The persistence of agricultural employment despite declining sectoral output represents what Lewis (1954) identified as "disguised unemployment," with significant implications for productivity and poverty reduction strategies. As Otsuka and Sugihara (2019) document, the structural transformation process in ASEAN has often been characterized by incomplete Labor transfer from agriculture to higher-productivity sectors, resulting in persistent rural-urban inequalities and dualistic economic structures.

The manufacturing sector saw its share of GDP increase until around 2000, after which it has generally declined as the services sector has grown. The Philippines has experienced the most significant growth in services, largely due to the development of its business process outsourcing (BPO) industry. The services sector now accounts for over 60% of GDP in the Philippines. This pattern of what Rodrik (2016) terms "premature deindustrialization" raises important questions about the sustainability of growth and employment generation in the region. Unlike the historical experience of advanced economies, many ASEAN countries are transitioning to service-dominated economies at much lower levels of per capita income, potentially bypassing the manufacturing-led development path that facilitated broad-based prosperity in earlier industrializers (Felipe et al., 2019).

Urbanization has been a key feature of ASEAN's structural transformation. Urbanization rates have increased significantly over recent decades, although there are substantial variations across the region. Malaysia's urbanization rate is now similar to that in many advanced economies. In contrast, urbanization rates in Vietnam and the Philippines remain relatively

low, with the rate in the Philippines remaining stable in recent decades. The spatial dimensions of economic transformation have profound implications for infrastructure needs, environmental management, and service delivery (World Bank, 2019). As McGee (2020) observes, the urbanization pattern in many ASEAN countries differs from Western models, with the emergence of "extended metropolitan regions" that blur traditional rural-urban distinctions and create complex governance challenges for sustainable development.

Productivity and Capital Intensity

Capital deepening has been a primary source of growth in the ASEAN region. Both private and public sector physical capital has grown faster than the labour force, contributing significantly to increases in labour productivity. However, labour productivity levels in the region remain comparatively low by global standards. The productivity gap between ASEAN economies and advanced countries points to what Hsieh and Klenow (2009) identify as "resource misallocation," whereby various market and institutional distortions prevent the optimal deployment of capital and Labor across firms and sectors. Improving allocative efficiency through financial market development, competition policy, and public investment management represents a significant opportunity for accelerating productivity growth in the region (ADB, 2020).

Indonesia and Malaysia have the highest capital intensity in the region. Over the past two decades, capital intensity in Vietnam has grown rapidly, although not as quickly as in China. This may be due to the later start of Vietnam's economic development and its concentration in labour-intensive, lower value-added production such as textiles, electronics assembly, and finishing. Thailand's capital per worker has recently shown strong upward momentum, reaching levels similar to China. These varying patterns of capital accumulation reflect differences in investment rates, economic structure, and technological adoption across the region (Eichengreen et al., 2017). As Verspagen (2021) argues, the ability of ASEAN economies to translate capital deepening into sustained productivity growth will depend on complementary investments in human capital, institutional quality, and innovative capacity.

Demographic Trends

Demographic trends have played a significant role in ASEAN's economic development. All five major ASEAN economies (Indonesia, Malaysia, Philippines, Thailand, and Vietnam) have experienced a 'demographic dividend' since 1970, with steadily declining dependency ratios. This has resulted in a positive contribution to economic growth from an increase in the size of the labour force. The demographic dividend, as conceptualized by Bloom et al. (2003), provides a temporary growth boost through increased Labor supply, higher savings rates, and human capital accumulation. However, the magnitude and duration of this dividend depend on complementary policies that facilitate productive employment and investment in the expanded working-age population (Mason & Lee, 2019).

However, the future demographic outlook varies significantly across the region. Thailand and Vietnam have already passed the peak of their demographic dividend, with dependency ratios beginning to rise. Thailand's population is projected to begin declining within two decades. In contrast, the Philippines has a young and fast-growing population, and its dependency ratio is projected to continue declining for an extended period. Indonesia has yet to reach the peak of its demographic dividend, but its population is growing more slowly than the Philippines.

Malaysia, while past the peak of its demographic dividend, is projected to maintain a remarkably steady dependency ratio until 2050, which is expected to be the lowest among the five economies after 2030. These divergent demographic trajectories create what Park and Shin (2020) describe as a "demographic mosaic" across ASEAN, necessitating differentiated policy responses to Labor market challenges, social protection needs, and fiscal sustainability.

These demographic trends have important implications for future growth prospects and policy needs. Thailand and Vietnam, facing the pressures of rapidly aging populations at much earlier stages of economic development than many other economies, will need to find ways to maintain productivity growth in the face of aging. The IMF (2017b) has highlighted that population aging can weigh on growth beyond its direct effect on the size of the Labor force by lowering productivity growth. This underscores the need for these economies to implement policies that can maintain and enhance productivity as their populations age. As Onder and Pestieau (2021) argue, demographic aging in middle-income contexts poses distinct challenges compared to advanced economies, as it coincides with still-evolving social protection systems and more limited fiscal capacity to address age-related spending pressures.

3.5 Fiscal Policy and Inequality in ASEAN

Fiscal Positions and Government Debt

The fiscal positions of ASEAN countries vary, but government debt levels are generally low by international standards. However, a common challenge for many ASEAN economies is relatively low levels of government revenue relative to GDP, which constrains their ability to fund public investments and social programs. This fiscal constraint represents what Besley and Persson (2014) term the "development tax trap," whereby limited tax capacity constrains public investments that could enhance long-term growth potential and address inequality. The mobilization of domestic resources has become an increasingly important policy priority as countries in the region seek to finance ambitious development agendas while maintaining fiscal sustainability (OECD, 2018).

In recent years, some ASEAN countries have taken steps to address this challenge. For instance, the Philippines government has implemented a broad, multi-year tax reform to raise government revenues, with a view to funding higher public infrastructure investment and reduce poverty. This comprehensive reform package, known as the Tax Reform for Acceleration and Inclusion (TRAIN), represents an attempt to broaden the tax base while introducing more progressive elements into the system (Rosario-Manasan, 2021). The reform aims to address what Stiglitz and Rosengard (2015) identify as the "equity-efficiency trade-off" in tax policy design by simultaneously enhancing revenue collection and improving distributional outcomes.

Indonesia, despite attempts by authorities to improve tax collection, has maintained the lowest government revenues relative to GDP in the region. This is partly due to weaker oil and gas tax revenues in recent years, although increased spending on infrastructure investment has also played a role. The persistent challenges Indonesia faces in expanding its tax base reflect what Brautigam et al. (2008) describe as the "politics of taxation," whereby powerful economic interests and the informal nature of much economic activity create significant obstacles to revenue mobilization. As Hadiz and Robison (2019) document, the political resistance to

expanding effective taxation of high-income individuals and corporations has limited the state's redistributive capacity and perpetuated reliance on regressive consumption taxes and natural resource revenues.

Vietnam presents a unique case within the region. Government debt has increased substantially since 2012, following a sizeable decline in government revenues from maturing oil fields and a reduction in tariffs under the country's WTO commitments (IMF 2012). This experience highlights the fiscal challenges that can arise during economic transition and integration into global markets, particularly when traditional revenue sources decline before new ones are fully established (World Bank, 2020). Vietnam's efforts to balance fiscal consolidation with continued public investment in infrastructure and human capital development illustrate the difficult trade-offs facing many middle-income countries seeking to maintain growth momentum while ensuring fiscal sustainability (Pincus, 2019).

In Malaysia, government debt to GDP has stabilized in recent years, reflecting efforts to consolidate the fiscal position. Malaysia's relatively sophisticated tax system and higher revenue collection capacity compared to many of its regional peers have facilitated greater fiscal flexibility, though challenges remain in reducing dependence on oil-related revenues and implementing more progressive taxation (Hill et al., 2020). The country's experience demonstrates what Bird and Zolt (2015) identify as the importance of institutional quality and administrative capacity in effective tax system design, with Malaysia's relatively strong public administration enabling more comprehensive revenue collection than in many neighbouring countries.

Inequality Trends

Despite strong economic growth, inequality remains a significant challenge in many ASEAN countries. GINI coefficients in the region are generally higher than in Nordic countries, although there are significant variations within ASEAN. This persistent inequality despite rapid growth challenges simplistic versions of Kuznets' (1955) hypothesis that inequality would naturally decline after an initial increase during industrialization. Instead, the ASEAN experience suggests that inequality trajectories are shaped by policy choices, institutional arrangements, and patterns of economic growth rather than following a predetermined path (Alvaredo et al., 2018).

Singapore, the Philippines, and Malaysia top the list of ASEAN countries with the highest levels of inequality. This high inequality persists despite these countries being among the more economically advanced in the region, highlighting the complex relationship between economic growth and income distribution. In Singapore, Chua (2017) attributes high inequality partly to the city-state's position as a global financial hub and its economic strategy focused on attracting high-skilled professional services, creating a bifurcated Labor market with large wage differentials. In the Philippines, Balisacan and Hill (2019) identify historical land inequality, uneven educational access, and geographically concentrated development as key drivers of persistent income disparities despite periods of strong growth.

On the other hand, Vietnam has managed to maintain relatively low levels of inequality despite rapid economic growth. This achievement is often attributed to its socialist market economy model and policies aimed at inclusive growth. Vietnam's land reforms, investments in rural infrastructure, and relatively broad-based educational expansion have facilitated what Ravallion (2016) terms "pro-poor growth," whereby economic gains have been more equitably

distributed across the income spectrum. As Glewwe and Dang (2020) document, Vietnam's comparative success in translating growth into poverty reduction while maintaining moderate inequality levels offers important lessons about the role of initial asset distribution and targeted social policies in shaping distributional outcomes during rapid economic transformation.

The strong economic growth in the region has led to solid growth in middle-class incomes, particularly after the Asian Financial Crisis. This has supported domestic demand, growth in the services sector, and increased demand for education and travel. However, the expansion of the middle class has not been uniform across the region. The middle class in Malaysia and Thailand is now comparable in size to that in many advanced economies. Over the past two decades, high per-capita GDP growth has also led to significant expansion of the middle class in Vietnam and Indonesia, although the middle class in Indonesia remains relatively small. In the Philippines, the middle-class accounts for a small share of the population and has seen little change, largely due to slower average per-capita GDP growth and relatively high income inequality. These varying patterns of middle-class development reflect what Kharas (2017) identifies as the importance of the "middle-class consumer engine" for sustainable and inclusive growth, with countries that have successfully expanded their middle classes typically demonstrating more balanced and resilient economic development.

The uneven expansion of the middle class across ASEAN has significant implications for both economic development and political dynamics. As Easterly (2001) argues, a substantial middle class can promote institutional development and more accountable governance through demands for better public services and less corruption. The differential size and growth of the middle class may therefore help explain divergent trajectories in governance quality and social policy development across the region (Khoo, 2020). Additionally, the capacity of economic growth to generate secure, well-compensated employment—what the ILO (2019) terms "decent work"—has varied significantly across ASEAN countries, with important implications for income distribution and social mobility.

Fiscal Policy Responses to Inequality

ASEAN countries have employed various fiscal policy tools to address issues of inequality, although the effectiveness of these policies remains a subject of debate. There has been a gradual shift towards more progressive taxation systems in some countries, although implementation challenges remain. The region's approach to fiscal redistribution generally reflects what Lustig (2018) describes as the "low-impact equilibrium" typical of many developing economies, whereby both taxes and transfers have limited redistributive effects compared to advanced economies. This limited redistributive impact stems from both the size of fiscal interventions and their design, with many countries relying heavily on indirect taxes and categorical rather than targeted benefits (Warr et al., 2022).

Targeted social spending programs have been implemented in several ASEAN countries. For example, the Philippines' Pantawid Pamilyang Pilipino Program (4Ps) is a conditional cash transfer program aimed at reducing poverty and increasing human capital investment among poor households. This program exemplifies the "social investment approach" advocated by Hemerijck (2018), which aims to break intergenerational poverty cycles through investments in children's health and education while providing immediate income support to vulnerable families. Evaluations of 4Ps have generally shown positive impacts on school enrolment, health service utilization, and consumption among beneficiaries, though questions remain about its long-term impacts on poverty reduction and social mobility (World Bank, 2019).

Indonesia's gradual reform of its fuel subsidy system and redirection of resources toward more targeted social programs represents another significant fiscal policy shift in the region. This reform addressed what Coady et al. (2017) identify as the "regressive nature of universal price subsidies," which disproportionately benefit higher-income groups with greater consumption capacity. The phased reduction of fuel subsidies allowed for the expansion of social assistance programs, including conditional cash transfers, health insurance, and educational subsidies for low-income households (Yusuf et al., 2020). However, political resistance to subsidy reform and implementation challenges in targeting mechanisms have limited the redistributive impact of these policy changes.

However, the implementation of redistributive fiscal policies faces several challenges in the ASEAN context. Limited fiscal space in many countries constrains the resources available for social programs. Administrative capacity to effectively target and deliver social programs varies across the region. Additionally, political economy considerations, including the influence of vested interests, can hinder the implementation of progressive fiscal reforms. These constraints reflect what Pritchett (2021) terms the "politics of implementation," whereby formal policy changes often fail to translate into effective practice due to capacity limitations, accountability deficits, and resistance from powerful stakeholders. Enhancing the redistributive impact of fiscal policy in ASEAN therefore requires attention not only to policy design but also to the political and administrative conditions that shape policy implementation (Fritz et al., 2019).

3.6 Climate Change and Environmental Policies in ASEAN

Emissions and Environmental Performance

ASEAN countries face significant challenges in terms of emissions and environmental performance. On an absolute scale, the high-income cluster countries (HIC), including Indonesia and Thailand, top the list of the worst polluters in ASEAN. When considered on a per-capita basis, Singapore and Brunei emit more than four times as much as the Nordic countries on average (World Bank Carbon Statistics, 2019). These disparities reflect what Stern (2015) identifies as the complex relationship between economic development, energy systems, and carbon intensity in emerging economies. Indonesia's emissions profile is particularly shaped by its large population, energy-intensive industrial development, and significant land use change emissions from deforestation and peatland degradation (Lamb et al., 2021). For Singapore, despite its advanced technological capacity and strong environmental governance, its position as a global transport hub and petrochemical center contributes to its high per-capita emissions, illustrating the challenges of decoupling emissions from economic specialization patterns (Neo, 2020).

Interestingly, for the lower- and upper-middle income clusters, per-capita pollution decreases with per-capita income, suggesting that discretionary income drives per-capita pollution. This pattern presents both challenges and opportunities for policymakers seeking to address climate change while promoting economic development. This relationship contradicts the conventional environmental Kuznets curve hypothesis, which suggests that environmental degradation initially increases with income before declining at higher income levels (Dasgupta et al., 2018). Instead, the ASEAN experience suggests a more complex relationship between income and emissions, influenced by economic structure, energy systems, and policy choices.

As Riahi et al. (2017) argue, technological leapfrogging and policy interventions can enable developing countries to pursue lower-carbon development pathways than those followed historically by advanced economies.

Beyond emissions, ASEAN countries face a range of environmental challenges. Deforestation is a significant issue, particularly in Indonesia, which has seen substantial loss of primary forest cover. Air and water pollution in urban areas pose serious public health risks. Moreover, many ASEAN countries are highly vulnerable to the impacts of climate change, including sea-level rise and increased frequency of extreme weather events. The economic costs of these environmental challenges are substantial, with the ADB (2022) estimating that climate change could reduce Southeast Asian GDP by up to 11% by 2100 under a high-emissions scenario. This vulnerability is compounded by rapid urbanization in coastal areas, dependence on climate-sensitive sectors like agriculture and fisheries, and limited adaptive capacity in many communities (Hijioka et al., 2019). The region's extensive coastlines, river deltas, and island territories make it particularly susceptible to sea-level rise, with Vietnam's Mekong Delta, Indonesia's coastal cities, and the Philippines' island communities facing severe risks (Mycoo, 2022).

The environmental challenges facing ASEAN are further complicated by the region's rapid urbanization and industrialization. Urban air pollution has emerged as a major public health crisis, with the World Health Organization estimating that air pollution causes over 800,000 premature deaths annually in Southeast Asia (Manisalidis et al., 2020). The transboundary haze from forest fires, particularly in Indonesia, represents another significant regional environmental challenge with serious health and economic impacts across multiple countries. As Forsyth (2018) documents, addressing these complex environmental problems requires governance approaches that span multiple scales, from local to transnational, and engage diverse stakeholders in collaborative solutions.

Policy Responses to Climate Change

ASEAN countries have increasingly recognized the need to address climate change and environmental degradation. At the regional level, initiatives such as the ASEAN Agreement on Transboundary Haze Pollution and the ASEAN Working Group on Climate Change demonstrate a commitment to addressing these issues collaboratively. These regional mechanisms reflect what Biermann et al. (2017) term "networked governance" approaches to transboundary environmental challenges, which attempt to coordinate national policies while respecting sovereignty concerns. However, as Varkkey (2020) notes, the implementation of these regional agreements has often been hampered by the ASEAN principle of non-interference and the reluctance of member states to establish binding commitments or strong enforcement mechanisms.

Despite these limitations, regional cooperation on environmental issues has evolved significantly in recent years. The ASEAN State of Climate Change Report (ASEAN, 2021) represents an important step toward developing a shared understanding of climate risks and opportunities across the region. Initiatives like the ASEAN Smart Cities Network have created platforms for knowledge sharing on sustainable urban development, while the ASEAN Power Grid aims to enhance regional energy security and facilitate greater integration of renewable energy (Andrews-Speed, 2022). These collaborative efforts illustrate what Bernauer et al. (2016) identify as the potential for regional organizations to serve as "laboratories" for

environmental governance innovation, developing approaches that can complement global frameworks while accounting for regional specificities.

At the national level, policy responses vary. Indonesia has made efforts to reduce deforestation and peatland degradation, although challenges remain in implementation and enforcement. The country's moratorium on new palm oil concessions in primary forests and peatlands, first introduced in 2011 and made permanent in 2019, represents a significant policy shift in a sector that has historically been a major driver of deforestation (Austin et al., 2019). Indonesia has also established the Peatland Restoration Agency and strengthened forest fire prevention and response capabilities. However, as Gaveau et al. (2021) document, implementation gaps, overlapping jurisdictions, and conflicting economic interests have limited the effectiveness of these policies, highlighting the challenges of environmental governance in complex political-economic contexts.

Singapore implemented a carbon tax in 2019, marking a significant step towards pricing carbon emissions. This policy represents what Stiglitz and Stern (2017) identify as a critical tool for internalizing the social cost of carbon and incentivizing emissions reductions across the economy. At S$5 per tonne of CO2 equivalent, Singapore's initial carbon price was modest by international standards, but the government has announced plans to progressively increase the rate to S$50-80 per tonne by 2030 (Ministry of Finance Singapore, 2022). This gradual approach reflects what Vogt-Schilb and Hallegatte (2017) term "sequential implementation" of climate policies, which allows economic actors to adapt while providing clear long-term signals for low-carbon investment.

Vietnam has developed a National Green Growth Strategy, aiming to reduce greenhouse gas emissions while promoting economic restructuring towards sustainable development. This approach exemplifies the concept of "climate-compatible development" advocated by Mitchell and Maxwell (2010), which seeks synergies between mitigation, adaptation, and development objectives. Vietnam's renewable energy expansion has been particularly notable, with solar capacity growing exponentially between 2018 and 2020 following the introduction of favourable feed-in tariffs (Do et al., 2022). However, grid integration challenges, planning coordination issues, and policy uncertainty have created bottlenecks in this transition, highlighting the importance of comprehensive policy frameworks and institutional coordination for effective climate action.

Other ASEAN countries have developed distinctive approaches to climate policy based on their specific contexts and capacities. The Philippines has emphasized climate adaptation and disaster risk reduction given its extreme vulnerability to typhoons and other climate impacts, establishing dedicated institutional mechanisms through the Climate Change Act of 2009 and subsequent legislation (Bedran-Martins et al., 2020). Thailand has focused on energy efficiency improvements and renewable energy development, though progress has been slowed by entrenched interests in the conventional energy sector and complex regulatory environments (Tongsopit et al., 2017). Malaysia has developed sectoral approaches to emissions reduction, with particular focus on sustainable forest management, renewable energy development, and green technology promotion (Hezri & Hasan, 2019).

However, ASEAN countries face significant challenges in implementing effective climate and environmental policies. These include the need to balance economic growth with environmental protection, limited fiscal resources for climate change adaptation and mitigation, and the need for enhanced regional cooperation to address transboundary environmental issues. The political economy of environmental reform represents a particularly

significant barrier, with powerful interests in extractive industries, agriculture, and conventional energy often resisting policy changes that could threaten established business models (Sovacool, 2018). Fiscal constraints further complicate climate action, as many countries struggle to mobilize sufficient resources for the investments in infrastructure, technology, and institutional capacity required for low-carbon, climate-resilient development (Halimanjaya, 2020). These challenges underscore the importance of what Victor (2016) terms "feasible climate policies"—approaches that align environmental objectives with political incentives, administrative capabilities, and economic realities while building broader constituencies for more ambitious action over time.

3.7 Comparative Approach and Case Study

To provide context and benchmarks for ASEAN's performance on inclusive growth and climate change mitigation, this research employs a comparative approach, contrasting ASEAN nations with Nordic countries. The Nordic model, characterized by a strong welfare state, high levels of social trust, and robust environmental policies, has achieved better inequality outcomes and environmental performance over several decades. For instance, the average Gini coefficient for Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden) in 2019 was 0.28, compared to an average of 0.39 for ASEAN countries (World Bank, 2021). Similarly, Nordic countries consistently rank among the top performers in the Climate Change Performance Index, with Sweden, Denmark, and Norway ranking 4th, 5th, and 8th respectively in the 2021 index, while the highest-ranking ASEAN country, the Philippines, was 23rd (Burck et al., 2020).

This comparative methodology builds upon what Esping-Andersen (1990) identified as "welfare regimes" – distinctive configurations of state, market, and family relationships that produce different social and economic outcomes. The Nordic countries represent what he termed the "social democratic" welfare regime, characterized by universalism, comprehensive risk coverage, and active Labor market policies that generate both equity and efficiency advantages. The theoretical foundation for this comparative approach draws on the varieties of capitalism literature developed by Hall and Soskice (2001) and extended by Nölke and Vliegenthart (2009) to encompass emerging market economies. This framework allows for systematic comparison of institutional complementarities across different political-economic systems while acknowledging their distinct historical trajectories and development challenges.

The methodological value of such comparison serves multiple purposes. First, it provides a benchmark for what is achievable in terms of combining economic prosperity with social equity and environmental sustainability. The Nordic experience demonstrates that environmental protection and social inclusion need not come at the expense of economic competitiveness, challenging the notion of inevitable trade-offs between these objectives (Stiglitz et al., 2019). Second, it offers insights into policy mechanisms that have proven effective in addressing inequality and climate change. Nordic approaches to carbon pricing, for instance, have successfully reduced emissions while maintaining public support through careful attention to distributional impacts and revenue recycling (Sterner, 2007). Third, it highlights the potential long-term benefits of prioritizing inclusive and sustainable development. The Nordic countries' investments in human capital, social cohesion, and environmental protection have contributed

to their consistent high rankings in global competitiveness indices, suggesting potential long-term economic advantages of such approaches (Porter & van der Linde, 1995; Schwab, 2019).

This comparison also facilitates what Rose (1991) terms "lesson-drawing" across systems – the identification of transferable policy elements that can be adapted to different contexts. While direct policy transfer is rarely feasible or desirable given institutional differences, comparative analysis can reveal underlying principles and approaches that might be recontextualized within ASEAN's distinctive institutional frameworks (Dolowitz & Marsh, 2000). The Nordic experience with carbon taxation demonstrates the importance of phased implementation, targeted compensation for vulnerable groups, and revenue recycling to maintain public support – principles that could inform ASEAN approaches to carbon pricing despite different economic structures and political systems (Sterner et al., 2019). Similarly, Nordic approaches to social protection emphasize universal basic coverage combined with targeted interventions for particularly vulnerable groups, a principle that could be adapted to ASEAN contexts with more limited fiscal resources (Mkandawire, 2005).

The comparison illuminates what Acemoglu and Robinson (2012) identify as the critical role of inclusive political and economic institutions in fostering sustainable development. The Nordic countries' strong democratic traditions, robust civil society, and transparent governance have created enabling conditions for long-term policy planning and social consensus-building around challenging reforms. This institutional foundation supports what Lockwood (2015) terms "credible commitment" to sustainability transitions – the ability to maintain policy continuity despite electoral cycles and economic fluctuations. Understanding these enabling conditions provides valuable context for assessing the institutional prerequisites for successful implementation of inclusive and sustainable fiscal reforms in ASEAN. Rothstein and Uslaner (2005) further highlight the importance of social trust in facilitating both progressive taxation and environmental regulation, suggesting that trust-building may be a crucial precondition for more ambitious policy interventions in the ASEAN context.

While recognizing the significant differences in historical, cultural, and economic contexts between Nordic and ASEAN countries, this comparative approach can still yield valuable insights for policy development in ASEAN. As Evans and Sewell (2013) argue, all contemporary capitalist systems face common challenges of balancing growth, equity, and environmental sustainability, albeit from different starting points and with different resource endowments. The Nordic countries' success in navigating these challenges while maintaining economic dynamism demonstrates the feasibility of "recombinant governance" approaches that blend market mechanisms, state interventions, and civil society engagement in context-appropriate configurations (Sabel & Zeitlin, 2012). As Sandbrook et al. (2020) emphasize, the experience of social democratic regimes offers valuable lessons not in terms of specific policy prescriptions but rather in demonstrating the possibility of alternative development pathways that prioritize social and environmental outcomes alongside economic growth.

Additionally, this research uses Indonesia as a primary case study, given its prominent role in ASEAN and its pressing climate and inequality challenges. As the largest economy in ASEAN, accounting for about 35% of the region's GDP (ASEAN Secretariat, 2020), Indonesia's policy choices have significant implications for the entire region. The country's size, diversity, and archipelagic geography create distinctive governance challenges that make it particularly instructive for understanding the complexity of implementing integrated fiscal approaches to inequality and climate change. Indonesia's decentralized governance structure, established following the democratic transition of the late 1990s, creates both opportunities and challenges

for policy coordination across levels of government (Ostwald et al., 2016). This multilevel governance context is particularly relevant for understanding how fiscal policies for climate and inequality can be effectively implemented in complex institutional environments.

Indonesia faces acute challenges in both inequality and climate change. Despite recent improvements, Indonesia's Gini coefficient of 0.38 in 2019 remains high by international standards (World Bank, 2021). This persistent inequality reflects what McCarthy and Robinson (2016) identify as the "political economy of inequality" in Indonesia – the concentration of political and economic power among elites that shapes distributive outcomes despite democratic transitions. As Berenschot and van Klinken (2018) document, patronage politics and clientelistic relationships continue to influence resource allocation and policy implementation, creating barriers to more progressive fiscal reforms. Nevertheless, Indonesia's inequality trajectory has shown improvement in recent years, with the Gini coefficient declining from a peak of 0.41 in 2014, suggesting potential for further progress through targeted policy interventions (World Bank, 2020). The expansion of social protection programs, particularly during the COVID-19 pandemic, demonstrates the potential for more ambitious redistributive policies in the Indonesian context (Suryahadi et al., 2021).

In terms of climate change, Indonesia is the world's 5th largest emitter of greenhouse gases, primarily due to deforestation and peatland degradation (World Resources Institute, 2020). This emissions profile creates what Luttrell et al. (2018) term a "distinctive climate policy challenge" – the need to address land-use emissions primarily driven by complex governance failures rather than energy system transformation alone. The political economy of forest and land management in Indonesia involves multiple jurisdictional levels, competing ministerial authorities, and powerful economic interests in plantation sectors, creating significant implementation challenges for emissions reduction policies (Ekawati et al., 2019). Despite these challenges, Indonesia has established ambitious climate targets, pledging to reduce emissions by 29% below business-as-usual by 2030, or 41% with international support, creating opportunities for innovative policy approaches that link climate action with development objectives (Republic of Indonesia, 2021). Indonesia's experience with REDD+ (Reducing Emissions from Deforestation and Forest Degradation) initiatives over the past decade provides valuable lessons about the interactions between fiscal incentives, governance arrangements, and land use outcomes in complex tropical forest contexts (Angelsen et al., 2018).

By focusing on Indonesia, this research can provide in-depth insights into the challenges and opportunities for implementing sustainable fiscal policies in a large, diverse, and rapidly developing ASEAN economy. The case study approach allows for what Gerring (2017) terms "causal process tracing" – the detailed examination of how institutional contexts, stakeholder interests, and policy design features interact to produce particular outcomes. Indonesia's experience with fuel subsidy reform, for instance, demonstrates both the fiscal potential and political challenges of redirecting environmentally harmful subsidies toward more progressive and sustainable expenditures (Chelminski, 2018). Similarly, the country's experiments with environmental fiscal transfers to incentivize forest conservation at the subnational level illustrate innovative approaches to aligning fiscal incentives with sustainability objectives across governance levels (Mumbunan et al., 2020; Irawan et al., 2021).

The Indonesia case study is complemented by broader regional analysis to capture the diversity of experiences within ASEAN and identify potential for regional policy coordination and learning. This nested approach follows what Snyder (2001) terms "scaled comparison" –

the examination of phenomena at multiple levels of analysis to capture both general patterns and contextual variations. This methodological strategy enables recognition of both shared challenges across ASEAN and the distinctive pathways through which individual member states might address them given their specific institutional configurations, development levels, and political economies. The comparative approach thus provides both breadth and depth in understanding the potential for sustainable fiscal policy to address the twin challenges of inequality and climate change in the ASEAN context.

3.8 Analysis: ASEAN and Nordic Approaches

While ASEAN countries have made significant progress in economic development, they face persistent challenges in ensuring that growth is both inclusive and environmentally sustainable. The comparison with Nordic countries highlights several key differences in approach and outcomes.

In terms of fiscal policy, Nordic countries are characterized by higher levels of social spending and more progressive taxation systems. This approach has contributed to lower levels of income inequality and more comprehensive social protection. In contrast, ASEAN countries generally have lower tax-to-GDP ratios and face challenges in implementing redistributive policies. The average tax-to-GDP ratio in Nordic countries exceeded 40% in 2019, compared to less than 20% in most ASEAN economies (OECD, 2021). This disparity in revenue mobilization capacity fundamentally constrains the redistributive potential of fiscal policy in Southeast Asia, limiting both the scale and scope of social protection systems and public investments. As Jomo (2019) observes, the relatively low tax collection in many ASEAN countries reflects both structural economic factors—such as large informal sectors and limited administrative capacity—and political economy constraints, including the influence of business elites in policy formulation and the legacy of development strategies that prioritized tax incentives to attract investment. The resulting fiscal constraints have perpetuated what Kwon (2005) terms "developmental welfare" systems that provide limited coverage and benefits compared to the comprehensive social protection regimes characteristic of Nordic countries.

The progressivity of tax systems also differs markedly between the two regions. Nordic tax systems derive a larger share of revenue from direct taxes on income and wealth, which tend to be more progressive, while ASEAN countries rely more heavily on indirect taxes such as value-added taxes, which can be regressive without countervailing measures (Bird & Zolt, 2018). This structural difference in tax composition has significant implications for distributional outcomes. Lustig et al. (2020) demonstrate that fiscal systems in many developing countries can actually increase poverty when the regressive effects of consumption taxes outweigh the progressive impact of limited transfer programs, creating what they term "fiscal impoverishment." This stands in stark contrast to the Nordic experience, where the tax-benefit system reduces inequality substantially through both progressive taxation and comprehensive transfers (Causa & Hermansen, 2020).

Environmental policy is another area of significant difference. Nordic countries were early adopters of stringent environmental regulations and have been at the forefront of implementing carbon pricing mechanisms. ASEAN countries have more recently begun to focus on environmental issues, with varying levels of policy implementation and effectiveness across the region. Sweden introduced the world's first carbon tax in 1991 and has since maintained

one of the highest carbon prices globally, while coverage of carbon pricing instruments remains limited in Southeast Asia (World Bank, 2021). The Nordic approach to environmental governance has been characterized by what Eckersley (2020) terms "ecological modernization"—the strategic integration of environmental objectives into core economic policy frameworks rather than treating them as peripheral concerns. This approach has facilitated deeper decarbonization while maintaining economic competitiveness through innovation and structural transformation.

In contrast, environmental governance in ASEAN has often been characterized by what Lemos and Agrawal (2006) describe as "fragmented authority"—overlapping jurisdictions, limited coordination, and implementation gaps that constrain policy effectiveness. Tadem (2020) identifies the influence of powerful business interests, particularly in resource extraction and land development, as a key constraint on more stringent environmental regulation in many ASEAN countries. Nevertheless, recent years have seen increasing recognition of climate vulnerabilities and growing policy attention to environmental sustainability across the region. Vietnam's rapid expansion of renewable energy capacity, Thailand's adoption of climate change master plans, and Indonesia's moratorium on new oil palm plantations in primary forests represent significant policy shifts, though implementation challenges remain (Han, 2021). The development of regional environmental cooperation mechanisms, such as the ASEAN Agreement on Transboundary Haze Pollution, further indicates growing recognition of the need for coordinated approaches to environmental challenges, despite limitations in enforcement capacity (Heilmann, 2018).

The Nordic countries' comprehensive welfare systems and high levels of labour union participation contrast with the more limited social protection systems and varying levels of labour rights in ASEAN countries. This difference reflects not only economic factors but also distinct political and social contexts. Trade union density in Nordic countries averages around 70%, compared to less than 20% in most ASEAN economies (ILO, 2020). This divergence in organized Labor strength has profound implications for both Labor market institutions and broader political dynamics, with Nordic unions playing a central role in negotiating sectoral wage agreements and influencing social policy through corporatist arrangements. Thelen (2019) identifies strong Labor market institutions as a crucial foundation for the egalitarian outcomes characteristic of Nordic political economies, facilitating wage compression, skills development, and worker voice in economic governance.

The more limited role of unions in ASEAN countries reflects both historical factors—including authoritarian suppression of independent Labor organizations in many countries during critical periods of industrialization—and structural economic conditions such as large informal sectors and surplus Labor supplies that constrain worker bargaining power (Caraway, 2020). The resulting power asymmetry between capital and Labor has contributed to what Phillips (2018) describes as "adverse incorporation" into global production networks, whereby integration into global value chains has generated employment but often under precarious conditions with limited Labor protections and wage growth. This pattern contrasts with the Nordic experience of "protective integration" into global markets, whereby strong domestic institutions mediate international competitive pressures to maintain social standards (Katzenstein, 1985).

The Nordic model's emphasis on gender equality through policies such as generous parental leave, subsidized childcare, and individual taxation also stands in contrast to the more varied approaches to gender issues across ASEAN. Nordic countries consistently rank at the top of global gender equality indices, reflecting both cultural values and explicit policy commitments

to women's economic participation and equal opportunity (World Economic Forum, 2020). While several ASEAN countries have made significant progress in certain dimensions of gender equality—particularly educational attainment and Labor force participation—significant gaps remain in areas such as political representation, leadership positions, and unpaid care responsibilities (ADB, 2021). Elson and Cagatay (2018) argue that fiscal policy design can either reinforce or challenge gender inequalities through its impact on care provision, employment opportunities, and resource distribution, suggesting potential lessons from Nordic countries' gender-sensitive budgeting approaches for ASEAN contexts.

While the Nordic model offers valuable insights, its direct applicability to the ASEAN context is limited by several factors. These include different historical contexts, levels of economic development, and political systems. However, there are opportunities for ASEAN countries to adapt elements of Nordic policies, such as social investment approaches and environmental regulations, to their specific contexts. Kangas and Palme (2022) suggest that the Nordic experience with gradual expansion of social protection—starting with targeted programs and progressively extending coverage and benefits as fiscal capacity grows—might offer more relevant lessons for developing countries than the current comprehensive systems. Similarly, Prichett (2021) argues that the institutional prerequisites for effective state capacity must be developed incrementally, with policy ambitions calibrated to implementation capabilities at different development stages.

The diverse historical trajectories of Nordic and ASEAN development highlight what North et al. (2009) identify as the path-dependent nature of institutional development, whereby initial conditions and historical contingencies shape subsequent possibilities for institutional innovation and policy reform. Nevertheless, comparative analysis can illuminate potential "adjacent possibilities" for institutional reconfiguration that respect contextual constraints while expanding the range of feasible policy options (Chang & Evans, 2005). For instance, while ASEAN countries may lack the fiscal capacity for Nordic-style comprehensive welfare states in the near term, targeted investments in early childhood development, primary healthcare, and social protection floors might offer efficient approaches to building human capabilities and reducing vulnerability within existing constraints (World Bank, 2020).

The comparative analysis thus suggests potential for selective adaptation rather than wholesale adoption of Nordic approaches, focusing on underlying principles and institutional complementarities rather than specific policy instruments. As both regions navigate the complex challenges of technological change, demographic shifts, and environmental pressures, continued policy learning and institutional innovation will be essential for developing context-appropriate responses that balance economic dynamism with social inclusion and environmental sustainability.

3.9 Conclusion

The stylized facts presented in this chapter highlight the complex challenges facing ASEAN countries in pursuing inclusive growth and climate resilience. While the region has experienced rapid economic growth and poverty reduction, issues of inequality and environmental degradation persist. The comparison with Nordic countries provides valuable insights into potential policy directions, while also underscoring the need for context-specific solutions.

Key findings from this analysis include the ongoing influence of ASEAN's historical and political context on its approach to economic development and social policy. The legacy of colonialism, state-led development, and recent shifts towards market-oriented economies shape current policy challenges and opportunities. As Booth (2019) documents, colonial administrative structures established distinctive institutional foundations across Southeast Asian countries, creating path dependencies that continue to influence contemporary governance capabilities and economic structures. The transition from various forms of state-dominated economies toward more market-oriented approaches has proceeded unevenly across the region, creating what Pempel (2015) describes as "hybrid political economies" that combine elements of state direction and market coordination in distinctive national configurations. These historical legacies and institutional arrangements create both constraints and opportunities for addressing contemporary challenges of inequality and environmental sustainability.

Macroeconomic trends, including structural transformation and demographic changes, present both opportunities and challenges for inclusive growth. While ASEAN countries have benefited from a demographic dividend, some are now facing the challenges of aging populations at earlier stages of development than many advanced economies. The rapid pace of structural change in ASEAN economies has created what Lewis (1954) identified as dualistic development patterns, with persistent productivity gaps between traditional and modern sectors contributing to income inequality and spatial disparities. As Mason and Lee (2019) argue, the differential timing of demographic transitions across ASEAN creates varied policy imperatives, with Thailand and Vietnam facing imminent aging challenges while the Philippines and Indonesia still have potential demographic dividends to harvest. These divergent demographic trajectories necessitate tailored policy approaches to Labor market development, social protection design, and fiscal sustainability.

Fiscal policy responses to inequality vary across ASEAN, with persistent challenges in implementing effective redistributive measures. Low tax-to-GDP ratios in many countries limit the resources available for social spending and public investment. This fiscal constraint reflects what Jha et al. (2021) identify as the paradox of "limited fiscal redistribution" in rapidly growing Asian economies, whereby economic expansion has not translated into proportionate increases in fiscal capacity for social investments. The political economy of taxation in ASEAN countries often reflects what Winters (2011) terms "oligarchic democracy," wherein powerful economic interests exert disproportionate influence over tax policy formulation and implementation. Nevertheless, recent reforms such as Indonesia's tax administration modernization, the Philippines' comprehensive tax reform program, and Vietnam's digital tax initiatives indicate growing recognition of the need to strengthen domestic resource mobilization to fund development priorities (IMF, 2020).

Climate change and environmental degradation pose significant risks to ASEAN's long-term sustainability, requiring enhanced regional cooperation and policy integration. While there have been some positive steps, such as Singapore's carbon tax, much more needs to be done to address environmental challenges effectively. The region's environmental governance challenges exemplify what Biermann (2014) describes as the "fragmentation of global environmental governance," with multiple overlapping initiatives operating across different scales with limited coordination and enforcement mechanisms. The climate vulnerability of many ASEAN countries creates what Barnett and O'Neill (2010) term "double exposure" to both climate impacts and economic globalization pressures, necessitating integrated approaches that address adaptation, mitigation, and sustainable development simultaneously.

The economic costs of inaction are substantial, with the Asian Development Bank (2021) estimating that climate change could reduce Southeast Asian GDP by up to 11% by 2100 under high-emissions scenarios.

The comparison with Nordic countries highlights potential areas for policy learning, particularly in terms of social protection systems and environmental regulations. However, these lessons must be adapted to the ASEAN context rather than directly transplanted. As Sandbrook et al. (2018) emphasize, the Nordic experience demonstrates not a blueprint for policy replication but rather the possibility of alternative development pathways that prioritize social and environmental outcomes alongside economic growth. The institutional foundations of Nordic success—including high levels of social trust, robust democratic processes, and strong state capacity—developed through long historical processes that cannot be quickly reproduced in different contexts. Nevertheless, certain policy principles, such as universal basic coverage combined with targeted interventions for particularly vulnerable groups, phased implementation of environmental regulations with attention to distributional impacts, and strategic industrial policy to support green innovation, offer potential lessons for ASEAN countries at their specific stages of development.

These stylized facts provide a foundation for the subsequent analysis in this thesis, informing the development of an integrated fiscal policy framework that addresses both inequality and climate change in the ASEAN context. By understanding the unique challenges and opportunities facing ASEAN countries, we can better tailor policy recommendations to promote inclusive and sustainable development in the region.

The path forward for ASEAN countries will require balancing multiple objectives: maintaining economic growth, reducing inequality, and addressing environmental challenges. This will necessitate innovative policy approaches that can leverage the region's strengths while addressing its vulnerabilities.

Key areas for policy focus might include strengthening fiscal capacity, as ASEAN countries need to enhance their ability to raise and effectively allocate government revenues. This could involve improving tax collection systems, broadening the tax base, and implementing more progressive taxation structures. As Moore and Prichard (2022) argue, building effective tax systems requires not only technical improvements in administration but also political strategies that build constituencies for compliance and create credible commitments to transparent and accountable revenue use. Digital technologies offer significant potential for enhancing tax administration efficiency and reducing compliance costs, though realizing these benefits requires complementary investments in administrative capacity and data systems (OECD, 2022).

Investing in human capital represents another critical priority given the demographic trends in the region. There is a pressing need to invest in education and skills development to boost productivity and ensure that economic growth translates into improved living standards for all. As Hanushek and Woessmann (2020) demonstrate, the quality of education rather than mere years of schooling is most strongly associated with long-term economic growth and income distribution. This suggests the importance of focusing not only on expanding educational access but also on improving learning outcomes through enhanced teacher quality, curricular relevance, and educational governance reforms. The Fourth Industrial Revolution creates both challenges and opportunities in this regard, necessitating education systems that can equip workers with adaptable skills for rapidly evolving Labor markets (ADB, 2021).

Enhancing social protection systems represents a third key priority area. While respecting the diverse contexts within ASEAN, there is scope for countries to learn from each other and from international best practices in developing more comprehensive and effective social safety nets. As Barrientos (2020) documents, many middle-income countries have successfully expanded social protection coverage through innovative program designs and delivery mechanisms, such as conditional cash transfers, social pensions, and digital identification systems. The COVID-19 pandemic has accelerated experimentation with social protection approaches across ASEAN, creating opportunities for policy learning and institutional innovation (Gentilini et al., 2021). The challenge now is to transition from emergency responses to more systematic and sustainable social protection architectures that can address both chronic poverty and vulnerability to shocks.

Promoting green growth offers ASEAN countries an opportunity to leapfrog to more sustainable development models. This could involve investments in renewable energy, sustainable urban planning, and circular economy approaches. As Stern and Valero (2021) argue, the declining costs of clean technologies and growing recognition of climate risks are creating increasingly favourable economics for low-carbon development pathways. ASEAN countries have significant potential for renewable energy deployment, particularly in solar, wind, and geothermal resources, which could enhance energy security while reducing emissions and local pollution (IRENA, 2020). Urban planning represents another critical intervention point, with rapidly growing ASEAN cities having opportunities to implement more sustainable transport, building, and waste management systems before being locked into high-carbon infrastructure (Colenbrander et al., 2019).

Strengthening regional cooperation will be essential, as many of the challenges facing ASEAN countries, particularly in terms of environmental issues and economic integration, require coordinated regional responses. Enhancing the effectiveness of ASEAN as a platform for policy coordination will be crucial. The ASEAN Economic Community presents opportunities for deepening economic integration while addressing shared challenges of inequality and environmental sustainability through coordinated approaches to standards, investment rules, and fiscal policies (Kimura et al., 2019). Transboundary environmental issues, such as air pollution, water resource management, and ecosystem conservation, particularly require stronger regional governance mechanisms that can overcome collective action problems while respecting national sovereignty concerns (Woo et al., 2020).

In conclusion, while ASEAN countries face significant challenges in pursuing inclusive and sustainable development, they also have unique opportunities. By learning from international experiences, including those of the Nordic countries, while adapting policies to their specific contexts, ASEAN countries can chart a path towards more equitable and environmentally sustainable growth. The subsequent chapters of this thesis will build on these stylized facts to develop concrete policy recommendations for achieving these goals.

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4 CHAPTER FOUR: INTEGRATED METHODOLOGY

4.1 Introduction

This chapter presents a comprehensive outline of the research design and mixed methodology approach employed in this study. The primary objective is to integrate qualitative and quantitative methods to address the complex interplay between fiscal policy, inclusive growth, and climate change resilience in ASEAN economies. This multifaceted approach is designed to provide a nuanced and in-depth understanding of the research topic, allowing for both exploratory analysis and rigorous hypothesis testing. The integration of diverse methodological approaches reflects the increasing recognition within economics research that complex socioeconomic and environmental challenges require methodological pluralism to capture their multidimensional nature (Creswell & Plano Clark, 2018; Morgan, 2014).

The methodology is structured to answer the central research question:

How can ASEAN member economies, through redistribution of national income (revenue and spending), achieve sustainable fiscal policy with simultaneous pro-equity and pro-green outcomes (i.e., internalise and mitigate income inequality and GHG emission externalities)?

This question embodies the contemporary challenge facing policymakers in the ASEAN region, where rapid economic growth has been accompanied by widening income disparities and accelerating environmental degradation. The dual challenge of addressing inequality while promoting environmental sustainability represents what Stern (2015) describes as the "twin market failures" of our time, requiring coordinated policy responses that can only be fully understood through integrated research approaches.

To comprehensively address this question, we have developed a three-stage mixed methods approach:

Stage 1 (RQ1) employs a qualitative scoping review to map the existing landscape of research on fiscal policy instruments that address both inequality and climate change externalities. This initial exploratory phase establishes the theoretical foundations for subsequent analysis, drawing on both established economic theories and emerging perspectives from ecological economics and sustainable development frameworks (Ostrom, 2009; Sachs, 2015). The scoping review methodology allows for a systematic yet flexible examination of diverse literature sources, identifying key concepts, gaps, and methodological approaches that inform our subsequent research stages.

Stage 1 (RQ2) extends the qualitative investigation through document and content analysis of fiscal policy frameworks across ASEAN economies. This stage examines how equity and environmental considerations are currently integrated into fiscal policy design and implementation, analysing policy documents, budget statements, and national development plans. The analysis employs both deductive coding based on theoretical frameworks identified in the scoping review and inductive coding to capture context-specific policy innovations and challenges (Bowen, 2009; Hsieh & Shannon, 2005).

Stage 2 (RQ3) transitions to quantitative panel regression analysis to empirically test hypotheses regarding the relationships between fiscal policy instruments and dual outcomes of reduced inequality and greenhouse gas emissions. This stage leverages econometric techniques to identify causal relationships and quantify the effectiveness of various policy instruments, controlling for country-specific economic, political, and institutional factors. The

panel regression approach allows for the incorporation of both time-series and cross-sectional dimensions, capturing both within-country policy evolution and cross-country comparative effectiveness (Baltagi, 2021; Wooldridge, 2010).

Stage 3 integrates and triangulates findings from the previous stages, synthesizing qualitative insights with quantitative results to develop a comprehensive understanding of how fiscal policy can effectively address both equity and environmental objectives. This integration phase employs analytical techniques from mixed methods research, including joint displays and meta-inferences, to identify convergent findings, explain divergent results, and develop policy recommendations grounded in both contextual understanding and empirical evidence (Fetters et al., 2013; Tashakkori & Teddlie, 2010).

Each stage corresponds to a specific research question and employs distinct methodologies, allowing for a progressively refined understanding of the research topic. This approach moves from broad exploration in the initial stages to specific hypothesis testing in the later stages, culminating in a comprehensive integration of findings. The sequential design enables findings from earlier stages to inform the development and refinement of subsequent stages, ensuring methodological coherence and cumulative knowledge building throughout the research process (Morse & Niehaus, 2009).

The use of triangulation is a key aspect of this research design, enhancing the validity and reliability of our findings. By employing a combination of qualitative and quantitative methods, framed by integrated theory from the comprehensive literature review, the research findings are corroborated from multiple perspectives. This triangulation approach addresses the limitations inherent in single-method studies and provides a more robust foundation for policy recommendations (Denzin, 2012; Johnson et al., 2007). Furthermore, the triangulation of methods allows for the exploration of both the "what" and "how" questions related to fiscal policy effectiveness, capturing both measurable outcomes and the contextual factors that influence implementation success.

This multi-method approach ensures a comprehensive coverage of the qualitative and quantitative aspects of the research objective and the interplay between the model components. The integration of qualitative and quantitative approaches is particularly valuable for research at the intersection of economic policy, social equity, and environmental sustainability, where complex causal mechanisms and context-specific factors can significantly influence policy outcomes (Ragin, 2014; Small, 2011).

In the following sections, we will delve into the specifics of each stage of the methodology, detailing the rationale behind each chosen method, the data collection and analysis procedures, and how each stage contributes to answering the central research question. The methodological approach outlined here reflects current best practices in mixed methods economic research while being tailored to the specific challenges of understanding fiscal policy effectiveness in the dynamic and diverse context of ASEAN economies.

4.2 Research Design Overview

The mixed methods approach was chosen for its unique strengths in providing both depth and breadth in complex topics. This design allows us to leverage the strengths of both qualitative and quantitative research paradigms, providing a more comprehensive understanding of the

research problem than either approach alone could offer. As noted by Tashakkori and Teddlie (2010), mixed methods research represents a pragmatic worldview that focuses on the research question rather than allegiance to any particular methodological tradition, enabling researchers to draw from multiple epistemological perspectives. In the context of fiscal policy research, this approach is particularly valuable as it addresses both the technical, quantifiable aspects of policy outcomes and the contextual, sociopolitical factors that influence policy design and implementation (Johnson & Onwuegbuzie, 2004).

The mixed methods design employed in this study follows what Creswell and Plano Clark (2018) describe as an "exploratory sequential design," where qualitative methods are first used to explore and understand a phenomenon, followed by quantitative methods to test and generalize the initial findings. This approach is well-suited to our research objectives, as it allows for an initial broad exploration of fiscal policy instruments and their potential impacts, followed by targeted empirical testing of specific relationships between policy instruments and outcomes related to inequality and environmental sustainability.

Structure of the overall methodology:

Table 1 summarises the integrated research methodology and employed methods for each research question. For each method it outlines the corresponding analysis techniques and data sources:

Table 1: Integrated Methodology

Research Question	Methodology / Methods	Analysis Techniques	Data Collection
Central Research Question (CRQ)	Mixed Methodology Stage 1-3	Qualitative, Quantitative, Triangulation of RQ1-3 Findings	Refer to Paper 1-3
Stage 1: RQ1 (Chapter 5, Paper 1)	Qualitative - Scoping Review	Descriptive Analysis Thematic Analysis Citation Analysis	Public repository search (libraries, Scholar Google, etc.) ASEANstats AMS Statistical Offices Global Institutional repositories (UN, WB Open Data, OECD, IMF, Universities) Grey sources from reputable advisory and NGO
Stage 1: RQ2 (Chapter 6, Paper 2)	Qualitative Document Analysis	Thematic Analysis Framework Analysis Comparative Analysis	Identified sources in Paper 1
Stage 2: RQ3 (Chapter 7)	Quantitative Panel Regression	Panel construction Panel Inspection Pre-Analysis Modelling & Analysis with advanced panel statistics	Government & Institutional Databases (AMS Statistical Offices, WB, IMF, UN STAT, WDI, OECD) ASEANstats

Stage 3: Integration of RQ1 to RQ3 (Chapter 8)	Mixed Methodology Integration of Qualitative & Quantitative Findings of RQ1 to RQ3	Synthesis of Stage 1 Findings Identification of Key Variables Linking Qualitative and Quantitative Findings Triangulation and Interpretation	Findings from Paper 1 - 3

Note: Each of the referenced chapters / stand-alone papers focus on the respective sub-question.

This Table illustrates the sequential nature of our research design, showing how each stage builds upon the findings of the previous stage, culminating in a comprehensive integration and triangulation of results. The sequential design mirrors Morse's (2003) typology of mixed methods designs, where different methodological components are implemented in a specific order to address different aspects of the research question. This approach allows for purposeful integration at multiple points in the research process, enhancing the depth and utility of findings (Fetters et al., 2013).

Qualitative Research Design (Stage 1)

The qualitative arm of this study utilizes a two-pronged approach to comprehensively explore the mitigation of fiscal externalities:

a) Scoping Review (RQ1): This method provides a contextual understanding of existing theories and identifies relevant data sources, crucial for navigating the fiscal externality landscape. The scoping review allows us to map the existing literature systematically, identifying key concepts, theories, and gaps in current knowledge related to fiscal policy, sustainable development, and externality mitigation in ASEAN economies. The structured approach follows Arksey and O'Malley's (2005) framework for scoping reviews, which emphasizes methodological rigor while maintaining the flexibility needed to explore emerging themes and connections across disciplines. Unlike systematic reviews that typically focus on narrowly defined research questions and methodological quality assessment, our scoping review is designed to capture the breadth of relevant literature, including diverse theoretical perspectives and empirical approaches (Levac et al., 2010).

Rationale: We chose a scoping review for RQ1 due to its effectiveness in exploring a broad range of diverse sources across related research fields. This method is particularly useful when dealing with complex or heterogeneous topics, as is the case with fiscal policy and sustainable development in ASEAN. The scoping review methodology allows us to systematically map the intellectual territory, identify conceptual boundaries, and clarify working definitions (Peters et al., 2015). Additionally, it enables the identification of methodological approaches used in existing research, informing our subsequent research design choices. As noted by Munn et al. (2018), scoping reviews are particularly valuable for emerging fields where the body of evidence is still developing and diverse, which characterizes much of the research at the intersection of fiscal policy, inequality, and environmental sustainability in the ASEAN context.

b) Document & Content Analysis (RQ2): This method yields rich qualitative insights into major themes and patterns by extracting and contextualising pertinent text artifacts from the identified sources. It allows us to examine existing policy documents, reports, and other sources related to programs addressing climate change and inequality in ASEAN member states. The document analysis employs both inductive and deductive coding strategies, as outlined by Hsieh and Shannon (2005), allowing for the identification of both predetermined theoretical concepts and emergent themes from the data. This approach enables a nuanced understanding of how policy frameworks conceptualize and address the twin challenges of inequality and environmental sustainability, and how these conceptualizations vary across different national contexts within ASEAN.

Rationale: Document & Content analysis was selected for RQ2 because it enables a contextual deep dive into the actual policies and programs implemented by ASEAN countries. This method allows us to identify policy goals, instruments, and potential outcomes related to fiscal policy interventions, providing a bridge between theoretical concepts identified in the scoping review and real-world applications. Bowen's (2009) methodological framework for document analysis informs our approach, emphasizing the importance of systematic selection, critical evaluation, and contextualization of documents. This method is particularly appropriate for our research as it allows for the examination of policy evolution over time and comparative analysis across different national contexts, providing insights into policy transfer, adaptation, and innovation within the ASEAN region (Prior, 2003; Yanow, 2000).

The qualitative stage informs the quantitative stage by identifying key variables and refining hypotheses. This iterative process ensures that our quantitative analysis is grounded in a thorough understanding of the context and existing knowledge base. As suggested by Brannen (2005), this linkage between qualitative and quantitative components enriches both, with qualitative findings providing contextual depth and explanatory power to statistical relationships, and quantitative analysis testing and refining insights derived from qualitative examination. The sequential design also allows for methodological adaptations based on emerging findings, enhancing the relevance and precision of each subsequent research phase (Greene et al., 1989).

Quantitative Research Design (Stage 2)

The quantitative arm employs advanced panel regression analysis to answer RQ3. This approach allows for rigorous testing of hypothesized relationships based on statistical methods with empirical evidence. The panel regression methodology follows contemporary econometric practices as outlined by Baltagi (2021) and Wooldridge (2010), incorporating advanced techniques to address common challenges in panel data analysis, including heteroskedasticity, autocorrelation, cross-sectional dependence, and potential endogeneity. The analysis employs both fixed-effects and random-effects specifications, with appropriate tests (e.g., Hausman test) to determine the most suitable approach for each model specification.

Rationale: Panel regression analysis was chosen for its ability to handle data from multiple countries over time, allowing us to account for both country-specific effects and temporal trends. This method is particularly suited to our research as it enables us to examine the effects of fiscal policy instruments on climate change externalities, inequality, and sustainable development outcomes across ASEAN economies over an extended period. The panel approach offers several advantages over cross-sectional or time-series analysis alone,

including increased degrees of freedom, reduced collinearity among explanatory variables, and the ability to control for unobserved heterogeneity (Hsiao, 2014). These features are especially valuable in the ASEAN context, where countries share regional economic integration but maintain significant differences in economic structures, institutional frameworks, and policy approaches.

The quantitative stage builds upon the insights gained from the qualitative stages, testing hypotheses and relationships identified earlier in the research process. This approach ensures that our statistical analysis is informed by a rich understanding of the context and nuances of fiscal policy in ASEAN. As noted by Small (2011), this integration of qualitative insights into quantitative model specification enhances the validity and interpretability of statistical findings, ensuring that models capture theoretically meaningful relationships rather than merely statistical correlations. The panel regression approach also allows for the examination of both immediate and lagged effects of policy interventions, recognizing that fiscal policy impacts on inequality and environmental outcomes may manifest over different time horizons (Auerbach & Gorodnichenko, 2012).

Integration and Triangulation (Stage 3)

The final stage integrates findings from the qualitative and quantitative stages, using triangulation to enhance validity and reliability. This approach ensures a comprehensive understanding of the research topic, allowing for the development of robust hypotheses in Stage 1 that can be tested quantitatively in Stage 2 and integrated for conclusive interpretation in Stage 3. The integration process follows Fetters et al.'s (2013) framework for integrating mixed methods research, utilizing techniques such as joint displays, narrative weaving, and data transformation to meaningfully combine insights from different methodological approaches.

Rationale: The integration and triangulation stage is crucial for synthesizing the diverse data and insights gathered throughout the research process. By combining qualitative and quantitative findings, we can provide a more nuanced and comprehensive answer to our central research question, identifying areas of convergence and divergence between different data types and methodological approaches. As Denzin (2012) argues, triangulation serves not only as a validation strategy but also as a means to deepen understanding by illuminating different facets of a phenomenon. In the context of fiscal policy research, this integration allows us to understand not only whether certain policy instruments are statistically associated with desired outcomes but also why and how these relationships manifest in specific contexts (Johnson et al., 2007). This comprehensive understanding is essential for developing effective policy recommendations that are both empirically grounded and contextually sensitive to the diverse economic, social, and environmental conditions across ASEAN member states.

The integrated approach also allows for the identification of policy synergies and trade-offs that might not be apparent through single-method approaches. By examining how fiscal policies simultaneously affect both inequality and environmental outcomes, we can identify potential complementarities and conflicts, informing the development of more coherent and effective policy frameworks (Stern, 2015; UNESCAP, 2018). This holistic perspective is particularly valuable for addressing complex sustainable development challenges that cross traditional disciplinary and policy boundaries.

4.3 Research Questions and Hypotheses

The central research question is broken down into three sub-questions, each addressed by a specific methodology. This decomposition follows the principle of methodological congruence, where research questions are aligned with appropriate methodological approaches to maximize the validity and utility of findings (Morse & Niehaus, 2009). The subdivision of the central question into component parts reflects the complexity of the research topic and the need for multiple analytical lenses to fully address the multifaceted nature of fiscal policy in relation to inequality and climate change (Maxwell, 2013).

RQ1 (Scoping Review): What are the main drivers and impediments of climate change and inequality issues in ASEAN arising from externalities of economic activity, and how are governments dealing with these challenges?

- H0: ASEAN governments do not effectively deal with inequality and climate change challenges
- H1: ASEAN governments deal effectively with inequality and climate change challenges

This question aims to provide a comprehensive overview of the current state of knowledge regarding fiscal externalities in ASEAN countries. By identifying key drivers and impediments, as well as current government approaches, we lay the groundwork for more focused analysis in subsequent stages. The scoping review methodology enables a systematic examination of the literature landscape, identifying theoretical frameworks, empirical findings, and methodological approaches relevant to understanding the complex relationships between economic activity, fiscal policy, inequality, and climate change in the ASEAN context (Arksey & O'Malley, 2005; Tricco et al., 2018).

The framing of this research question reflects the dual market failures framework articulated by Stern (2008, 2015), which posits that both climate change and inequality represent significant market failures that require coordinated policy intervention. In the ASEAN context, these market failures are particularly pronounced due to the region's rapid economic growth, structural transformation, and vulnerability to climate impacts (ADB, 2021; OECD, 2019). The hypothesis testing approach allows for a critical assessment of the effectiveness of current government approaches, moving beyond descriptive analysis to evaluative judgments based on systematic evidence (Patton, 2015).

This research question also engages with the broader literature on policy responses to externalities, drawing on Pigouvian theories of corrective taxation and more recent developments in environmental economics and public finance (Fullerton, 2011; Stiglitz, 2019). By examining how ASEAN governments conceptualize and respond to these externalities, we can identify innovative approaches and potential lessons for policy design and implementation across diverse political and economic contexts (Rodrik, 2014).

RQ2 (Document & Content Analysis): To what extent do existing policies and programs in ASEAN Member States (AMS) address climate change and inequality, and how do AMS governments engage in multilateral policy coordination?

- H0: ASEAN Member states have no effective intervention strategies to mitigate fiscal externalities

- H1: ASEAN Member states have effective intervention strategies to mitigate fiscal externalities

This question delves deeper into specific policies and programs implemented by ASEAN countries. By examining actual policy documents and reports, we can assess the practical applications of fiscal policy in addressing climate change and inequality. The document and content analysis approach allows for systematic examination of policy texts, enabling identification of policy goals, instruments, and implementation mechanisms across different national contexts (Bowen, 2009; Wesley, 2014).

The focus on multilateral policy coordination reflects the recognition that externalities, particularly those related to climate change, transcend national boundaries and require coordinated regional and international responses (Barrett, 2003; Keohane & Victor, 2016). This dimension of the research is particularly relevant in the ASEAN context, where regional integration efforts provide institutional frameworks for policy coordination while significant differences in national capacities and priorities create challenges for collective action (Nesadurai, 2017; Tan, 2021).

The hypothesis testing framework for this question facilitates comparative analysis across ASEAN member states, allowing for identification of variation in policy effectiveness and the factors that contribute to successful intervention strategies. This approach aligns with the comparative public policy literature, which emphasizes the importance of understanding both policy content and the institutional contexts that shape policy design and implementation (Howlett & Cashore, 2014; Schmitt, 2020).

By focusing on both policy content and multilateral coordination, this research question bridges domestic and international dimensions of fiscal policy, recognizing that effective responses to externalities require coherent action across multiple governance levels (Biermann et al., 2010; Jordan et al., 2018). This multi-level governance perspective is particularly relevant for understanding how ASEAN member states navigate the complex interplay between national policy autonomy and regional cooperation in addressing shared challenges of inequality and climate change.

RQ3 (Panel Regression Analysis): a) How can fiscal policy balance socio-economic stability and sustainable development goals with pro-equity and pro-green qualities in a sustainable fiscal policy model? b) How can an effective mitigation mechanism be integrated at the regional and global levels through multilateral policy coordination, and at the local level through policy integration, to achieve inclusive and sustainable fiscal outcomes?

- H0: Fiscal policy cannot effectively internalise and mitigate Inequality and GHG emission externalities
- H1: Fiscal policy can effectively internalise and mitigate Inequality and GHG emission externalities

This two-part question addresses the core of our research, examining how fiscal policy can be designed and implemented to achieve multiple objectives simultaneously. The quantitative analysis allows us to test specific hypotheses about the relationships between fiscal policy instruments and outcomes related to inequality and climate change. The panel regression methodology provides statistical rigor in examining these relationships across multiple countries and time periods, controlling for various factors that might influence the effectiveness of fiscal policy interventions (Baltagi, 2021; Wooldridge, 2010).

Part (a) of the question focuses on the potential synergies and trade-offs between different policy objectives, reflecting ongoing debates in the sustainable development literature about the compatibility of economic, social, and environmental goals (Barbier & Burgess, 2017; Sachs, 2015). By empirically testing the relationships between fiscal policy instruments and multiple outcome measures, we can assess whether and under what conditions "triple win" policies that simultaneously address economic stability, social equity, and environmental sustainability are achievable (Hepburn et al., 2020; UNESCAP, 2018).

Part (b) extends the analysis to examine the institutional arrangements and coordination mechanisms necessary for effective policy implementation across governance levels. This dimension reflects insights from multilevel governance and policy integration literature, which emphasize that complex sustainable development challenges require coordinated action across multiple jurisdictions and policy domains (Adelle & Russel, 2013; Lenschow et al., 2018). The focus on regional and global coordination is particularly relevant for addressing transboundary externalities like greenhouse gas emissions, while the emphasis on local policy integration recognizes the importance of contextual factors in shaping policy outcomes (Biesbroek et al., 2018; Oberthür & Stokke, 2011).

The hypothesis testing framework for this question allows for rigorous empirical assessment of the effectiveness of fiscal policy in addressing externalities, moving beyond theoretical arguments to evidence-based conclusions. This approach aligns with the growing emphasis on empirical evaluation in public policy research, which seeks to identify causal relationships between policy interventions and outcomes of interest (Angrist & Pischke, 2010; Gertler et al., 2016).

By integrating economic, social, and environmental dimensions of fiscal policy, this research question contributes to emerging literature on integrated policy approaches for sustainable development, which emphasizes the need for policy coherence across traditionally separate domains (Nilsson et al., 2016; OECD, 2018). This integrated perspective is essential for addressing the complex challenges of inequality and climate change, which cut across conventional policy boundaries and require coordinated responses that recognize their interconnected nature.

4.4 Conceptual Model

The conceptual model (Figure 2) illustrates the relationships between key variables in our study. It demonstrates how fiscal policies, through taxation and spending, affect income inequality and GHG emissions. The model includes a feedback loop representing the mitigation mechanism, which adjusts fiscal policies based on their outcomes. This dynamic conceptualization builds upon theoretical frameworks from public economics, environmental economics, and development studies, synthesizing diverse perspectives into an integrated analytical framework (Agénor et al., 2013; Baumol & Oates, 1988; Stiglitz, 2019). The model represents what Ostrom (2009) described as a social-ecological system, where economic policies, social outcomes, and environmental impacts are interconnected through complex causal pathways and feedback mechanisms.

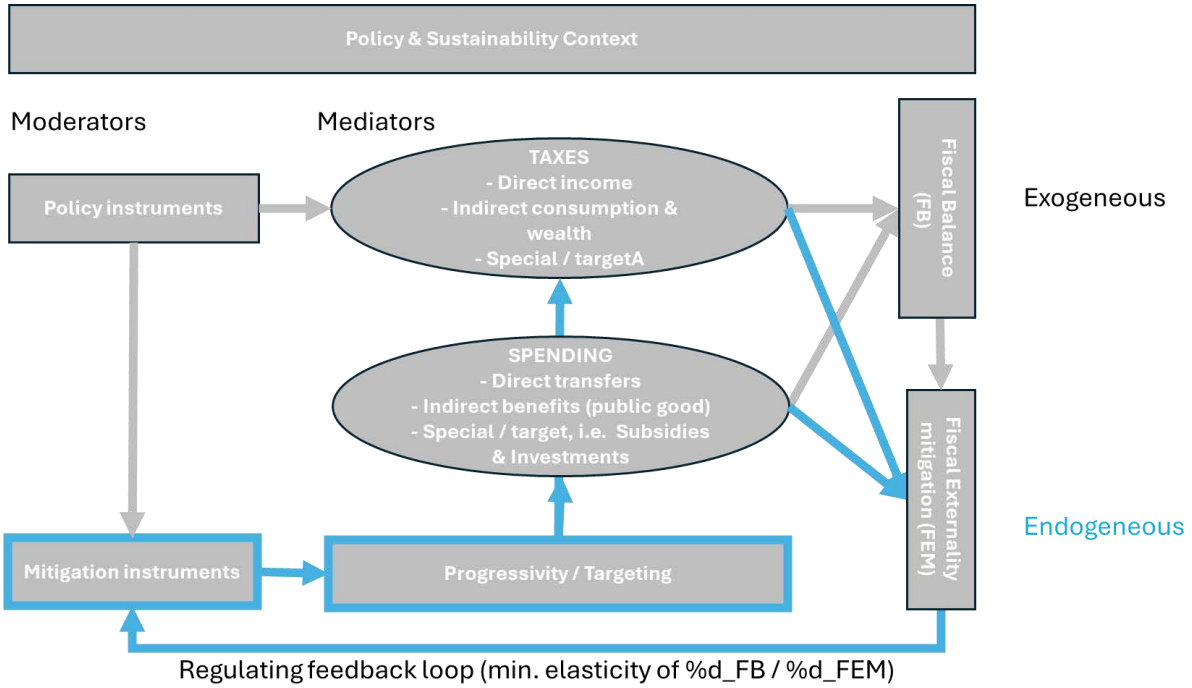

Figure 2 Conceptual Research Model

The model extends traditional public finance frameworks by explicitly incorporating externality effects and feedback mechanisms, reflecting contemporary theoretical developments in the literature on sustainable fiscal policy (Hepburn et al., 2020; IMF, 2021; Stern, 2015). This approach aligns with the "environmental fiscal reform" paradigm advocated by international organizations and ecological economists, which emphasizes the potential for well-designed fiscal policies to simultaneously address environmental degradation and social inequities (OECD, 2017; UNEP, 2019).

Key components of the model include:

- Fiscal Policy Instruments:
- Taxes: Direct income taxes, indirect consumption and wealth taxes, and special or targeted taxes (e.g., luxury, pollution taxes)
- Spending: Direct transfers, indirect benefits (public goods), and special or targeted initiatives such as subsidies and investments

The distinction between different types of fiscal instruments reflects the literature on differential tax incidence and spending impacts across income groups and economic sectors (Diamond & Saez, 2011; Musgrave & Musgrave, 2003). The model acknowledges that the distributional and environmental impacts of fiscal instruments vary significantly depending on their design, implementation, and contextual factors. For example, consumption taxes may be regressive in isolation but progressive when considered alongside targeted spending programs (Engel et al., 1999; Lustig et al., 2014). Similarly, environmental taxes may have complex distributional implications depending on consumption patterns across income groups and the use of tax revenues (Fullerton, 2011; Sterner, 2012).

The inclusion of "special or targeted" instruments recognizes the emerging literature on innovative fiscal approaches specifically designed to address environmental and social objectives, such as carbon taxes with revenue recycling, progressive wealth taxes, and green

investment programs (Jacobs & van der Ploeg, 2019; Saez & Zucman, 2019; Stiglitz et al., 2017). These targeted instruments are increasingly relevant in the ASEAN context, where countries are exploring policy innovations to address the dual challenges of inequality and environmental sustainability while maintaining economic growth (ADB, 2021; ERIA, 2019).

Mitigation Instruments:

- Designed to adjust fiscal policies to better handle externalities, specifically focusing on environmental and social impacts

The mitigation instruments component represents the institutional and policy frameworks that enable learning, adaptation, and refinement of fiscal policies based on their observed impacts. This element draws on literature from policy learning and adaptive governance, emphasizing the importance of monitoring mechanisms, institutional flexibility, and policy feedback for effective externality management (Bennett & Howlett, 1992; Folke et al., 2005; Hall, 1993). The inclusion of explicit mitigation instruments reflects recognition that addressing complex externalities requires ongoing policy adjustment rather than static policy prescriptions, particularly in rapidly evolving economic and environmental contexts like those found in ASEAN countries (Djalante et al., 2011; Nesadurai, 2017).

The conceptualization of mitigation instruments as distinct from but connected to primary fiscal instruments allows for analysis of policy coordination mechanisms at different governance levels. This approach enables examination of both vertical coordination (across local, national, and regional levels) and horizontal coordination (across different policy domains and ministries), which research suggests is crucial for effective management of complex externalities (Adelle & Russel, 2013; Persson, 2004; Tosun & Lang, 2017).

Outcome Variables:

- Income Inequality: Measured by household income distribution (GINI coefficient or Theil-T Index)
- Climate Change: Measured by GHG emissions (CO2e)

The selection of inequality and greenhouse gas emissions as primary outcome variables reflects the dual focus of the research on social and environmental externalities. This approach aligns with the sustainable development paradigm, which emphasizes the interconnectedness of economic, social, and environmental dimensions of development (Sachs, 2015; UN, 2015). The choice of specific metrics for these outcomes is informed by methodological literature on measuring inequality and environmental impacts, considering both data availability and conceptual appropriateness (Atkinson, 1970; IPCC, 2014; Jenkins, 2015).

The model recognizes that these outcome variables are influenced by multiple factors beyond fiscal policy, including structural economic characteristics, institutional arrangements, and external influences such as global economic conditions and international agreements. By incorporating these relationships into the conceptual framework, the model provides a basis for distinguishing the specific contributions of fiscal policy from other determinants of inequality and emissions (Milanović, 2016; Stern, 2008).

Control Variables:

- Fiscal Balance (FB) and Net Fiscal Incidence (NFI): Representing the equilibrium between government revenues and expenditures
- Macro variables: e.g., GDP, population growth, renewable energy mix

The inclusion of fiscal balance and net fiscal incidence as control variables reflects the literature on public finance sustainability, which emphasizes that effective fiscal policy must balance multiple objectives within resource constraints (Blanchard et al., 2010; Woodford, 2011). This approach acknowledges the potential trade-offs between addressing externalities and maintaining fiscal sustainability, particularly for developing economies with limited fiscal space (Gaspar et al., 2019; IMF, 2018).

The broader set of macroeconomic control variables captures structural factors that influence both the feasibility of fiscal policy interventions and their effectiveness in addressing externalities. These include economic structure and development level (represented by GDP), demographic factors (population growth), and technological factors (renewable energy mix). The selection of these variables is informed by empirical literature on the determinants of inequality and emissions, which identifies these factors as significant influencers across national contexts (Chancel & Piketty, 2015; Kanbur, 2015; Stern, 2008).

The model operates on the principle that fiscal policies should not only aim to maintain economic stability and full employment but also actively mitigate negative externalities without disrupting the fiscal balance. This principle extends traditional Keynesian perspectives on fiscal policy by incorporating sustainable development objectives, reflecting contemporary theoretical frameworks that emphasize the potential for well-designed fiscal policies to simultaneously address multiple policy goals (Barbier, 2010; Jacobs, 2012; Stiglitz et al., 2015).

The feedback loop in the model represents the dynamic nature of policy adjustment, where outcomes inform future policy decisions. This dynamic conceptualization draws on systems thinking and policy learning literature, which emphasize that effective governance of complex systems requires continuous monitoring, evaluation, and adjustment (Duit & Galaz, 2008; Folke, 2006; Ostrom, 2009). The feedback mechanism captures both formal policy evaluation processes and informal adaptive responses to changing conditions, reflecting the reality that policy evolution occurs through multiple channels and at different time scales (Howlett, 2019; Sabatier & Jenkins-Smith, 1993).

By integrating these diverse theoretical perspectives and empirical insights, the conceptual model provides a comprehensive framework for analysing how fiscal policies can be designed and implemented to effectively address the dual challenges of inequality and climate change in the ASEAN context. The model's emphasis on dynamics, feedback, and multi-objective policy design reflects the complexity of the sustainable development challenges facing the region and the need for integrated, adaptive policy approaches to address them.

4.5 Data Collection Methods

Qualitative Data Collection

Qualitative data collection involves a two-stage process, aligned with our two qualitative research questions. This staged approach reflects what Creswell and Plano Clark (2018) describe as a sequential design, where each phase of data collection builds upon and is informed by the previous phase. The comprehensive nature of our qualitative data collection strategy allows for both breadth and depth in understanding the complex relationships

between fiscal policy, inequality, and climate change in the ASEAN context (Flick, 2018; Patton, 2015).

1. Scoping Review (RQ1):

We conduct a systematic search of academic databases including JSTOR, PubMed, Web of Science, and Scopus for articles published between 2000 and 2023. The search strategy is developed in consultation with a research librarian to ensure comprehensive coverage of relevant literature. This approach follows best practices in systematic review methodology, as outlined by Petticrew and Roberts (2006) and Moher et al. (2015), ensuring a transparent, replicable, and comprehensive search strategy.

Key search terms include combinations of:

- "fiscal policy" OR "tax policy" OR "public spending"
- "sustainable development" OR "inclusive growth" OR "climate change mitigation"
- "ASEAN" OR [individual ASEAN country names]
- "externalities" OR "inequality" OR "emissions"

The development of search terms was guided by the PICO framework (Population, Intervention, Comparison, Outcome), adapted for policy research as suggested by Booth (2016). This structured approach ensures that our search captures the multidimensional nature of our research topic, including both economic policy instruments and their social and environmental impacts. The inclusion of country-specific terms recognizes the importance of contextual factors in shaping policy effectiveness and outcomes (Rodrik, 2014).

Selection criteria included:

- Relevance to fiscal externalities, policy frameworks, and mitigation strategies
- Focus on ASEAN countries or economies with relevant contexts
- Peer-reviewed articles, books, and high-quality grey literature (e.g., working papers from reputable institutions)

The inclusion of high-quality grey literature reflects recognition that valuable research on emerging policy issues is often found in working papers, institutional reports, and policy briefs, particularly for rapidly evolving fields at the intersection of economic policy and sustainable development (Adams et al., 2017; Mahood et al., 2014). This approach is particularly important for research on ASEAN economies, where relevant policy innovations may be documented in institutional publications before appearing in peer-reviewed academic literature.

The initial search yielded over 500 documents, which were screened based on title and abstract. After full-text review, a final sample of 120 articles was selected for in-depth analysis. This multi-stage screening process follows the PRISMA guidelines for systematic reviews (Page et al., 2021), ensuring methodological rigor while maintaining the flexibility needed for exploratory research. The systematic documentation of the search and screening process enhances the transparency and reproducibility of our research, addressing common methodological concerns in qualitative research (Tracy, 2010).

2. Document & Content Analysis (RQ2):

For this stage, we collected policy documents, reports, and government publications from official websites of ASEAN countries, international organizations (e.g., World Bank, IMF, ASEAN Secretariat), and relevant ministries (e.g., finance, environment). This approach to document selection follows what Scott (1990) describes as the principles of authenticity, credibility, representativeness, and meaning, ensuring that the documents analysed provide valuable insights into official policy positions and frameworks.

Eligibility criteria focused on:

- Documents addressing climate change, inequality, and fiscal policies
- Official policy statements, national development plans, and program reports
- Publications from 2000 onwards, with a focus on the most recent decade

The temporal focus on the most recent decade reflects the rapid evolution of policy approaches to sustainable development, particularly following the adoption of the Paris Agreement (2015) and the Sustainable Development Goals (UN, 2015). This recency emphasis ensures that our analysis captures contemporary policy innovations and challenges while maintaining sufficient historical context to understand policy evolution over time (Jordan et al., 2018; Nilsson et al., 2016).

This process resulted in a sample of 80 documents for detailed analysis. The document sample includes a diverse range of policy texts, including national development plans, sectoral strategies, budget statements, and policy evaluations. This diversity allows for examination of both stated policy intentions and implementation mechanisms, providing insights into both the "rhetoric" and "reality" of policy approaches to inequality and climate change (Bacchi, 2009; Yanow, 2000).

The use of multiple sources and types of documents enhances the comprehensiveness of our qualitative data, allowing for a rich understanding of both academic perspectives and practical policy applications in ASEAN countries. This approach to source triangulation strengthens the validity of our findings by enabling comparison across different document types and institutional perspectives (Bowen, 2009; Denzin, 2012). The combination of academic literature and policy documents also facilitates examination of potential gaps between theoretical frameworks and practical policy implementation, providing insights into the challenges of translating policy ideals into effective interventions (Cairney, 2016; Howlett, 2019).

3. Quantitative Data Collection (RQ3)

Quantitative data collection utilizes panel data from multiple ASEAN countries spanning 2000-2023. The longitudinal nature of the data allows for examination of both cross-sectional variation across countries and temporal trends within countries, providing a more comprehensive understanding of the relationships between fiscal policy, inequality, and environmental outcomes (Baltagi, 2021; Wooldridge, 2010). The extended time period enables analysis of both short-term policy impacts and longer-term structural relationships, which is particularly important for understanding the complex dynamics of sustainable development transitions (Geels et al., 2017; Stern, 2015).

The primary sources include:

- World Bank Open Data
- International Monetary Fund (IMF) databases
- ASEAN Secretariat statistical portal
- National statistical offices of ASEAN countries

The use of multiple data sources reflects best practices in comparative economic research, as it enables cross-validation of key indicators and helps address potential measurement inconsistencies across different institutional sources (Ravallion, 2016; Solt, 2020). The inclusion of both international and national data sources also allows for balancing standardized cross-country comparability with context-specific measurement approaches, enhancing both the reliability and validity of our analysis (Jerven, 2013; Kanbur, 2017).

Key variables collected include:

- GHG emissions (CO2e) data
- Household income distribution (GINI coefficient and Household Income Distributions)
- Fiscal policy indicators (e.g., tax revenue by category as % of GDP, government expenditure by category as % of GDP, fiscal balance, fiscal stance)
- Macroeconomic indicators (e.g., GDP Growth and Per-Capita, Inflation and Unemployment rates,)
- Social indicators (e.g., Population, Demographics, Work Force Participation, poverty rates, Social Benefits per-Capita)
- Environmental indicators (e.g., CO2 footprint, Renewable energy share, and Pro-green investment)

The selection of these variables is guided by both theoretical considerations and empirical literature on the determinants of inequality and environmental outcomes. The inclusion of multiple indicators for key concepts (e.g., different measures of inequality, various environmental indicators) allows for robustness checks and sensitivity analysis, addressing concerns about measurement validity in cross-country comparative research (Atkinson & Brandolini, 2001; Solt, 2020). The categorization of fiscal policy instruments into distinct types (e.g., direct vs. indirect taxes, different expenditure categories) enables nuanced analysis of how specific policy instruments affect different outcomes, moving beyond aggregate fiscal measures to identify more precise policy mechanisms (Martinez-Vazquez et al., 2012; Stiglitz, 2019).

To ensure consistency and comparability across all datasets, we standardize the frequency to annual observations within the 2000-2023 period. The sampling strategy focused on countries with complete datasets over the period, resulting in a sample of 10 ASEAN countries. This comprehensive country coverage provides a balanced panel dataset, enhancing the statistical power and representativeness of our analysis (Hsiao, 2014). The inclusion of all ASEAN member states allows for examination of how policy effectiveness varies across different levels of economic development, institutional capacity, and structural characteristics within the region (ADB, 2021; ERIA, 2019).

Data validation processes include:

- Cross-checking between multiple sources to ensure consistency
- Addressing missing values through appropriate imputation techniques
- Conducting panel diagnostic tests for unit-root, cointegration, and heteroskedasticity, etc.

These rigorous data collection and validation processes ensure the reliability and robustness of our quantitative analysis. The attention to data quality issues reflects recognition that effective policy analysis requires not only appropriate statistical methods but also careful consideration of data limitations and potential measurement errors (Jerven, 2013; Ravallion, 2016). The comprehensive diagnostic testing approach follows contemporary best practices in panel econometrics, addressing common challenges such as non-stationarity, cross-sectional dependence, and heterogeneity in dynamic relationships across countries (Eberhardt & Teal, 2011; Pesaran, 2015).

The integration of these rigorous qualitative and quantitative data collection methods provides a solid foundation for our mixed methods analysis, enabling both in-depth understanding of policy contexts and mechanisms and systematic testing of key relationships between fiscal policy instruments and outcomes related to inequality and climate change. This complementary approach to data collection enhances both the breadth and depth of our analysis, addressing the multifaceted nature of sustainable fiscal policy in the ASEAN context.

4.6 Data Analysis Procedures

Qualitative Data Analysis

Scoping Review Method (RQ1):

1. Setting Topical and Search Scope:

- Develop a comprehensive list of keywords and search terms
- Define geographical scope focusing on ASEAN member states
- Determine timeframe (2000-2023) for literature search

This initial stage establishes the parameters for our systematic literature search, following established methodological frameworks for scoping reviews (Arksey & O'Malley, 2005; Tricco et al., 2018). The development of a comprehensive keyword list ensures that our search captures the multidimensional nature of fiscal policy in relation to sustainable development, including both economic and environmental dimensions. The geographic focus on ASEAN reflects our research objective of understanding region-specific policy challenges and innovations, while the extended timeframe allows for examination of policy evolution over a period of significant economic transformation and increasing environmental awareness in the region (ADB, 2021; Nesadurai, 2017).

2. Selection Criteria:

- Establish clear inclusion and exclusion criteria
- Include publications addressing fiscal policy, sustainable development, or their interactions in ASEAN context
- Exclude studies with narrow focus on a specific country or irrelevant to research question

The development of explicit selection criteria enhances the transparency and reproducibility of our review, addressing common methodological concerns in qualitative research (Booth et al., 2016; Tracy, 2010). The inclusion criteria are designed to capture literature that addresses both fiscal policy instruments and sustainable development outcomes, reflecting our integrated research approach. While country-specific studies are included to capture contextual variations, our focus remains on identifying generalizable insights that can inform regional policy approaches, aligning with the comparative public policy literature on lesson-drawing and policy transfer (Dolowitz & Marsh, 2000; Rose, 1991).

3. Document Validation:

- Implement two-stage screening process
- Conduct initial screening based on titles and abstracts
- Apply full-text review to shortlisted articles

The two-stage screening process follows PRISMA guidelines for systematic reviews (Page et al., 2021), ensuring methodological rigor while managing the substantial volume of potentially relevant literature. This approach balances efficiency with comprehensiveness, allowing for rapid identification of clearly relevant or irrelevant sources while reserving more time-intensive full-text review for ambiguous cases (Petticrew & Roberts, 2006). The systematic documentation of the screening process, including reasons for exclusion, enhances the transparency and reproducibility of our review methodology (Moher et al., 2015).

4. Document Classification and Summary:

- Develop coding scheme to categorize and organize literature
- Extract key information including research themes, methodologies, findings, and limitations
- Summarize content and metadata of each included study

The development of a structured coding scheme provides a systematic framework for extracting and organizing information from diverse literature sources, enhancing the comparability and synthesis of findings across studies (Miles et al., 2014). The coding approach draws on principles of qualitative content analysis, balancing predetermined categories derived from our research questions with emergent codes that capture unanticipated themes and insights (Hsieh & Shannon, 2005). The systematic extraction of methodological details and limitations also enables critical assessment of the quality and reliability of existing research, informing our evaluation of the evidence base for different policy approaches (Pawson, 2006).

5. Data Analysis:

- Conduct thematic analysis to identify recurring themes and patterns
- Utilize descriptive analysis to summarize key findings and research gaps

- Perform citation analysis to explore intellectual structure of the field

The development of a structured coding scheme provides a systematic framework for extracting and organizing information from diverse literature sources, enhancing the comparability and synthesis of findings across studies (Miles et al., 2014). The coding approach draws on principles of qualitative content analysis, balancing predetermined categories derived from our research questions with emergent codes that capture unanticipated themes and insights (Hsieh & Shannon, 2005). The systematic extraction of methodological details and limitations also enables critical assessment of the quality and reliability of existing research, informing our evaluation of the evidence base for different policy approaches (Pawson, 2006).

Document & Content Analysis Method (RQ2):

1. Source Identification:

- Leverage findings from scoping review to identify relevant policy documents
- Utilize government websites, institutional repositories, and reports from think tanks

This approach to source identification builds upon the scoping review findings, creating methodological continuity between the two qualitative stages. The focus on official sources ensures authenticity and representativeness of the policy documents analysed, while the inclusion of think tank reports provides complementary perspectives on policy design and implementation (Scott, 1990; Wesley, 2014). This comprehensive sourcing strategy recognizes that policy development involves diverse stakeholders and can be understood through multiple documentary lenses (Yanow, 2000).

2. Selection Criteria:

- Establish clear inclusion and exclusion criteria for identified documents and themes
- Include official policy documents, national development plans, budget statements, and program reports
- Exclude outdated documents and sources lacking transparency or clear authorship

The explicit selection criteria enhance the methodological rigor of our document analysis, ensuring that the included documents provide meaningful insights into contemporary policy approaches. The focus on diverse document types—from broad development plans to specific program reports—allows for examination of how policy intentions translate into specific implementation mechanisms, addressing a common gap in policy analysis between stated goals and operational realities (Cairney, 2016; Howlett, 2019). The attention to document authenticity and credibility follows established principles for document analysis in social research (Bowen, 2009; Scott, 1990).

3. Coding Scheme Development:

- Develop coding scheme to categorize and analyse document content
- Include categories such as policy goals, target groups, fiscal instruments, and anticipated outcomes

The structured coding scheme provides a systematic framework for analysing diverse policy documents, enhancing comparability across different national contexts and policy domains. The categorization approach draws on theories of policy design and implementation, focusing on the key elements of policy logic: problem definition, goals, instruments, and anticipated outcomes (Howlett & Mukherjee, 2018; Schneider & Ingram, 1997). This theoretically informed coding approach facilitates not only description of policy content but also analysis of the underlying causal theories and assumptions embedded in policy documents (Bacchi, 2009; Yanow, 2000).

4. Document & Content Analysis:

- Apply coding scheme systematically to analyse identified documents for themes, topic and text artifacts
- Extract key information related to policy goals, instruments, and potential outcomes
- Utilize thematic and framework analysis to identify recurring themes, topics and text artifacts and compare policy approaches

The systematic application of the coding scheme ensures consistent analysis across the document sample, enhancing the reliability of our findings. The combined use of thematic analysis and framework analysis provides both flexibility to identify emergent themes and structure to facilitate cross-case comparison (Braun & Clarke, 2006; Ritchie & Spencer, 1994). This dual analytical approach is particularly valuable for comparative policy analysis, allowing for identification of both commonalities in policy approaches across ASEAN countries and distinctive national innovations or adaptations (Lenschow et al., 2018; Schmitt, 2020).

5. Data Synthesis:

- Synthesize findings to identify commonalities and variations in policy approaches
- Analyse potential effectiveness of existing fiscal policy interventions

The synthesis phase moves beyond description to comparative analysis and evaluation, identifying patterns in policy approaches across ASEAN countries and assessing their potential effectiveness based on theoretical frameworks and empirical evidence. This approach aligns with the comparative public policy literature, which emphasizes the importance of understanding both policy content and the contextual factors that shape policy effectiveness (Howlett & Cashore, 2014; Schmitt, 2020). The evaluative dimension of our analysis draws on principles of theory-based evaluation, examining the internal logic and underlying assumptions of policy approaches in light of existing evidence on effective interventions (Pawson & Tilley, 1997; Weiss, 1997).

The qualitative data analysis is conducted using NVivo and RapidMiner software, which facilitated the organization, coding, and thematic analysis of the large volume of textual data. These computer-assisted qualitative data analysis tools enhance the efficiency and systematic nature of our analysis, while still maintaining the interpretive depth essential for meaningful qualitative research (Bazeley & Jackson, 2013; Silver & Lewins, 2014). The use of RapidMiner, with its text mining capabilities, complements the more traditional qualitative analysis in NVivo, allowing for identification of patterns and relationships that might not be immediately apparent through manual coding alone (Miner et al., 2012).

Quantitative Data Analysis

Panel Regression Analysis (RQ3):

1. Panel Data Construction:

- Gather relevant data for fiscal policy instruments, climate change indicators, inequality measures, and sustainable development outcomes
- Utilize established data sources (World Bank, IMF, ASEAN Secretariat, United Nations Statistical Division and other Global Institutions, e.g. OECD, Eurostat and and NGOs)
- Ensure data consistency and addressed missing values

The panel data construction process involves careful compilation of data from multiple sources, with attention to consistency and comparability across countries and over time. This approach follows best practices in comparative economic research, recognizing the challenges of cross-country data harmonization and the importance of reliable measurement for valid causal inference (Jerven, 2013; Ravallion, 2016). The use of established institutional data sources enhances the credibility and transparency of our analysis, while the attention to data consistency and missing values addresses common challenges in panel data analysis (Baltagi, 2021; Hsiao, 2014).

2. Panel Inspection:

- Conduct preliminary tests including unit root tests and stationarity checks
- Analyse potential issues like cross-sectional dependence and serial correlation
- Employ suitable techniques to address identified issues

The comprehensive panel inspection approach follows contemporary econometric best practices, systematically addressing potential violations of model assumptions that could lead to biased or inefficient estimates (Baltagi, 2021; Wooldridge, 2010). The testing for unit roots and stationarity is particularly important for macroeconomic variables, which often exhibit non-stationary behaviour, while the assessment of cross-sectional dependence recognizes the interconnected nature of ASEAN economies (Pesaran, 2015; Phillips & Moon, 2000). These diagnostic procedures ensure that our subsequent model specifications and estimation

techniques are appropriate for the data characteristics, enhancing the validity and reliability of our findings.

3. Pre-Analysis:

- Conduct descriptive statistics to summarize key variables
- Perform correlation analysis to explore preliminary relationships

The pre-analysis phase provides a foundation for subsequent model building by establishing the empirical distributions and bivariate relationships among key variables. This approach allows for preliminary assessment of research hypotheses and identification of potential confounding relationships that need to be addressed in multivariate models (Angrist & Pischke, 2010; Wooldridge, 2010). The descriptive analysis also enables assessment of the plausibility of model assumptions and identification of potential outliers or influential observations that might require special attention in model specification (Bollen & Jackman, 1985).

4. Model Specification and Estimation:

- Develop panel regression models (Fixed Effects versus Random Effects, model selection (VECM / SVAR) in context of hypothesised theories
- Estimate model parameters and assess statistical significance of relationships
- Conduct model diagnostics for analytical and interpretative contexts

The model specification and estimation approach balances theoretical considerations with empirical testing, developing models that reflect hypothesized relationships while being appropriate for the data characteristics. The consideration of alternative model specifications (Fixed vs. Random Effects) follows standard econometric practice, with selection based on both theoretical appropriateness and empirical testing (e.g., Hausman test) (Bell & Jones, 2015; Clark & Linzer, 2015). The inclusion of more sophisticated time-series models (VECM, SVAR) reflects recognition of the dynamic nature of fiscal policy effects and the potential for bidirectional relationships between policy instruments and outcomes (Blanchard & Perotti, 2002; Stock & Watson, 2001).

5. Post-Estimation Analysis:

- Evaluate goodness-of-fit and addressed potential issues (multicollinearity, heteroskedasticity)
- Conduct robustness checks using alternative model specifications

The post-estimation analysis ensures that our findings are reliable and robust, addressing potential threats to valid inference that might arise from model misspecification or violation of assumptions. The evaluation of goodness-of-fit provides insights into the explanatory power of our models, while the diagnostic testing for issues like multicollinearity and

heteroskedasticity guides appropriate model refinement (Greene, 2018; Kennedy, 2008). The robustness checks using alternative model specifications enhance the credibility of our findings by demonstrating that they are not artifacts of specific modelling choices, a particularly important consideration in policy-relevant research where findings may inform practical interventions (Athey & Imbens, 2017; Imbens & Rubin, 2015).

We used R-statistical software for the panel regression analysis, employing fixed-effect models and Structured Vector Autoregression (SVAR), and Vector Error Correction Model (VECM) techniques and diagnostics. The use of advanced econometric methods allows us to account for the complex dynamics of fiscal policy effects over time and across countries. The R environment provides a comprehensive set of tools for panel data analysis, including specialized packages for advanced econometric techniques like SVAR and VECM (Croissant & Millo, 2018; Pfaff, 2008). These sophisticated modelling approaches enable examination of both short-term policy impacts and longer-term structural relationships, providing a more comprehensive understanding of how fiscal policy affects inequality and environmental outcomes across different time horizons (Blanchard & Perotti, 2002; Helmke & Levitsky, 2004).

4.7 Integration of Qualitative and Quantitative Data

The integration of qualitative and quantitative data followed a convergent design framework, ensuring that insights from both methods are combined to provide a comprehensive understanding. This process involves:

1. Synthesis of Stage 1 Findings:
    - Integrate key themes and insights from scoping review and document & content analysis
    - Create holistic understanding of existing knowledge base and policy landscape
2. Identification of Key Variables:
    - Based on qualitative findings, identify relevant fiscal policy instruments, climate change indicators, and inequality measures for quantitative analysis
3. Linking Qualitative and Quantitative Findings:
    - Use qualitative insights to inform development of the quantitative models
    - Present quantitative results alongside qualitative themes for comprehensive picture
4. Triangulation and Interpretation:
    - Identify areas of convergence and divergence between qualitative and quantitative results
    - Use of qualitative findings to contextualize and explain quantitative results

This integration process is facilitated by the use of mixed methods data analysis software like NVivo or RapidMiner, allowing for the systematic comparison of qualitative themes with quantitative findings.

4.8 Validity and Reliability

Qualitative Validity and Reliability

To ensure validity and reliability in qualitative research, we employ several strategies that align with established frameworks for quality assessment in qualitative research (Lincoln & Guba, 1985; Tracy, 2010). These strategies address key dimensions of qualitative rigor, including credibility, dependability, confirmability, and transferability, ensuring that our findings accurately represent the phenomena under study and can withstand critical scrutiny (Korstjens & Moser, 2018; Nowell et al., 2017).

- Rigorous screening process during data collection:
- Develop clear inclusion and exclusion criteria for both the scoping review and document analysis
- Implement a two-stage screening process (title/abstract and full-text review)
- Maintain a detailed audit trail of the selection process

This systematic approach to data collection enhances what Lincoln and Guba (1985) term the "dependability" of qualitative research, ensuring that the process is transparent, replicable, and consistent. The explicit documentation of inclusion and exclusion criteria addresses common critiques of qualitative research regarding selection bias and cherry-picking of evidence (Petticrew & Roberts, 2006). The maintenance of a detailed audit trail aligns with best practices in systematic reviews and qualitative research more broadly, providing a record of methodological decisions that enhances both the transparency and credibility of the research process (Bowen, 2009; Mays & Pope, 2000).

Peer debriefing sessions:

- Conduct regular meetings with research team members to review and refine coding and thematic analysis
- Engage in reflexive discussions to challenge assumptions and interpretations
- Document key decisions and rationales throughout the analysis process

Peer debriefing represents what Guba (1981) identifies as a key strategy for enhancing the credibility of qualitative research, providing opportunities for critical questioning and refinement of interpretations. This collaborative approach to analysis helps to mitigate individual researcher bias and enhances the depth and nuance of interpretations through diverse perspectives (Creswell & Miller, 2000). The integration of reflexivity in this process addresses the recognition in contemporary qualitative methodology that researchers' positionality and assumptions inevitably influence the research process, requiring explicit examination and critical reflection (Finlay, 2002; Malterud, 2001).

Triangulation of findings from different qualitative sources:

- Compare themes emerging from academic literature (scoping review) with those from policy documents (document & content analysis)
- Identify areas of convergence and divergence between different data sources

- Use multiple coders to analyse a subset of data, calculating inter-coder reliability

The triangulation of different qualitative data sources enhances the comprehensiveness and credibility of our findings, aligning with Denzin's (1978, 2012) framework for triangulation in qualitative research. The comparison of themes across academic and policy literature allows for examination of potential gaps between theoretical frameworks and practical policy applications, providing insights into both the state of knowledge and its translation into practice (Cairney, 2016). The use of multiple coders with intercoder reliability assessment addresses concerns about the subjective nature of qualitative coding, introducing a quantitative element to validate the consistency of thematic interpretation (Campbell et al., 2013; O'Connor & Joffe, 2020).

Member checking with experts:

- Consult with experts in fiscal policy and economics to validate interpretations and conclusions
- Present preliminary findings at academic conferences for peer feedback
- Incorporate expert insights to refine our analysis and interpretations

Member checking represents a classic approach to enhancing the credibility of qualitative research by validating interpretations with knowledgeable stakeholders (Lincoln & Guba, 1985). The consultation with domain experts helps to ensure that our interpretations align with specialist knowledge and address nuances that might be missed by researchers without domain-specific expertise (Birt et al., 2016). The presentation of preliminary findings at academic conferences provides opportunities for critical feedback from the broader academic community, allowing for refinement of interpretations based on diverse perspectives and expertise (Tracy, 2010).

These strategies enhance the credibility, dependability, and confirmability of our qualitative findings, ensuring a robust foundation for the subsequent quantitative analysis. The comprehensive approach to qualitative validity and reliability reflects contemporary understandings of quality in qualitative research, which emphasize systematic processes, transparent documentation, reflexive practice, and validation through multiple perspectives (Lincoln & Guba, 1985; Tracy, 2010).

4.9 Quantitative Validity and Reliability

For quantitative research, we take several measures to ensure validity and reliability, following established econometric practices for panel data analysis (Baltagi, 2021; Wooldridge, 2010). These measures address key methodological challenges in panel data research, including non-stationarity, heterogeneity, cross-sectional dependence, and endogeneity, ensuring the robustness and validity of our statistical inferences.

Panel diagnostic tests:

- Conduct unit-root tests (e.g., Im, Pesaran, & Shin, 2003) to check for stationarity
- Perform cointegration tests (e.g., Pedroni, 1999, 2004) to examine long-run relationships

- Test for heteroskedasticity using modified Wald test for groupwise heteroskedasticity (Greene, 2000)
- Check for cross-sectional dependence using Pesaran CD test (Pesaran, 2004, 2015)

The comprehensive diagnostic testing approach follows best practices in panel econometrics, systematically identifying and addressing potential violations of model assumptions that could lead to spurious relationships or biased estimates (Baltagi, 2021; Pesaran, 2015). The testing for unit roots and cointegration is particularly important for macroeconomic variables, which often exhibit non-stationary behaviour that can lead to misleading statistical inferences if not properly addressed (Eberhardt & Teal, 2011; Phillips & Moon, 2000). The assessment of cross-sectional dependence recognizes the interconnected nature of ASEAN economies and the potential for common shocks to affect multiple countries simultaneously, requiring appropriate modelling techniques to ensure valid statistical inference (Chudik & Pesaran, 2015; Pesaran, 2006).

Consistency checks across multiple datasets:

- Cross-verify data from different sources (e.g., World Bank, IMF, national statistics offices)
- Address discrepancies through careful examination and, where necessary, contacting original data providers for clarification

The attention to data consistency addresses a critical but often overlooked aspect of empirical research: the quality and reliability of the underlying data (Jerven, 2013; Ravallion, 2016). By cross-verifying key variables across multiple sources, we enhance confidence in the accuracy of our measurements and mitigate potential biases arising from measurement error or inconsistent definitions. This approach is particularly important for cross-country research in developing economies, where data quality and comparability can vary significantly across countries and sources (Kanbur & Shaffer, 2007; Solt, 2020).

Cross-referencing data sources:

- Compare our compiled dataset with those used in similar published studies
- Document and justify any deviations in data selection or treatment

This cross-referencing approach enhances the transparency and reproducibility of our research, following growing calls for more open and replicable empirical practices in economics and social sciences more broadly (Christensen & Miguel, 2018; Ioannidis, 2005). By comparing our dataset with those used in similar studies, we can identify potential anomalies or unusual patterns that might require further investigation. The explicit documentation of data selection and treatment decisions addresses concerns about researcher degrees of freedom and potential p-hacking, ensuring that our analytical choices are transparent and justifiable (Simmons et al., 2011).

Employing robust statistical techniques:

- Use of fixed-effect models to account for unobserved country-specific heterogeneity (Bell & Jones, 2015; Clark & Linzer, 2015)
- Implement Vector Autoregression models (SVAR, VECM) to capture dynamic relationships between variables (Blanchard & Perotti, 2002; Stock & Watson, 2001)

- Apply robust standard errors to address potential heteroskedasticity and autocorrelation (White, 1980; Newey & West, 1987)

The selection of appropriate statistical techniques reflects both theoretical considerations about the nature of the relationships under study and methodological best practices for panel data analysis (Angrist & Pischke, 2010; Wooldridge, 2010). The use of fixed-effect models addresses the challenge of unobserved heterogeneity across countries, controlling for time-invariant characteristics that might confound the relationships between fiscal policy instruments and outcomes (Bell & Jones, 2015; Clark & Linzer, 2015). The implementation of vector autoregression approaches recognizes the dynamic and potentially bidirectional nature of the relationships between fiscal policy, inequality, and environmental outcomes, allowing for more nuanced analysis of temporal dynamics and causal mechanisms (Blanchard & Perotti, 2002; Stock & Watson, 2001).

Sensitivity analysis:

- Test alternative model specifications to ensure robustness of results
- Examine the impact of outliers and influential observations on our findings

The systematic approach to sensitivity analysis enhances confidence in the robustness and stability of our findings, addressing concerns about model dependency and the potential for results to be driven by specific analytical choices or unusual observations (Leamer, 1983; Young, 2018). By testing alternative model specifications and examining the influence of potential outliers, we can distinguish between robust relationships that persist across different analytical approaches and more tenuous findings that depend on specific assumptions or data points. This approach aligns with growing emphasis in econometrics on robustness and stability as key criteria for credible empirical research (Athey & Imbens, 2017; Imbens, 2014).

These measures ensure that our quantitative analysis is both reliable and valid, providing robust empirical evidence for testing our hypotheses. The comprehensive approach to quantitative validity and reliability reflects contemporary best practices in econometric research, emphasizing transparent documentation, rigorous diagnostic testing, and systematic sensitivity analysis to ensure that statistical findings provide a credible basis for causal inference and policy recommendations (Christensen & Miguel, 2018; Imbens & Rubin, 2015).

Triangulation

Triangulation plays a crucial role in enhancing the overall validity and reliability of the study by integrating qualitative and quantitative data. Our approach to triangulation includes multiple dimensions identified in the methodological literature (Denzin, 1978, 2012; Flick, 2018), providing a comprehensive framework for cross-verification and integration of findings from different sources and methods.

Methodological triangulation:

- Compare findings from different methodological approaches (scoping review, document & content analysis, panel regression)
- Identify areas of convergence to strengthen conclusions and areas of divergence for further investigation

This approach exemplifies what Denzin (1978) terms "between-method triangulation," using different methodological approaches to examine the same phenomenon. The comparison of findings across qualitative and quantitative methods allows for both corroboration and complementary insights, with each method illuminating different aspects of the relationships between fiscal policy, inequality, and climate change (Greene et al., 1989; Johnson et al., 2007). The explicit attention to both convergent and divergent findings recognizes that triangulation serves not only to validate findings through convergence but also to deepen understanding through examination of divergence and contradictions (Mathison, 1988; Patton, 2015).

Data triangulation:

- Use of multiple data sources (academic literature, policy documents, statistical databases) to corroborate findings
- Compare perspectives from different stakeholders (academics, policymakers, international organizations)

The triangulation of diverse data sources enhances the comprehensiveness and credibility of our findings, providing insights into both theoretical frameworks and practical policy applications. The inclusion of multiple stakeholder perspectives acknowledges the complex and contested nature of fiscal policy design and implementation, where different actors may have varying understandings of policy goals, mechanisms, and effectiveness (Fischer, 2003; Yanow, 2000). This approach allows for identification of consensus views across stakeholder groups as well as areas of divergence that may reveal underlying tensions or trade-offs in policy design (Cairney, 2016; Jones & McBeth, 2010).

Investigator triangulation:

- Involve multiple researchers in data collection, analysis, and interpretation
- Regularly compare and discussed individual interpretations to reach consensus

The involvement of multiple researchers in the research process enhances what Lincoln and Guba (1985) term the "confirmability" of findings, reducing the influence of individual biases and perspectives. The collaborative approach to interpretation allows for more nuanced and comprehensive analysis, drawing on diverse expertise and disciplinary perspectives (Archibald, 2016; O'Cathain et al., 2010). The regular comparison and discussion of interpretations provides opportunities for critical questioning and refinement, enhancing the depth and rigor of the analytical process (Berends & Johnston, 2005).

Theoretical triangulation:

Examine our findings through multiple theoretical lenses (e.g., fiscal policy theory, sustainable development frameworks, institutional economics).

This approach recognizes that different theoretical frameworks highlight different aspects of complex phenomena, providing complementary insights into the relationships between fiscal policy, inequality, and climate change. The application of diverse theoretical perspectives allows for a more comprehensive understanding of these relationships, identifying both common themes across theoretical traditions and unique insights offered by particular frameworks (Denzin, 2012; Flick, 2018). This theoretical pluralism is particularly valuable for addressing complex policy challenges that span traditional disciplinary boundaries, requiring integration of insights from economics, political science, institutional theory, and sustainability studies (Biesbroek et al., 2018; Jordan et al., 2018).

This comprehensive approach to triangulation allows for cross-verification of findings, ensuring that results are corroborated from multiple perspectives. It also helps to identify inconsistencies and convergences between different data types, enhancing the credibility and robustness of the study's conclusions. The systematic integration of diverse methods, data sources, investigator perspectives, and theoretical frameworks provides a solid foundation for developing policy recommendations that are both empirically grounded and conceptually robust (Johnson et al., 2007; Teddlie & Tashakkori, 2009).

4.10 Ethical Considerations

Despite the use of secondary data, we carefully address ethical considerations throughout the research process. This attention to ethics reflects the growing recognition that even research using publicly available secondary data requires careful consideration of ethical implications (Israel & Hay, 2006; Tripathy, 2013). Our approach aligns with contemporary frameworks for research ethics that emphasize principles of integrity, respect, justice, and beneficence across all research stages, regardless of methodology or data sources (National Health and Medical Research Council, 2018; Resnik, 2018).

Data integrity and transparency:

- Ensure all sources of data are publicly available and properly cited
- Maintain a detailed record of all data sources and analysis procedures
- Commit to open data principles, making our dataset available for replication studies (subject to copyright restrictions)

This commitment to data integrity and transparency reflects the growing emphasis on open science principles in contemporary research, aiming to enhance the reproducibility and credibility of scientific findings (Christensen & Miguel, 2018; Nosek et al., 2015). By maintaining comprehensive documentation of data sources and analytical procedures, we enable critical evaluation and potential replication of our findings, addressing concerns about the "replication crisis" in social sciences (Ioannidis, 2005; Open Science Collaboration, 2015). The commitment to sharing our compiled dataset (within copyright constraints) further enhances research transparency and facilitates cumulative knowledge building in the field (Miguel et al., 2014).

Privacy and confidentiality:

- Uphold data privacy by anonymizing any sensitive information in the analysed documents and datasets
- Ensure that no individual-level data is used or reported in our analysis

While our research primarily utilizes aggregate data and publicly available documents, we maintain sensitivity to potential privacy concerns, particularly when analysing policy documents that might contain identifiable information about specific individuals or organizations (Dawson, 2009; Tilley & Woodthorpe, 2011). This approach reflects recognition that ethical research requires consideration of privacy implications even when using data that is technically publicly available, as the aggregation and analysis of such data can sometimes create new privacy risks or concerns (Markham & Buchanan, 2012; Zimmer, 2010).

Institutional review:

- Obtain ethical clearance from the James Cook University Human Research Ethics Committee (where required)
- Adhere to the Australian Code for the Responsible Conduct of Research

Adherence to institutional ethical review processes and national research conduct codes ensures that our research meets established standards for responsible research practice (National Health and Medical Research Council, 2018). While secondary data analysis often involves lower ethical risks than primary data collection involving human participants, institutional review remains important for ensuring that all potential ethical implications are considered and appropriately addressed (Tripathy, 2013). The Australian Code for the Responsible Conduct of Research provides a comprehensive framework for research integrity, encompassing principles of honesty, rigor, transparency, fairness, respect, and responsibility (Australian Research Council, 2018).

Avoiding misrepresentation:

- Commit to accurate and truthful reporting of findings
- Clearly state limitations of our data and methods
- Avoid overgeneralization of results, acknowledging the specific context of ASEAN countries

This commitment to accurate representation and appropriate contextualization of findings reflects core principles of research integrity and responsible communication (Resnik, 2018; Shamoo & Resnik, 2015). By explicitly acknowledging methodological limitations and contextual specificity, we guard against potential misuses or misinterpretations of our findings, particularly in policy contexts where research may inform consequential decisions (Jasanoff, 2011; Parkhurst, 2017). This approach recognizes the ethical responsibility of researchers to ensure that their work is not only technically sound but also appropriately framed and contextualized for various audiences (Elliott & Resnik, 2014).

Intellectual property rights:

- Respect copyright laws when using published materials
- Obtain necessary permissions for use of copyrighted images or extensive quotations

Respect for intellectual property rights represents both an ethical and legal obligation in research, acknowledging the contributions of other scholars and creators while complying with relevant legal frameworks (Scheuerman, 2015). This commitment is particularly important for mixed methods research involving extensive literature review and document analysis, where proper attribution and permission for use of copyrighted materials are essential aspects of research integrity (Coughlin et al., 2016). By adopting rigorous practices for citation and permission-seeking, we model ethical scholarly practice and contribute to a culture of respect for intellectual property within the academic community.

Conflict of interest:

- Disclose any potential conflicts of interest related to funding sources or affiliations
- Ensure that no external influences compromised the objectivity of our research

Transparency regarding potential conflicts of interest is essential for maintaining research credibility and public trust in scientific findings (Resnik & Elliott, 2013; Thompson, 1993). By disclosing funding sources and institutional affiliations, we enable readers to evaluate potential sources of bias or undue influence in our research design, analysis, or interpretation (Doucet

& Sismondo, 2008). This transparency is particularly important for policy-relevant research, where financial or institutional interests might potentially influence research outcomes or recommendations (Parkhurst, 2017; Smith & Bero, 2020).

These ethical considerations ensure that our research is conducted responsibly and ethically, respecting the rights and privacy of data sources while maintaining scientific integrity. Our comprehensive approach to research ethics reflects recognition that ethical considerations should permeate all aspects of the research process, from initial design through data collection, analysis, and dissemination (Israel & Hay, 2006; Resnik, 2018). By explicitly addressing these ethical dimensions, we aim to contribute not only substantive findings about fiscal policy and sustainable development but also exemplary practices for ethical conduct in mixed methods policy research.

4.11 Limitations of the Methodology

While our methodology is comprehensive, it is important to acknowledge its limitations. This critical self-reflection aligns with principles of research transparency and integrity, recognizing that all methodological approaches have inherent constraints and boundary conditions (Aguinis & Solarino, 2019; Alvesson & Sköldberg, 2018). By explicitly addressing these limitations, we provide context for interpreting our findings and identify potential areas for future methodological refinement (Ioannidis, 2007; Maxwell, 2004).

Reliance on secondary data:

- May limit the depth of insights into specific local contexts
- Potential for data quality issues or inconsistencies across different sources

The use of secondary data, while enabling broad comparative analysis, inevitably restricts our ability to capture nuanced contextual factors that might influence policy design and effectiveness. As noted by Jerven (2013) and Ravallion (2016), cross-country data compilation often involves trade-offs between standardization and contextual specificity, potentially obscuring important local variations. Additionally, secondary data quality can vary significantly across countries and time periods, particularly for developing economies where statistical capacity and data collection methodologies may be inconsistent (Deaton, 2010; Kanbur, 2017). These limitations necessitate cautious interpretation of findings and appropriate acknowledgment of data quality concerns.

Time frame constraints:

- The study period (2000-2023) may not capture very recent policy changes
- Historical data limitations may affect the analysis of long-term trends

The selected time frame, while substantial, may not fully capture recent policy innovations or longer-term historical trends. Policy responses to emerging challenges like climate change are evolving rapidly, and our analysis may not reflect the most recent developments (Hepburn et al., 2020; UNEP, 2021). Conversely, understanding long-term structural relationships between fiscal policy, inequality, and environmental outcomes ideally requires longer time series than are available for many ASEAN countries, potentially limiting our ability to distinguish structural trends from cyclical fluctuations (Piketty, 2014; Stern, 2015).

Complexity of the topic:

- Challenging to fully isolate the effects of specific fiscal policies from other influencing factors
- Potential for omitted variable bias in quantitative analysis

The multifaceted nature of sustainable development challenges creates significant analytical complexity, making it difficult to establish clear causal relationships between specific policy interventions and outcomes. As Rodrik (2015) and Manski (2013) emphasize, economic policy operates within complex systems where multiple factors interact, creating challenges for causal identification. Despite our efforts to control for relevant factors in our panel regression models, the potential for omitted variable bias remains a concern, particularly for factors that are difficult to measure or for which consistent data is unavailable across countries (Angrist & Pischke, 2010; Wooldridge, 2010).

Language limitations:

- Focus on English-language sources may exclude relevant literature or policy documents in local languages

Our reliance on primarily English-language sources introduces potential selection bias, potentially overlooking valuable insights from literature and policy documents published in the diverse languages of ASEAN countries. This limitation may be particularly significant for understanding local policy contexts and implementation challenges, which might be more extensively documented in local-language publications (Curry & Lillis, 2004; Marin & Petrič, 2012). While pragmatic given resource constraints, this language limitation potentially narrows the range of perspectives and evidence informing our analysis.

Generalizability:

- Findings may not be fully generalisable to non-ASEAN contexts
- Heterogeneity among ASEAN countries may limit the applicability of aggregate results

The focus on ASEAN countries, while providing valuable regional insights, raises questions about the generalizability of findings to other contexts. As Rodrik (2014) and Pritchett and Woolcock (2004) emphasize, policy effectiveness is often highly context-dependent, influenced by institutional, cultural, and economic factors specific to particular regions or countries. Additionally, the significant heterogeneity among ASEAN countries—spanning diverse political systems, economic structures, and development levels—creates challenges for developing generalizable conclusions even within the region (Jones, 2016; Nesadurai, 2017).

Methodological limitations:

- Qualitative analysis subject to researcher interpretation bias
- Panel regression analysis assumes linear relationships, which may not always hold in complex economic systems

All research methodologies have inherent limitations that must be acknowledged. Our qualitative analysis, despite efforts to enhance rigor through triangulation and peer debriefing, remains vulnerable to researcher interpretation bias and subjectivity (Finlay, 2002; Tracy, 2010). Similarly, our quantitative models, while incorporating advanced econometric techniques, rely on assumptions about linear relationships and parameter stability that may not fully capture the complex, non-linear dynamics of economic systems (Angrist & Pischke,

2010; Kennedy, 2008). These methodological constraints highlight the importance of methodological pluralism and careful interpretation of findings.

Data availability:

Some ASEAN countries may have limited or inconsistent data availability, potentially biasing the sample Variations in data availability across ASEAN countries create potential biases in our analysis, with better-resourced countries likely having more comprehensive and reliable data. This differential data availability may lead to conclusions that disproportionately reflect experiences of countries with stronger statistical systems rather than representing the full diversity of regional experiences (Jerven, 2013; Kanbur, 2017). While we have taken steps to address missing data through appropriate imputation techniques and robustness checks, the fundamental challenge of uneven data availability across countries remains a limitation.

Policy lag effects:

- Difficulty in capturing the full impact of fiscal policies, which may have delayed or long-term effects

The time-lagged and dynamic nature of policy impacts creates challenges for empirical assessment of policy effectiveness. As noted in the fiscal policy literature, the effects of tax and spending changes often manifest over multiple time horizons, with immediate impacts potentially differing from medium and long-term outcomes (Blanchard & Perotti, 2002; Romer & Romer, 2010). While our VECM and SVAR approaches attempt to capture these dynamic relationships, fully assessing policy impacts—particularly for structural challenges like inequality and climate change—ideally requires even longer time horizons than available in our dataset.

Acknowledging these limitations enhances the transparency and credibility of our research, providing a balanced perspective on the strengths and weaknesses of our methodological approach. Rather than undermining our findings, these acknowledgments contextualize our contributions within the inherent constraints of social science research on complex policy questions. As Maxwell (2004) and Ioannidis (2007) emphasize, explicit recognition of methodological limitations is essential for scientific progress, enabling more accurate interpretation of current findings and identifying priorities for future methodological refinement.

4.12 Conclusion

This multifaceted and multi-stage methodology offers a robust framework to investigate the complex interplay between fiscal policy and sustainable development in ASEAN economies. By combining qualitative and quantitative methods, we aim to provide a nuanced and comprehensive understanding of how ASEAN countries can achieve sustainable fiscal policy with pro-equity and pro-green outcomes. This integrated methodological approach reflects the recognition that complex policy challenges require multiple analytical lenses to capture their multidimensional nature and the diverse contexts in which policies operate (Creswell & Plano Clark, 2018; Johnson et al., 2007).

The integration of scoping review, document & content analysis, and panel regression analysis allows for a progressively refined examination of our research questions. The qualitative stages provide rich contextual understanding and identify key themes and variables, while the

quantitative stage offers rigorous empirical testing of hypothesized relationships. This sequential approach creates what Greene et al. (1989) describe as "developmental" integration, where earlier methodological components inform and enhance subsequent stages, creating a coherent and cumulative research process. The progression from exploratory qualitative inquiry to focused quantitative testing enables both discovery of emergent themes and rigorous examination of specific causal relationships, providing a more complete understanding than either approach could offer in isolation (Morgan, 2014; Teddlie & Tashakkori, 2009).

Our approach to ensuring validity and reliability, through various triangulation strategies and methodological rigor, strengthens the credibility of our findings. The comprehensive attention to quality criteria across both qualitative and quantitative components addresses what Tashakkori and Teddlie (2008) identify as "inference quality" in mixed methods research, encompassing both the design quality and interpretive rigor of the study. The systematic approach to triangulation—across methods, data sources, investigators, and theoretical perspectives—enhances both the breadth and depth of our analysis, providing multiple vantage points for understanding the complex relationships between fiscal policy, inequality, and environmental sustainability in the ASEAN context (Denzin, 2012; Patton, 2015).

By acknowledging and addressing the limitations of our methodology, we provide a transparent account of the research process. This critical self-reflection aligns with contemporary standards for research integrity and transparency, recognizing that all methodological approaches have inherent constraints and boundary conditions (Aguinis & Solarino, 2019; Miguel et al., 2014). Rather than undermining the value of our research, this acknowledgment of limitations contextualizes our contributions and identifies priorities for future methodological refinement, contributing to cumulative knowledge building in the field.

Ultimately, this methodology sets the foundation for a comprehensive analysis that can inform both academic discourse and policy-making in ASEAN countries, contributing to the broader goal of achieving inclusive and sustainable development in the region. The interdisciplinary nature of our approach—bridging economic, environmental, and social dimensions of development—reflects the integrated nature of sustainable development challenges themselves, which transcend traditional disciplinary and policy boundaries (Nilsson et al., 2016; Sachs, 2015). By providing both contextually rich understanding of policy processes and rigorous empirical evidence on policy effectiveness, our research aims to bridge the gap between academic knowledge and practical policy implementation, contributing to more effective approaches for addressing the twin challenges of inequality and environmental sustainability in ASEAN and beyond.

Based on my analysis of both reference sets, I've created an integrated reference list that includes all the new references from our session while eliminating duplicates from the original list. Here's the consolidated APA-style reference list for the methodology chapter:

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5 CHAPTER FIVE: ANALYSIS & FINDINGS (RQ1)

5.1 Introduction

This chapter addresses the first research question (RQ1). It is based on the published paper "Fiscal implications–inclusive growth and climate change resilience: a scoping study of existing policy in selected ASEAN countries" (Weber, M., & Chaiechi, T. (2022)), an independent study implementing the scoping review in pursuit of RQ1 of this thesis.

The central research question:

What are the main drivers and impediments of climate change and inequality issues in ASEAN arising from externalities of economic activity, and how are governments dealing with these challenges?

The ASEAN region has experienced remarkable economic growth in recent decades, with GDP more than quadrupling from $577 billion in 2000 to $3.2 trillion in 2019 (ASEAN Secretariat, 2020). This extraordinary expansion represents one of the most significant economic transformations in the modern global economy, with annual growth rates consistently outpacing global averages (Menon & Melendez, 2017). The economic rise of ASEAN nations has fundamentally altered the geopolitical and economic landscape of Southeast Asia, creating new centres of manufacturing, trade, and financial services that have become integral to global supply chains (Kimura & Chen, 2018). However, this impressive growth trajectory has been accompanied by widening inequality and accelerating environmental degradation that threatens long-term sustainability and social cohesion throughout the region.

Income disparities within ASEAN countries have increased substantially, with Gini coefficients rising in most member states despite overall economic prosperity (Jain-Chandra et al., 2018). The benefits of economic growth have been unevenly distributed, with urban centres capturing a disproportionate share of new wealth while rural areas and marginalized communities have experienced more modest improvements in living standards (Yap & Reyes, 2020). These economic disparities are further complicated by significant differences in access to education, healthcare, and digital technologies, creating multidimensional inequalities that extend beyond purely financial measures (Warr et al., 2022).

Simultaneous to this uneven development, environmental indicators across the region have deteriorated markedly. Deforestation rates in Indonesia, Malaysia, and Myanmar rank among the highest globally, while air pollution in major urban centres frequently exceeds World Health Organization guidelines by substantial margins (Fahn, 2021). The region is also exceptionally vulnerable to climate change impacts, with extensive coastlines, dependence on agriculture, and dense urban populations creating multiple vectors of exposure to rising sea levels, extreme weather events, and changing precipitation patterns (Hijioka et al., 2014; IPCC, 2022).

As the region continues to develop, the twin challenges of inclusive growth and climate change mitigation have become increasingly pressing, necessitating comprehensive policy responses

that address both economic and environmental sustainability. These challenges are not merely parallel concerns but deeply interconnected issues, as climate impacts often disproportionately affect economically vulnerable populations, while environmental protection measures may have distributional consequences that exacerbate existing inequalities if not carefully designed (Kanbur, 2016; Islam & Winkel, 2017).

Following the Integrated Methodology outlined in the prior chapter, this chapter examines the extent to which ASEAN member states have developed inclusive and sustainable fiscal policies to address these interrelated challenges. The analysis employs a systematic approach to evaluate policy frameworks across multiple dimensions, including tax structures, public expenditure priorities, subsidy programs, and climate finance mechanisms (Addison et al., 2018). By analysing a wide range of policy documents, government reports, and academic literature through this methodological lens, we aim to provide a comprehensive overview of the current state of fiscal policy in ASEAN with respect to inequality and climate change.

This chapter also contextualizes ASEAN's policy approaches within broader global frameworks, including the Paris Climate Agreement, the Sustainable Development Goals, and evolving international standards for climate finance and just transition policies (Heffron & McCauley, 2018). Through this comparative perspective, the analysis identifies both innovative policy solutions emerging from within the region and potential gaps where existing approaches may be insufficient to address the scale and complexity of the challenges at hand (OECD, 2021).

The findings from this chapter establish a foundation for subsequent analysis in later sections of this thesis, providing essential context for understanding how fiscal policy instruments can be optimized to simultaneously address climate resilience and inclusive growth objectives in rapidly developing economies (Dorband et al., 2019). By systematically examining current policy frameworks across ASEAN member states, this chapter contributes to broader scholarly discussions about the role of fiscal policy in managing the economic externalities that drive both inequality and environmental degradation.

5.2 Methodology

Following the Integrated Methodology outlined in the prior chapter, this study employs a two-stage qualitative analysis approach: a scoping review followed by document analysis. This methodology was chosen for its effectiveness in exploring a broad range of diverse sources across related research fields, particularly in the context of policy research where a wide variety of document types may be relevant.

Scoping Review

The scoping review in exploratory mode, as described by Arksey and O'Malley (2005), aims to identify and map the relevant literature in the field of research, based on the guiding question and search criteria (a priori protocol). This approach has gained significant traction in policy research because it allows for comprehensive mapping of complex policy landscapes across

multiple jurisdictions and policy domains (Munn et al., 2018). Unlike systematic reviews, which typically focus on narrowly defined research questions and emphasize quantitative assessment of evidence quality, scoping reviews are particularly well-suited to exploring broader thematic areas where the boundaries between disciplines may be fluid and where diverse methodological approaches coexist (Tricco et al., 2016).

This step involves a focused, positive search process to identify a representative subset of all relevant literature in scope from pre-selected online libraries, databases and repositories, article reference lists, reverse citations and proximity searches. According to Arksey and O'Malley, the scoping study needs to achieve in-depth and broad results across different source domains, regardless of the individual article design. This breadth is essential when examining fiscal policy in the ASEAN context, as relevant insights may be found not only in traditional economic journals but also in climate science literature, development studies, and governmental policy documents (Colquhoun et al., 2014; Levac et al., 2010).

The scoping review methodology follows a structured framework that has been refined over time to enhance its rigor and reproducibility. The process implemented in this study adheres to the enhanced scoping review framework that builds upon Arksey and O'Malley's original five-step approach, incorporating refinements suggested by subsequent methodological research (Peters et al., 2015; Khalil et al., 2016). This approach ensures that the review captures the full breadth of relevant literature while maintaining a systematic and transparent process that can be assessed and replicated by other researchers.

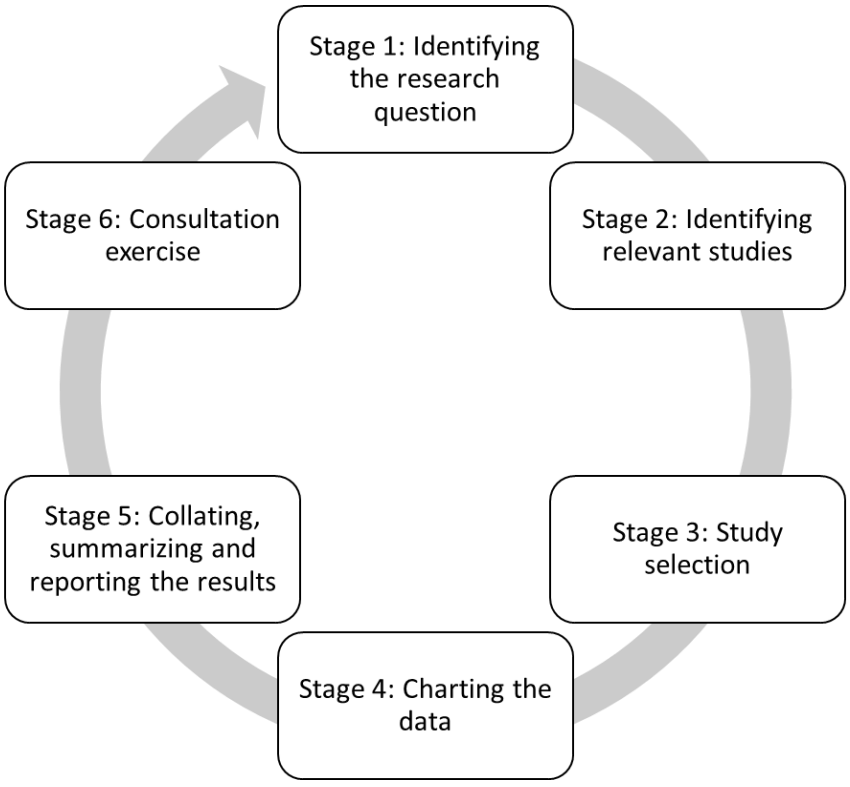

Figure 3: Scoping review method with 5/6-steps - adapted from Arksey & O'Malley (2005)

The search was conducted using various databases, including Google Scholar, JSTOR, Web of Science, and government repositories of ASEAN countries. These databases were selected to ensure comprehensive coverage across both academic and policy domains, capturing peer-reviewed research alongside official governmental frameworks and reports (Bramer et al., 2017). Following Chaiechi (2020), an a priori protocol has been developed to guide this process, which defines the following guiding question for this study: the inclusion and exclusion criteria, secondary screening criteria, and the reporting and presentation techniques, as listed in Table 2.

The protocol development process incorporated insights from methodological research on scoping reviews, particularly regarding the importance of clearly defined eligibility criteria that balance comprehensiveness with practical constraints (Daudt et al., 2013). The search strategy was designed to be exhaustive within specified parameters, using Boolean operators and controlled vocabulary terms to maximize the identification of relevant literature while minimizing the inclusion of irrelevant materials (Booth, 2016).

Table 2: Eligibility criteria - adapted from Chaiechi (2020)

CRITERION	INCLUSION	EXCLUSION
Publication Year	2001-2020	Studies outside this period
Search Language	English	Non-English literature
Type of Literature	Peer-reviewed original research, conference proceedings, work papers, governmental reports. Grey literature including reputable advisory reports and pertinent published articles and books	Non-scholarly, non-official or non-reputable sources
Concepts	Documents that discuss dimensions of Inclusive Sustainable Fiscal Policy (ISFP), including fiscal policy in the context of pro-equity and pro-green and sustainable development outcomes	Documents without thematic relevance
Coverage	The document must cover Inequality, Climate Change issues in Sustainable Fiscal Policy context	Documents with only partial coverage
Relevance	Title and abstract relevant to the guiding question	Irrelevant titles and abstracts

The time frame for the literature search was set from 2001 to 2020, reflecting the period of increased public interest in inequality and climate change challenges in the context of economic externalities. This era is characterized by regional and global economic crises (i.e., Asian Financial Crisis 1998, Global Financial Crisis 2001 and 2008) followed by moderating world growth. The selection of this timeframe aligns with significant developments in international climate policy, including the establishment of the Kyoto Protocol (which entered

into force in 2005), the Paris Agreement (adopted in 2015), and growing scholarly attention to inequality following the global financial crisis (Piketty & Saez, 2014; Milanović, 2016). This period also encompasses important institutional developments within ASEAN, including the ASEAN Economic Community Blueprint (2007) and subsequent regional integration initiatives that have shaped the policy landscape (ASEAN Secretariat, 2015).

5.3 Document Analysis

Following the scoping review, a document analysis was conducted using the method proposed by Bowen (2009). This methodological approach was selected because it provides a systematic framework for examining and interpreting documents to elicit meaning, gain understanding, and develop empirical knowledge (Corbin & Strauss, 2008). Document analysis is particularly valuable in policy research because it allows researchers to trace the evolution of policy frameworks over time and to identify both explicit and implicit policy rationales (Shaw et al., 2004).

The aim was to expose, conceptualise and map the relevant thematic constructs as identified in this second stage of the process, and visualise the relationships, concepts, paradigms and article design in accordance with the research objective and the protocol, as depicted in Figure 4. This approach allows for the identification of both manifest and latent content within policy documents, capturing not only explicitly stated policy objectives but also underlying assumptions and conceptual frameworks that may shape policy design and implementation (Altheide et al., 2008; Krippendorff, 2018).

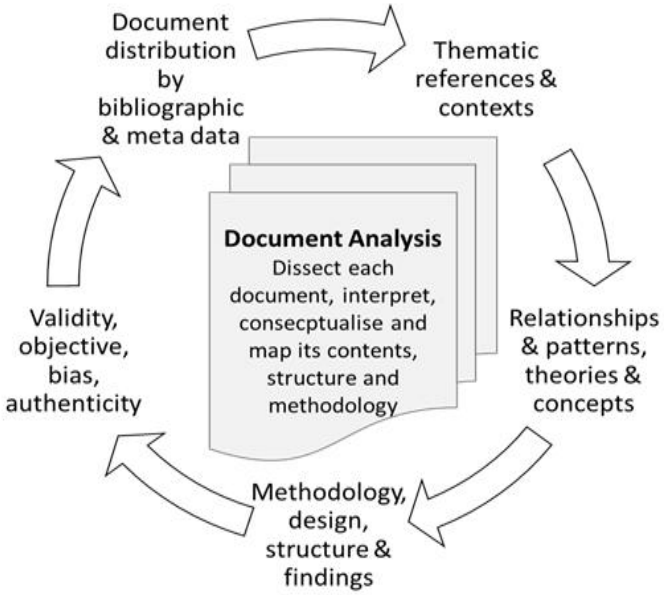

Figure 4: Document analysis method - adapted from Bowen (2009)

This process involved 3 passes through the identified documents resulting in topical indexing and meta tagging of the relevant contents:

1. Skimming (superficial examination)
2. Reading (thorough examination)
3. Interpretation

This iterative approach allows for progressively deeper engagement with the material, moving from initial identification of relevant documents to nuanced interpretation of their content and context (Fereday & Muir-Cochrane, 2006). The multi-pass approach also enhances the reliability of the analysis by ensuring that initial categorizations are repeatedly verified and refined through subsequent reviews of the material (Lincoln & Guba, 1985).

The document analysis focused on extracting and contextualizing relevant thematic constructs from the identified sources. This process involved multiple passes through the text, including:

1. Full-text search using word frequency and proximity techniques
2. Identification of relevant thematic references and contexts
3. Exposure of relationships between identified thematic constructs
4. Search for relevant features of document design, methodology, and methods
5. Validation search for evidence of authenticity, diversity, or congruence of citations

The analytical process combined both deductive and inductive approaches, beginning with a predetermined coding framework based on key concepts identified in the literature review, but remaining open to emergent themes and constructs that arose during the analysis (Braun & Clarke, 2006). This hybrid approach is particularly valuable when examining policy documents that may reflect multiple theoretical traditions and pragmatic considerations (Fereday & Muir-Cochrane, 2006).

To assist in the analysis, we used NVivo 12 Plus and Rapid Miner software for structured content analysis, allowing for systematic coding and thematic analysis. These computer-assisted qualitative data analysis software (CAQDAS) tools enhance the rigor and transparency of qualitative analysis by providing systematic frameworks for coding, retrieval, and cross-referencing of data (Bazeley & Jackson, 2013). NVivo 12 Plus was employed primarily for its robust capabilities in managing diverse document types and facilitating complex coding structures, while Rapid Miner supplemented this analysis with more sophisticated text mining capabilities, including semantic network analysis and automated topic modelling (Miner et al., 2012). The combination of these analytical tools enabled both detailed close reading of individual documents and broader pattern recognition across the corpus as a whole, enhancing both the depth and breadth of the analysis (Leech & Onwuegbuzie, 2011).

5.4 Findings from the Scoping Review

The scoping review identified 2091 relevant documents, with 1643 related to inclusive fiscal policy and 449 related to sustainable fiscal policy. This distribution already suggests a greater literature focus on inequality issues compared to climate change within the ASEAN policy discourse, reflecting a historical prioritization pattern that has characterized much of the region's development approach (Cook & Pincus, 2014). The significant imbalance in literature volume may indicate that inequality has been more thoroughly integrated into mainstream policy discussions, while climate change considerations remain somewhat peripheral despite their growing importance (Haines et al., 2017).

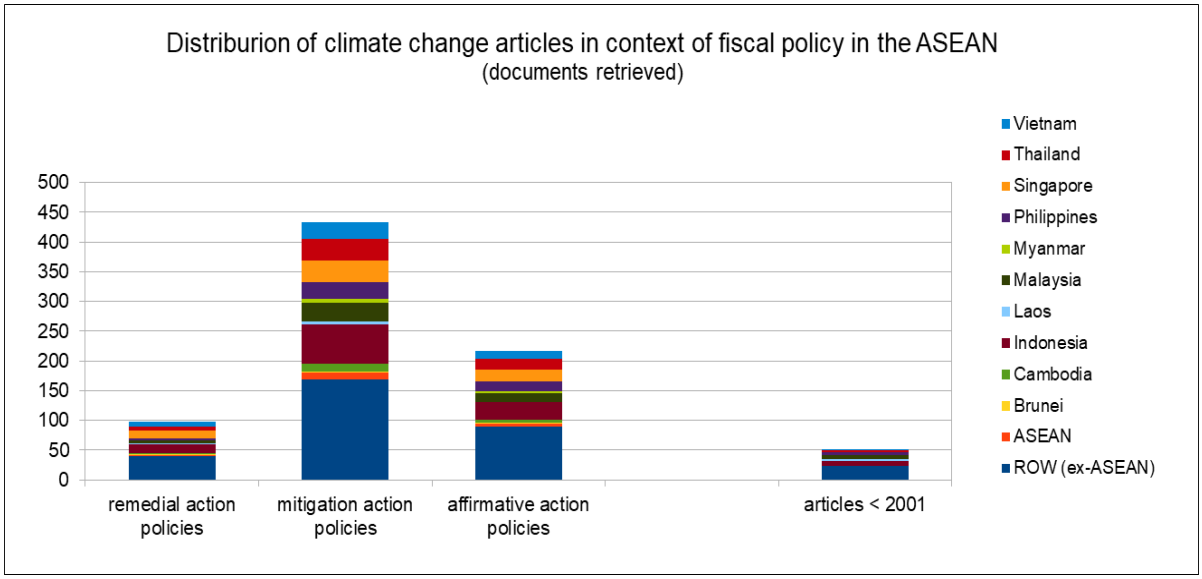

Figure 5: Distribution of fiscal policy documents context climate change - source: authors

In the context of climate change, the search retrieved 747 documents worldwide within the research context, categorized as follows:

- 434 in "mitigation policy action"
- 216 in "affirmative policy action"
- 97 in "remedial policy action"

The predominance of mitigation-focused documents (58.1% of climate change literature) reflects the global policy emphasis on reducing emissions rather than adapting to climate impacts, a pattern that has been observed in international climate policy since the Kyoto Protocol (Füssel, 2007; Schipper, 2006). This emphasis on mitigation over adaptation is particularly notable given the high vulnerability of many ASEAN countries to climate impacts, suggesting a potential misalignment between research focus and regional needs (Hijioka et al., 2014). The relatively small number of documents concerning remedial policy action (13%) indicates a reactive rather than proactive approach to climate policy within the region, potentially leaving countries unprepared for managing climate-related disasters and long-term environmental changes (Thomalla et al., 2017).

Of these 747 documents, 316 were deemed relevant to the study after applying the inclusion criteria, with 18 published under the ASEAN regional banner and 298 from other countries. The limited number of ASEAN-specific documents (representing just 5.7% of relevant climate change literature) highlights a gap in regionally contextualized research, which may hamper the development of climate policies tailored to Southeast Asian socioeconomic and environmental conditions (Koh & Bhullar, 2019). This situation is particularly concerning given the unique challenges faced by the region, including extensive coastlines vulnerable to sea-level rise, economies heavily dependent on climate-sensitive sectors like agriculture and tourism, and rapidly growing urban populations vulnerable to heat stress and flooding (Raitzer et al., 2015).

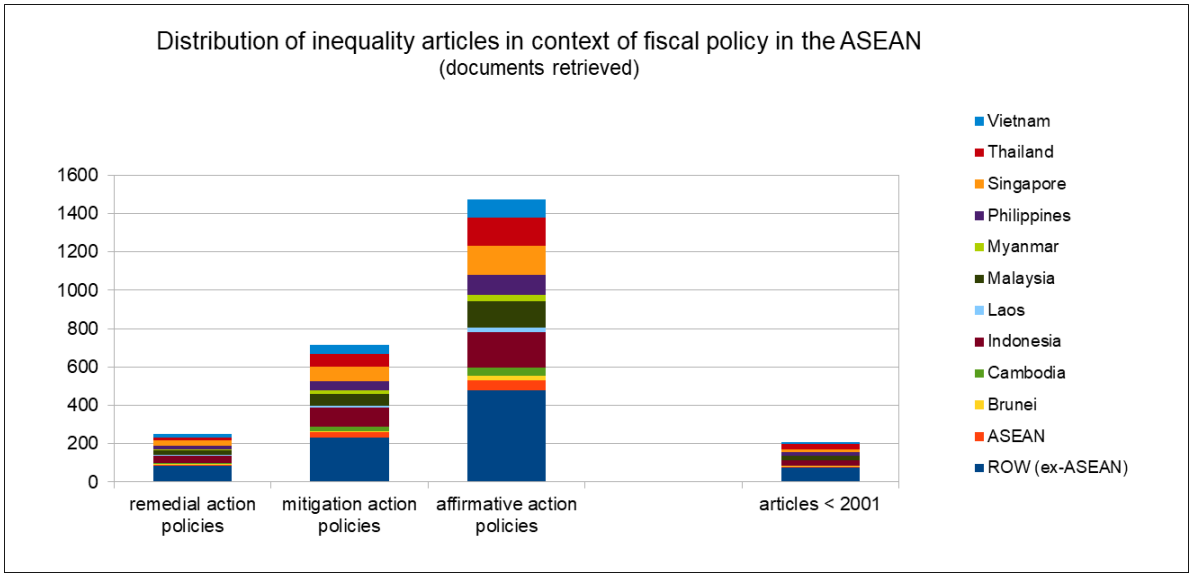

Figure 6: Distribution of fiscal policy documents context inequality - source: authors

For inequality, the search retrieved 2437 documents worldwide, categorized as follows:

- 1471 in "affirmative policy action"
- 716 in "mitigation policy action"
- 250 in "remedial policy action"

The concentration of literature in affirmative policy action (60.4% of inequality literature) suggests a stronger emphasis on proactive approaches to addressing inequality, including redistributive fiscal measures, progressive taxation, and targeted social spending (Atkinson, 2015; Mkandawire, 2018). This contrasts with the climate change literature, where mitigation predominates, potentially reflecting the different temporal dynamics of these challenges – inequality presents immediate social and political pressures that demand immediate action, while climate change impacts unfold over longer time horizons (Hallegatte et al., 2016).

Of these 2437 documents, 882 were deemed relevant after applying the inclusion criteria, with 88 published under the ASEAN regional banner and 794 from other countries. The higher proportion of regional literature on inequality (10% of relevant documents) compared to climate change (5.7%) suggests greater regional engagement with inequality issues, possibly

reflecting the political salience of distributional concerns in developing economies and the historical emphasis on poverty reduction in Southeast Asian development strategies (Warr, 2015). Nevertheless, the relatively small proportion of ASEAN-specific literature in both domains highlights a significant knowledge gap regarding regionally appropriate policy responses to these interconnected challenges (Sovacool, 2018).

Country-specific Findings

The number of published articles with reference to relevant policy themes varied considerably among ASEAN member states, revealing significant disparities in research attention and potentially in policy prioritization. These disparities largely reflect differences in economic development, institutional capacity, and historical patterns of engagement with international policy frameworks (Nesadurai, 2017; Ravenhill, 2016).

Recent articles on Climate Change:

- Indonesia: 110 documents
- Singapore: 70 documents
- Myanmar: 11 documents
- Laos: 7 documents

The dominance of Indonesia in climate change literature (34.8% of country-specific documents) aligns with its status as one of the world's largest greenhouse gas emitters, primarily due to deforestation, peatland degradation, and a rapidly growing energy sector (Tacconi, 2016). As a major archipelagic nation, Indonesia also faces substantial climate vulnerability, creating both mitigation and adaptation imperatives that have attracted significant research attention (Case et al., 2018). The substantial literature on Singapore (22.2% of country-specific documents) reflects its position as a regional hub for research and policy development, as well as its distinctive approach to climate policy that emphasizes technological innovation and urban resilience despite its limited territorial footprint (Cheah, 2020; Chang, 2017).

The relative paucity of research on Myanmar and Laos (3.5% and 2.2% of country-specific documents, respectively) likely reflects multiple factors, including lower research capacity, more limited integration into international climate policy frameworks, and competing development priorities that may overshadow climate concerns (Huang & Bocchi, 2019). These knowledge gaps are particularly concerning given the high climate vulnerability of these countries, especially in rural agricultural regions where adaptive capacity is often limited by resource constraints and institutional fragility (Sovacool et al., 2017).

Recent articles on Inequality:

1. Indonesia: 321 documents
2. Singapore: 253 documents
3. Laos: 37 documents
4. Brunei: 27 documents

The distribution of inequality literature follows similar patterns to climate change research, with Indonesia and Singapore together accounting for approximately 65% of country-specific documents. Indonesia's prominence (36.4% of country-specific documents) reflects both its size and the complexity of its inequality challenges, which span urban-rural divides, regional disparities, ethnic dimensions, and significant wealth concentration (Miranti et al., 2013; Pepinsky & Wihardja, 2011). The substantial literature on Singapore (28.7% of country-specific documents) addresses its distinctive pattern of inequality, characterized by high wealth concentration alongside strong public services and housing policies (Ng, 2015; Teo, 2018).

The relatively greater research attention to inequality in Laos and Brunei compared to climate change suggests that socioeconomic disparities may be more politically salient or easier to document in these contexts (Rigg, 2015; Thorbecke & Wan, 2013). For Brunei specifically, inequality research may be shaped by its unique economic structure as an oil-rich state with extensive welfare provisions but persistent disparities in opportunity and outcomes (Lawrey, 2010).

These findings suggest that Indonesia and Singapore are leading the region in terms of research and policy focus on both climate change and inequality issues. This leadership position likely reflects their relatively greater research capacity, stronger institutional frameworks, and more extensive engagement with international policy communities (Nesadurai, 2017). The lower number of publications from countries like Myanmar, Laos, and Brunei may indicate less policy attention to these issues or limited research capacity, rather than necessarily reflecting the absence or lesser importance of these challenges in these countries (Rigg et al., 2016).

Indeed, the disparities in research output may themselves constitute a form of inequality that warrants attention, as countries with limited knowledge resources may face additional barriers to developing effective policy responses to both climate change and socioeconomic disparities (Heffron et al., 2015; Newell, 2021). This "knowledge inequality" can perpetuate and exacerbate other forms of disadvantage, as policy innovations and best practices developed in wealthier countries with stronger research institutions may not adequately transfer to contexts with different socioeconomic and environmental conditions (Sovacool et al., 2018).

5.5 Findings from Document Analysis

The document analysis yielded several key themes related to inclusive and sustainable fiscal policy in ASEAN. We used a conceptual model to guide our analysis, focusing on three dimensions to cover economic, social, and ecological aspects within the research objective. This multidimensional approach reflects the growing recognition that effective policy frameworks must simultaneously address multiple objectives rather than treating economic, social, and environmental goals as separate or sequential priorities (Gough, 2017; Koch & Fritz, 2014).

Policy Focus and Extent

[Figure 5: Conceptualised thematic map of the "policy focus and extent" theme within the three sustainability dimensions - source: authors]

The analysis revealed that literature associates the economic and social, and ecological dimension with the concept of an "inclusive and sustainable fiscal policy". The sub-themes within each dimension identified further important qualities of an integrated fiscal policy model to effectively address the ASEAN countries' inequality and climate change challenges. This integration represents an emerging paradigm in fiscal policy thinking that moves beyond the traditional focus on macroeconomic stability to encompass broader societal goals (Stiglitz et al., 2019; Islam & Iversen, 2018).

Economic Dimension:

The economic dimension of fiscal policy in ASEAN countries demonstrates a continued emphasis on growth-oriented strategies, albeit with increasing recognition of sustainability concerns. The focus on sustained economic growth remains central to policy frameworks across the region, reflecting the developmental priorities of countries still working to achieve high-income status (Jomo, 2019). This growth emphasis is manifested in both domestic policies and regional cooperation initiatives that seek to enhance economic productivity and competitiveness (Asian Development Bank, 2020).

The emphasis on attracting foreign direct investment (FDI) emerges as a key strategy across ASEAN economies, with fiscal incentives playing a significant role in creating favourable investment environments. Countries throughout the region have developed extensive tax incentive regimes, special economic zones, and streamlined regulatory frameworks designed to attract multinational corporations and global capital (Thomsen, 2019). While these policies have successfully generated employment and technology transfer opportunities, they have also raised concerns about potential "race to the bottom" dynamics that may undermine long-term fiscal sustainability and exacerbate regional inequalities (Li, 2016; UNCTAD, 2020).

Promotion of regional economic integration represents another significant theme in ASEAN fiscal policy, with the ASEAN Economic Community (AEC) serving as the institutional framework for deepening economic ties. This integration has progressed through tariff reduction, harmonization of standards, and facilitation of cross-border investment, supported by fiscal measures designed to manage the transition costs of economic opening (Menon & Melendez, 2017). While integration has created new opportunities for growth, it has also generated challenges for fiscal policy, including tax competition, coordination difficulties, and the need to manage distributional impacts across and within countries (Ramstetter & Sjöholm, 2013).

The development of infrastructure to support economic activities features prominently in fiscal planning across the region, with substantial public investment allocated to transportation networks, energy systems, and digital connectivity. These investments reflect both national development strategies and regional initiatives such as the Master Plan on ASEAN Connectivity (Kimura et al., 2019). The fiscal implications of these infrastructure programs are considerable, involving not only direct public expenditure but also various forms of public-private partnerships, sovereign guarantees, and contingent liabilities that may affect long-term fiscal sustainability (OECD, 2018; Yoshino et al., 2019).

Social Dimension:

The social dimension of fiscal policy in ASEAN encompasses a range of strategies aimed at ensuring that economic growth translates into improved well-being for all segments of society. Poverty reduction strategies remain foundational to social policy throughout the region, reflecting the substantial progress made in reducing absolute poverty over recent decades but also acknowledging the persistence of poverty pockets in both rural and urban areas (Rigg, 2015). Fiscal approaches to poverty reduction include both targeted transfers to vulnerable households and broader investments in productive capacity and market access for low-income communities (Sumner, 2016).

The expansion of social protection programs represents an increasingly important direction for fiscal policy in ASEAN, though with significant variation across countries in terms of coverage, generosity, and design. More developed economies like Singapore, Malaysia, and Thailand have established relatively comprehensive social security systems, while countries like Cambodia, Myanmar, and Laos are still in the early stages of building basic safety nets (Cook & Pincus, 2014). The fiscal sustainability of expanded social protection remains a concern, particularly in countries with limited tax capacity and aging populations (Ramesh & Asher, 2016).

Initiatives to improve access to education and healthcare feature prominently in fiscal policy frameworks, reflecting the dual objectives of enhancing human capital for economic development and ensuring equitable access to essential services. Public spending on education and health has generally increased across the region, though with persistent challenges in addressing quality gaps and ensuring that fiscal resources reach marginalized populations and underserved regions (Hanushek & Woessmann, 2016; McKee et al., 2017).

Efforts to reduce income inequality have gained increased attention in fiscal policy discussions, though with varying levels of commitment and effectiveness across countries. Progressive taxation, targeted social transfers, and labour market policies have been deployed to address rising inequality, but fiscal constraints and political economy considerations have often limited the scope and impact of redistributive measures (Kanbur et al., 2017; Jain-Chandra et al., 2018).

Ecological Dimension:

The ecological dimension of fiscal policy has emerged as an increasingly significant consideration, though generally receiving less emphasis than economic and social objectives. Growing attention to environmental protection is evident in policy documents across the region, with increasing recognition of the economic costs of environmental degradation and resource depletion (UNEP, 2018). Fiscal measures for environmental protection include both dedicated budget allocations for conservation and regulatory enforcement, and broader efforts to integrate environmental considerations into sectoral policies and investment decisions (Puig & Scotney, 2017).

Climate change mitigation and adaptation strategies have gained prominence in fiscal planning, particularly in countries like Indonesia, Vietnam, and the Philippines that face high climate vulnerability. Fiscal approaches include direct public investment in climate-resilient

infrastructure, disaster risk management systems, and ecosystem-based adaptation measures (ADB, 2019). Several countries have also begun to develop green budgeting practices that systematically assess the climate implications of fiscal decisions, though these remain at a relatively early stage of implementation (OECD, 2020).

Sustainable resource management policies represent another important ecological dimension, particularly in countries with significant natural resource endowments such as Indonesia, Malaysia, and Myanmar. Fiscal instruments such as resource extraction taxes, royalty regimes, and environmental bonds have been employed to promote sustainable resource use, though with ongoing challenges related to enforcement, corruption, and the persistence of environmentally harmful subsidies (Castiglione et al., 2015; Sterner & Robinson, 2018).

The promotion of green technologies and industries has emerged as a strategic direction for fiscal policy in several ASEAN countries, particularly more developed economies like Singapore and Malaysia. Tax incentives for renewable energy, green building, and clean transportation have been implemented alongside direct public investment in research and development and demonstration projects (Schwerhoff et al., 2017). These initiatives reflect growing recognition of the economic opportunities associated with the global low-carbon transition, though the scale of green fiscal measures remains modest relative to overall fiscal frameworks (Fay et al., 2015).

Policy Drivers and Impediments

Literature evidence pointed at several determinants that advocate the inclusive and sustainable fiscal policy model and the impediments to overcome in policy development. This analysis of drivers and barriers provides important context for understanding the political economy of fiscal reform in ASEAN countries, where policy change often reflects a complex interplay of domestic and international pressures (Nesadurai, 2017).

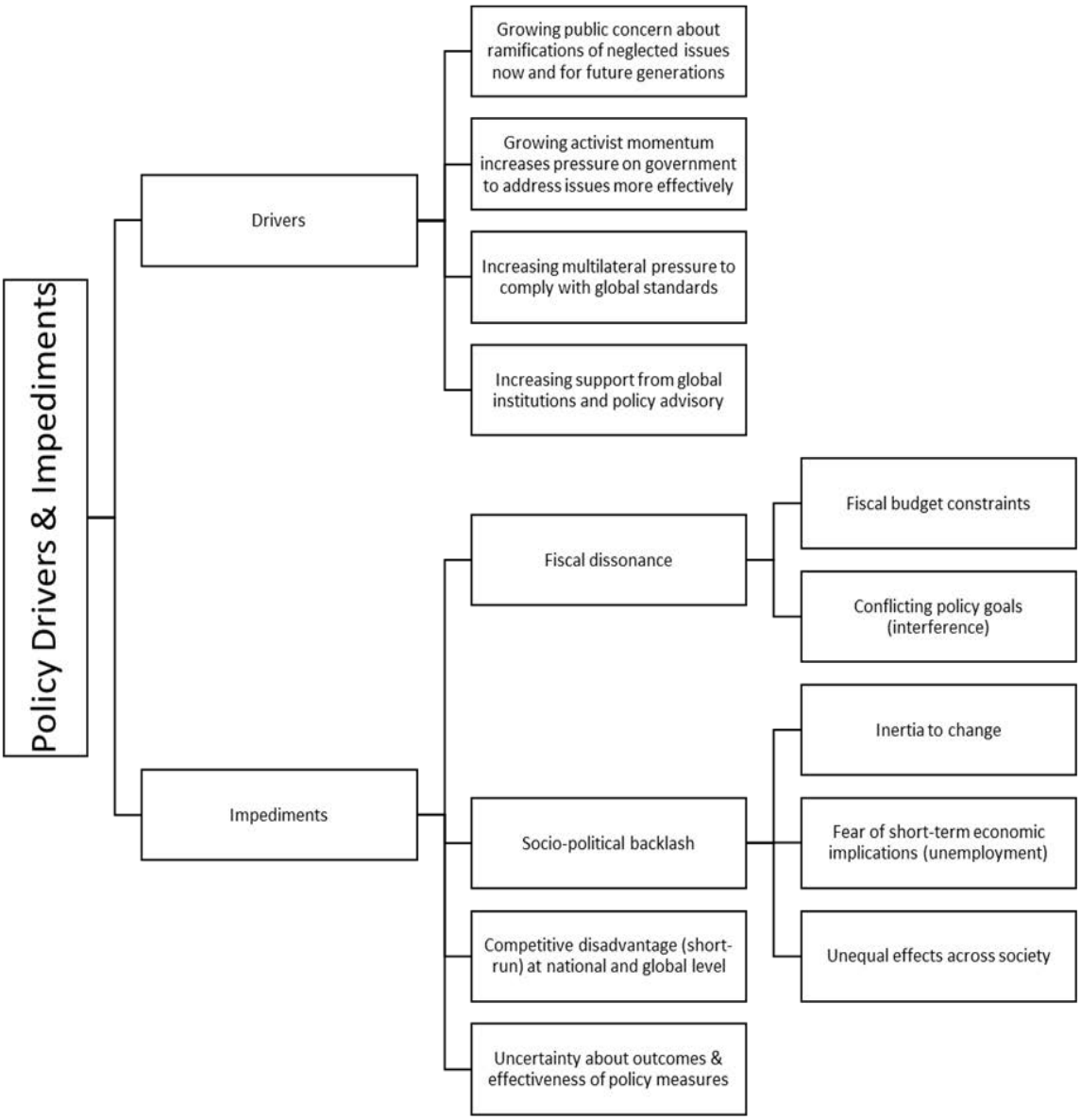

Figure 7: Conceptualised thematic map of policy drivers and impediments, source: authors

Further analysis of the policy drivers based on the thematic map in Figure 6 uncovered additional aspects of increasing public concern about non-sustainable policy action and lack of policy effectiveness and the potential ramifications of this neglect for future generations. We found evidence of the growing global consent of a causal relationship between the unresolved inequality and climate change trends and the socio-economic instability, sustainable growth and development, and the negative direct and indirect effects on the quality of life (Human Development Index, United Nations Development Program; and World Happiness Index, Sustainable Development Solutions Network). Moreover, there is literature evidence of increasing global pressure for government conformance with multilateral standards and institutional and policy advisory recommendations with an urgent call to action. For policy impediments, the analysis revealed socio-political backlash (i.e., the inertia or resistance to change), a competitive disadvantage in the short-run (i.e., first-mover disadvantage) and uncertainty about sustainable policy effectiveness.

Key Drivers:

Growing public concern about non-sustainable policies

Public awareness and concern regarding environmental degradation and social inequalities have increased significantly across ASEAN countries, creating domestic pressure for policy reform. Increased awareness of environmental issues among ASEAN populations has been driven by a combination of factors, including visible environmental degradation in urban centres, extreme weather events linked to climate change, and growing media coverage of environmental issues (Harries-Jones, 2016; Mol, 2016). This heightened environmental consciousness has translated into political pressure through various channels, including civil society mobilization, consumer preferences, and voting behaviour, though with significant variation across political systems (Fünfgeld, 2019; McCarthy & Robinson, 2016).

Rising social unrest due to perceived economic inequalities has created additional impetus for inclusive fiscal policies, particularly in countries experiencing rapid but uneven economic growth. Urban protests, Labor activism, and electoral politics increasingly reflect concerns about economic fairness and access to opportunities, creating political incentives for governments to address distributional issues through fiscal policy (Ford & Pepinsky, 2014; Thompson, 2016). This dynamic is particularly evident in middle-income ASEAN countries like Thailand, Malaysia, and Indonesia, where rising expectations and growing middle classes have generated increased demand for both economic opportunity and social protection (Jones, 2016; Warr, 2015).

Increasing global pressure for conformance with multilateral standards

External influences have played a significant role in shaping fiscal policy approaches to inequality and climate change in ASEAN. The influence of international agreements such as the Paris Agreement has created normative and practical pressures for policy reform, establishing global standards against which national policies are increasingly measured and evaluated (Falkner, 2016). While compliance mechanisms remain relatively weak, these international frameworks have influenced domestic policy discussions by providing reference points and creating expectations for policy alignment (Bernauer et al., 2016).

Pressure from international financial institutions and development partners has further shaped fiscal policy approaches, particularly in countries that rely on development assistance or have participated in structural adjustment programs (Gavin & Rodrik, 1995; Rodrik, 2006). While the policy prescriptions of institutions like the IMF and World Bank have evolved to place greater emphasis on inequality and environmental sustainability, tensions remain between these objectives and traditional fiscal policy priorities like debt sustainability and macroeconomic stability (Best, 2014; Kentikelenis et al., 2016).

Recognition of the link between inequality, climate change, and socio-economic instability

A growing body of research has highlighted the interconnections between inequality, environmental degradation, and broader socioeconomic outcomes, influencing policy thinking in ASEAN countries. Understanding of the potential economic costs of climate change has deepened, with research demonstrating the substantial risks to agricultural productivity,

coastal infrastructure, public health, and Labor productivity in Southeast Asia (ADB, 2015; Kompas et al., 2018). These economic analyses have strengthened the case for preventative action through fiscal policy, framing climate mitigation and adaptation as investments rather than simply costs (Stern, 2015).

Awareness of the social and political risks associated with high inequality has similarly influenced fiscal policy discussions, with research linking inequality to political instability, social conflict, and reduced economic growth (Ostry et al., 2014; Stiglitz, 2012). This growing recognition of the instrumental as well as intrinsic importance of reducing inequality has provided an additional rationale for inclusive fiscal policies beyond normative considerations of fairness (Acemoglu & Robinson, 2012; Wilkinson & Pickett, 2010).

Key Impediments:

Socio-political resistance to change

Despite growing recognition of the need for policy reform, significant obstacles remain to implementing inclusive and sustainable fiscal policies in ASEAN. Vested interests in existing economic structures often resist reforms that may redistribute resources or impose new regulatory burdens (Khan, 2010; North et al., 2009). These interests may operate through formal political channels such as lobbying and campaign finance, or through informal influence networks that shape policy decisions outside of public view (Hadiz & Robison, 2013; Winters, 2011).

Fear of short-term economic disruption represents another source of resistance, with policymakers concerned about potential growth slowdowns, job losses, or competitive disadvantages associated with ambitious fiscal reforms (Derviş & Leipziger, 2016). This concern is particularly acute for countries still focused on poverty reduction and basic economic development, where the immediate costs of policy change may appear to outweigh uncertain long-term benefits (Hallegatte et al., 2016).

Short-term competitive disadvantages

Regional and global economic competition creates additional barriers to ambitious fiscal reform. Concerns about losing investment to countries with less stringent regulations can create a classic collective action problem, where individual countries are reluctant to move ahead with reforms unilaterally (Oates & Portney, 2003). This dynamic is evident in areas such as environmental taxation and Labor standards, where policymakers fear that higher standards could reduce competitiveness in export markets or discourage inward investment (Frankel, 2005).

Reluctance to impose additional costs on domestic industries reflects both economic and political considerations, with policymakers concerned about potential impacts on economic growth, employment, and business viability (Victor, 2011). These concerns may be particularly acute for industries that are politically connected, strategically important, or major employers, creating uneven political terrain for fiscal reform (Newell & Paterson, 2010).

Uncertainty about policy effectiveness

Limited evidence on the impact of certain policy interventions in the ASEAN context creates additional barriers to reform, with policymakers hesitant to implement measures without clear evidence of effectiveness (Banerjee & Duflo, 2012). This uncertainty may be particularly significant for innovative policy approaches like carbon pricing or universal basic income, where experience in the region is limited and outcomes may depend on specific implementation details and contextual factors (Dorband et al., 2019).

Challenges in measuring and attributing policy outcomes further complicate reform efforts, making it difficult to evaluate policy success and adjust approaches over time (Woolcock, 2013). These measurement challenges affect both inequality and climate policy, where outcomes reflect complex causal pathways and may only become apparent over extended time horizons (Stern, 2015). The resulting uncertainty can favour policy inertia and incremental approaches rather than more ambitious reforms, even when the status quo is clearly suboptimal (IPCC, 2018).

Policy Variables and Instruments

This step exposed five dimensions of policy variables (Figure-7), including taxation (i.e., direct and indirect tax schemes), expenditure (i.e. spending for public services and infrastructure and social transfers), fiscal budget and stance (i.e., expansionary, contractionary) and public debt, as well as specific levers for policy targeting, progressivity schemes, inequality and climate change incidences (i.e., dynamic feedback loops). This multidimensional framework reflects the complexity of fiscal policy design, where multiple instruments must be coordinated to achieve diverse and sometimes competing objectives (Atkinson, 2015; IMF, 2017).

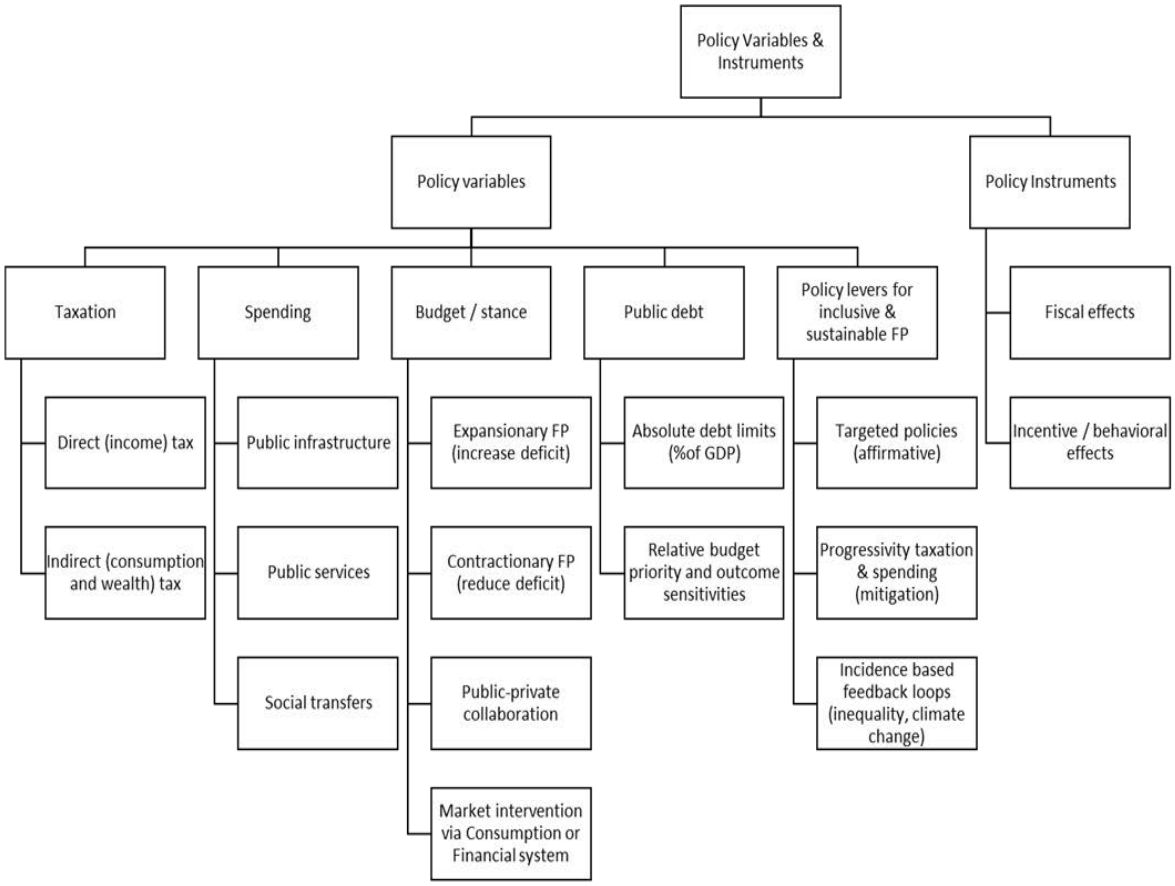

Figure 8: Conceptualised thematic map, policy variables & instruments - source: authors

The literature revealed many instruments that worked on one or several policy variables. These were classified into two categories, those with a primary fiscal effect and those aiming to incentivise behaviour change through positive or negative reinforcement (i.e., tax/fee/fine or subsidy/transfers, etc.). This dual categorization reflects the growing recognition that fiscal policy serves both allocative and distributive functions, reshaping economic incentives while also directly transferring resources between groups (OECD, 2019).

Key Policy Variables:

Taxation

Taxation represents a fundamental fiscal variable with significant implications for both inequality and climate objectives. Direct income taxes constitute a primary tool for addressing income inequality, with progressive rate structures potentially reducing post-tax disparities (Lustig, 2018). However, the effectiveness of direct taxation in ASEAN is often limited by narrow tax bases, extensive exemptions, and enforcement challenges, with personal income tax revenue remaining relatively low as a share of GDP in most countries (OECD, 2018; World Bank, 2020).

Indirect consumption and wealth taxes play an increasingly important role in ASEAN fiscal systems, including value-added taxes, property taxes, and excise duties on specific goods (Keen, 2013). While these taxes can generate substantial revenue with relatively low

administration costs, they may have regressive distributional implications if not carefully designed, potentially exacerbating inequality (Inchauste & Lustig, 2017). The balance between direct and indirect taxation thus represents an important policy consideration in addressing inequality objectives.

Special or targeted taxes (e.g., carbon taxes, luxury taxes) have emerged as instruments specifically designed to address externalities or target high-wealth segments. Carbon taxes in particular have gained attention as efficient instruments for reducing greenhouse gas emissions while generating revenue that can potentially be used for climate adaptation or compensating affected groups (Dorband et al., 2019; Sterner, 2012). Despite their theoretical advantages, implementation of carbon taxes in ASEAN remains limited, with Singapore being the first country in the region to introduce a comprehensive carbon pricing mechanism in 2019 (IMF, 2019; World Bank, 2020).

Public Expenditure

Public expenditure constitutes a second major fiscal variable with direct relevance to both inequality and climate objectives. Social spending (education, healthcare, social protection) represents a primary channel for addressing inequality, providing both immediate support to vulnerable groups and investments in human capital that can reduce inequality over the longer term (Bourguignon, 2018; Li et al., 2017). The effectiveness of social spending in ASEAN varies considerably across countries, with more developed economies like Singapore and Malaysia having established relatively comprehensive systems, while lower-income countries continue to struggle with coverage gaps and implementation challenges (Cook & Pincus, 2014).

Infrastructure investment represents another significant expenditure category with implications for both inequality and climate objectives. Infrastructure development can reduce spatial inequality by connecting remote regions to economic opportunities, while climate-resilient infrastructure can reduce vulnerability to environmental shocks (Rozenberg & Fay, 2019). Throughout ASEAN, infrastructure investment has been a fiscal priority, though with varying attention to distributional and environmental dimensions (ADB, 2017).

Environmental protection and conservation programs constitute a third important expenditure category, encompassing initiatives ranging from protected area management to pollution control enforcement (OECD, 2018). While such programs remain relatively small in budgetary terms compared to other expenditure categories, they represent an important direct contribution to environmental objectives and may yield significant co-benefits for public health and quality of life (UNEP, 2016).

Fiscal Budget and Stance

The overall fiscal stance, balancing revenue and expenditure, represents another key policy variable with implications for both inequality and climate objectives. The balance between revenue and expenditure determines the overall fiscal impulse to the economy, with expansionary stances potentially reducing unemployment and supporting incomes at the lower end of the distribution (Stiglitz, 2014). However, fiscal constraints vary considerably

across ASEAN, with some countries facing significant debt sustainability concerns that limit their capacity for expansionary policy (IMF, 2018).

The use of fiscal policy for economic stabilisation interacts with both inequality and climate objectives, as counter-cyclical policies can prevent economic downturns that disproportionately affect vulnerable groups (Ostry et al., 2018). Climate-related shocks may increasingly necessitate fiscal responses, highlighting the importance of fiscal buffers that provide policy space for addressing environmental emergencies (IMF, 2019).

Public Debt

Public debt management represents a fourth key fiscal variable with implications for policy sustainability and intergenerational equity. Management of government borrowing involves complex trade-offs between current spending needs and long-term fiscal sustainability, with high debt potentially constraining future policy options (Ostry et al., 2016). Climate change intensifies these intergenerational considerations, as investments in mitigation and adaptation may yield benefits primarily for future generations while imposing costs on current taxpayers (Hepburn, 2017).

Allocation of resources for debt servicing can have significant distributional implications, potentially crowding out social spending or productive investment when debt burdens are high (Reinhart & Rogoff, 2010). The composition of public debt, including its currency denomination, maturity structure, and creditor base, further influences fiscal vulnerability to external shocks and policy autonomy (Aizenman et al., 2019).

Policy Instruments:

The analysis identified a range of specific policy instruments being deployed or considered across ASEAN to address inequality and climate objectives. Progressive taxation systems that place higher burdens on higher-income individuals and households represent a traditional approach to addressing income inequality, though their effectiveness depends on both design details and implementation capacity (Inchauste & Lustig, 2017).

Targeted social transfer programs, including both conditional and unconditional cash transfers, have emerged as important tools for addressing poverty and inequality while potentially advancing other policy objectives through program design (Banerjee et al., 2019). Countries like Indonesia and the Philippines have developed relatively large-scale transfer programs, though coverage and adequacy remain challenges across the region (Bastagli et al., 2016).

Green subsidies and environmental taxes represent fiscal instruments specifically targeted at environmental objectives, including renewable energy deployment, energy efficiency, and emission reduction (OECD, 2019). While such instruments have clear theoretical advantages for addressing environmental externalities, their implementation in ASEAN faces challenges related to fiscal constraints, administrative capacity, and potential distributional impacts (IMF, 2019).

Public investment in climate-resilient infrastructure represents an instrument with potential to simultaneously address climate vulnerability and provide economic opportunities, particularly for regions and communities at high risk of climate impacts (Global Commission on Adaptation, 2019). Such investments may be particularly important in the ASEAN context given the region's high exposure to climate hazards and substantial infrastructure needs (ADB, 2017).

Conditional cash transfer programs that link social assistance to specific behaviours or outcomes have gained prominence as instruments that can potentially address multiple policy objectives simultaneously, including poverty reduction, human capital development, and environmental protection (Fiszbein & Schady, 2009). Programs that incorporate environmental conditions, such as Indonesia's Program Keluarga Harapan with its forest conservation components, represent innovative approaches to policy integration (Alpízar & Ferraro, 2020).

Carbon pricing mechanisms, including both carbon taxes and emissions trading systems, have emerged as potentially efficient instruments for reducing greenhouse gas emissions while generating revenue (Stiglitz & Stern, 2017). Singapore's carbon tax, introduced in 2019, represents the first comprehensive carbon pricing system in ASEAN, though several other countries are exploring similar mechanisms (World Bank, 2020).

5.6 Discussion of Policy Effectiveness

The analysis reveals varying degrees of effectiveness in ASEAN countries' fiscal policies aimed at addressing inequality and climate change. We examine the effectiveness through the lens of key indicators and policy implementations, recognizing that policy outcomes reflect complex interactions between fiscal interventions and broader economic, social, and environmental factors (Addison et al., 2018; Dorband et al., 2019). This assessment draws on both quantitative indicators and qualitative evaluation of specific policy initiatives to develop a nuanced understanding of what has worked, what hasn't, and why.

Inequality

Most ASEAN countries show stagnating or slightly decreasing Gini coefficients, indicating some progress in addressing inequality, though with significant variation across the region. These trends reflect a combination of market forces, structural economic changes, and policy interventions, making it challenging to isolate the specific contribution of fiscal policies (Kanbur et al., 2014; Zhuang et al., 2014). Nevertheless, certain patterns emerge that suggest the relative effectiveness of different policy approaches.

Indonesia's Gini coefficient decreased from 0.41 in 2012 to 0.38 in 2019 (World Bank, 2021), representing modest but meaningful progress in reducing income disparities. This improvement coincided with expanded social protection programs, including the Program Keluarga Harapan (PKH) conditional cash transfer initiative and reforms to fuel subsidy programs that redirected fiscal resources toward more progressive expenditures (World Bank, 2018). However, research by Dartanto et al. (2020) suggests that these gains remain fragile,

with significant vulnerability to economic shocks and persistent regional disparities that fiscal policies have only partially addressed.

Thailand demonstrates a clear downward trend in inequality, with the Gini coefficient falling from 0.45 in 2000 to 0.35 in 2019. This reduction coincided with the implementation of universal health coverage, expanded educational access, and targeted poverty reduction programs in rural areas (Jitsuchon, 2020). Fiscal policies, particularly the expansion of progressive social spending, appear to have played a significant role in this trend, though economic growth and demographic changes have also contributed (Warr et al., 2022). Yang et al. (2020) note that Thailand's experience illustrates the potential effectiveness of universal social programs in reducing inequality, though fiscal sustainability challenges remain.

The Philippines maintains the highest level of inequality in the selected countries but shows a declining trend, with the Gini coefficient falling from 0.46 in 2015 to 0.44 in 2018. This modest improvement coincides with expanded social protection measures, but research by Bayudan-Dacuycuy and Lim (2014) suggests that structural factors, including high concentration of land ownership and uneven access to education, continue to constrain the effectiveness of fiscal interventions. The persistently high inequality in the Philippines despite relatively robust economic growth underscores the limitations of growth-focused strategies without comprehensive redistributive mechanisms (Balisacan, 2015).

Vietnam presents a contrasting case, with a slight increase in inequality as measured by the Gini coefficient, which rose from 0.35 in 2010 to 0.35 in 2018. This trend reflects the complex distributional implications of Vietnam's economic transition and integration into global markets (Nguyen et al., 2017). Despite significant success in poverty reduction, Vietnam's experience highlights the challenges of maintaining equitable growth during rapid economic transformation, with fiscal policy struggles to keep pace with changing patterns of advantage and disadvantage (Kozel, 2014).

In terms of policy effectiveness, several specific interventions demonstrate promising results. Conditional cash transfer programs, such as the Philippines' Pantawid Pamilyang Pilipino Program (4Ps), have shown positive results in reducing poverty and improving access to education and healthcare. Empirical evaluations by Orbeta and Paqueo (2016) document improvements in school enrolment, nutrition status, and healthcare utilization among beneficiary households. However, these programs' long-term impact on structural inequality remains uncertain, particularly regarding their capacity to facilitate sustained economic mobility across generations (Reyes et al., 2015).

Indonesia's Village Fund program (Dana Desa) has contributed to rural development and poverty reduction by transferring fiscal resources directly to village governments for local infrastructure and social programs. Research by Lewis (2015) and Olken (2019) indicates positive impacts on basic service delivery and local economic activity, though with significant variation in implementation quality across regions. The program illustrates the potential of decentralized fiscal approaches to address spatial inequality, though challenges related to local capacity and governance continue to affect outcomes (Alatas et al., 2019).

However, the persistence of high inequality in some countries suggests that more targeted and comprehensive policies may be needed to address deeply rooted structural drivers of

inequality. Current fiscal approaches often focus on mitigating the symptoms of inequality through social transfers rather than addressing fundamental causes such as unequal access to productive assets, skills-biased technological change, and market concentration (Milanović, 2016; Stiglitz, 2019). Furthermore, the revenue side of fiscal policy remains underdeveloped in many ASEAN countries, with limited progressivity in tax systems and challenges in effectively taxing high-income individuals and wealth (OECD, 2018).

Climate Change

GHG emissions (CO2e) per capita vary widely among ASEAN countries, reflecting differences in economic structure, development stage, and policy approaches. These variations illustrate the heterogeneous challenges facing ASEAN countries in addressing climate change, with some focused primarily on low-carbon development pathways while others must balance mitigation with existing high emissions from industrial and energy sectors (Overland et al., 2021; Tacconi & Muttaqin, 2019).

Singapore exhibits the highest per capita emissions at 8.4 metric tons in 2018, reflecting its energy-intensive industrial base and high living standards, but has implemented efforts to improve energy efficiency. The city-state's climate policy centres on energy efficiency improvements, industrial emissions standards, and most recently, carbon pricing (NEA, 2019). Research by Jayaraman et al. (2015) and Chang (2019) suggests that Singapore's regulatory approach has yielded improvements in energy intensity, though absolute emissions continue to rise due to economic and population growth. The carbon tax introduced in 2019, while modest in rate (S$5 per ton CO2e), represents a significant policy innovation within the ASEAN context, potentially establishing a model for broader regional adoption of carbon pricing (World Bank, 2020).

Malaysia follows with 7.1 metric tons per capita in 2018, with an increasing trend that reflects the country's industrial development and rising energy consumption. Malaysia's climate policy framework, including the Renewable Energy Act and Green Technology Financing Scheme, has promoted incremental shifts toward cleaner energy, but analysis by Bekhet and Harun (2017) indicates that these measures have been insufficient to decouple emissions from economic growth. The country's continued reliance on coal for electricity generation and the expansion of energy-intensive industries present significant challenges for emissions reduction efforts (Shaari et al., 2020).

Thailand's emissions remain relatively stable at 3.7 metric tons per capita in 2018, reflecting a balance between economic growth and incremental improvements in energy efficiency and renewable energy deployment. Thailand's Alternative Energy Development Plan and Energy Efficiency Plan have established ambitious targets, but implementation has faced challenges related to regulatory barriers, financing constraints, and vested interests in conventional energy systems (Tongsopit et al., 2016). Fiscal measures such as feed-in tariffs for renewable energy have shown some success, but the overall policy framework lacks sufficient integration with broader fiscal planning (Chimres & Wongwises, 2016).

Indonesia, Vietnam, and the Philippines all register below 3 metric tons per capita, but with rising trends due to economic growth, urbanization, and increasing energy consumption. These countries face the dual challenge of meeting growing energy demands while attempting

to limit emissions growth, a tension that fiscal policies have only partially addressed (ADB, 2017). As Ravindranath et al. (2019) note, these emerging economies require significant international support and innovative financing mechanisms to pursue low-carbon development pathways without compromising economic and social objectives.

In terms of specific policy effectiveness, Indonesia leads in implementing policies to restrict deforestation and improve pollution controls, including a moratorium on new palm oil plantations and peatland restoration efforts. These measures target a critical emissions source, as land-use change and forestry account for a substantial portion of Indonesia's greenhouse gas emissions (Tacconi & Muttaqin, 2019). Fiscal instruments, including performance-based payments through the REDD+ framework and environmental rehabilitation funds, have supported these efforts, though enforcement challenges and competing economic priorities continue to undermine full implementation (Busch et al., 2015; Tacconi et al., 2019).

Singapore's carbon tax, introduced in 2019, represents a significant step towards pricing carbon emissions, though its initial rate (S$5 per ton CO2e) falls well below estimates of the social cost of carbon or levels needed to drive transformative change (World Bank, 2020). Nevertheless, the policy establishes an important precedent within ASEAN and includes provisions for future rate increases, potentially creating a foundation for more ambitious carbon pricing over time (Zheng & Wang, 2021). The revenue recycling approach, which directs proceeds toward additional climate measures rather than general fiscal purposes, may enhance both environmental effectiveness and political acceptability (IMF, 2019).

Thailand's Alternative Energy Development Plan aims to increase the share of renewable energy in total energy consumption to 30% by 2037, supported by fiscal incentives including tax exemptions for renewable energy equipment and subsidized loan programs for energy efficiency investments (DEDE, 2018). Analysis by Tongsopit et al. (2016) suggests that these measures have successfully accelerated renewable energy deployment, particularly solar photovoltaics, though regulatory and grid integration challenges continue to constrain expansion. The fiscal dimensions of Thailand's renewable energy policy illustrate both the potential and limitations of sectoral approaches that operate somewhat separately from core fiscal policy frameworks.

However, the overall rising trend in emissions across most ASEAN countries suggests that current policies may not be sufficient to meet climate change mitigation goals, particularly in the context of the Paris Agreement's aim to limit global warming to well below 2°C (UNFCCC, 2015). As Overland et al. (2021) and the ADB (2015) emphasize, achieving substantial emissions reductions while maintaining economic development will require more comprehensive and ambitious policy frameworks that fully integrate climate considerations into fiscal planning and economic strategy.

Policy Integration

The analysis reveals limited evidence of systematic sustainable fiscal policies with internalized mitigation mechanisms for both inequality and climate change. Most ASEAN countries rely on discretionary policy add-ons rather than integrated approaches that comprehensively address multiple objectives through coordinated fiscal instruments. This fragmentation reflects both

institutional arrangements that separate environmental, social, and economic policymaking and conceptual frameworks that have traditionally treated these domains as distinct rather than interconnected (Heffron & McCauley, 2018; OECD, 2021).

This suggests a need for more comprehensive policy frameworks that address both inequality and climate change in a cohesive manner, recognizing both the potential synergies and trade-offs between these objectives. As Islam (2015) and Dorband et al. (2019) emphasize, fiscal policies designed primarily for environmental purposes may have significant distributional implications, while measures focused on inequality may either reinforce or undermine climate objectives depending on their design. Integrated approaches that explicitly consider these interactions can potentially enhance effectiveness across multiple dimensions while avoiding unintended consequences (Hallegatte et al., 2016).

Examples of emerging integrated approaches provide potential models for broader policy development. Vietnam's National Green Growth Strategy (2012) aims to reduce greenhouse gas emissions while promoting economic restructuring towards sustainable development, with fiscal measures including environmental taxation, subsidy reform, and green public procurement (Government of Vietnam, 2012). Analysis by Zimmer et al. (2015) suggests that this framework has facilitated some policy coordination, though implementation remains uneven and financing gaps constrain effectiveness. Nevertheless, the strategy represents an important step toward conceptualizing climate policy as integral to, rather than separate from, broader economic development.

Malaysia's Green Technology Master Plan 2017-2030 seeks to integrate environmental sustainability with economic growth objectives through a comprehensive policy framework that includes fiscal incentives, public investment, and regulatory measures (KeTTHA, 2017). The plan establishes connections between green technology promotion and objectives related to economic competitiveness, job creation, and enhanced quality of life, potentially creating a basis for policy integration. However, research by Bekhet and Harun (2017) and Wong et al. (2020) indicates that implementation has been constrained by limited fiscal resources, institutional coordination challenges, and competing priorities.

However, these initiatives often lack clear mechanisms for integrating climate and inequality concerns into broader fiscal policy frameworks, particularly regarding major revenue and expenditure decisions. The disconnect between specialized environmental or social initiatives and core fiscal processes limits the transformative potential of these approaches, as resource allocation continues to be driven primarily by traditional economic considerations (OECD, 2019; UNEP, 2019). Achieving meaningful policy integration would require fundamental reforms to budgeting processes, tax policy design, and fiscal governance arrangements to systematically incorporate sustainability and equity considerations (Addison et al., 2018).

Moreover, the analysis identifies significant gaps in policy evaluation and learning mechanisms that would facilitate evidence-based refinement of integrated approaches. Few ASEAN countries have developed comprehensive frameworks for assessing the distributional and environmental impacts of fiscal policies, limiting the ability to identify both unintended consequences and potential co-benefits (ADB, 2021; OECD, 2018). Building these analytical capabilities represents an important priority for enhancing policy effectiveness, particularly as

countries navigate the complex interactions between inequality, climate change, and broader development objectives.

The limited evidence of integrated policy approaches also reflects political economy constraints, including the influence of vested interests, short-term political incentives, and institutional fragmentation (Never & Betz, 2014; Tanner & Allouche, 2011). These factors create barriers to the development and implementation of comprehensive fiscal reforms that might challenge existing patterns of economic advantage or require significant upfront investments for long-term benefits. Overcoming these constraints will likely require both enhanced technical capacity and political strategies that build broader constituencies for integrated policy approaches (Michaelowa & Allen, 2018).

5.7 Identified Knowledge Gaps

The comprehensive analysis of existing literature on sustainable fiscal policy in ASEAN countries reveals several critical knowledge gaps that significantly constrain policy development and implementation effectiveness. These gaps not only highlight areas where current research is insufficient but also point to promising directions for future scholarly inquiry to better address the twin challenges of inequality and climate change through integrated fiscal frameworks.

A primary deficiency in the current research landscape is the notable absence of integrated policy approaches. The literature predominantly focuses on either inequality or environmental issues in isolation, creating artificial silos that fail to recognize the profound interconnections between these challenges. This fragmentation is particularly problematic because climate policies often have distributional implications, while inequality-focused interventions frequently carry environmental consequences. The lack of research examining these interactions limits policymakers' ability to design coherent fiscal frameworks that simultaneously address multiple dimensions of sustainable development. Future research must bridge this divide by developing conceptual frameworks and empirical methodologies that can capture the complex feedback loops between socioeconomic and environmental systems within the context of fiscal policy design and implementation.

Equally concerning is the insufficient attention paid to rigorous policy effectiveness measurement. While numerous studies describe policy initiatives and theoretical frameworks, relatively few conduct systematic evaluations of actual outcomes against stated objectives. This empirical gap is particularly pronounced in the ASEAN context, where data limitations and methodological challenges complicate assessment efforts. Without robust evidence on what works, what doesn't, and why, policymakers face significant uncertainty when allocating limited fiscal resources. Developing more sophisticated evaluation methodologies—incorporating both quantitative metrics and qualitative assessments of implementation processes—would substantially strengthen the evidence base for policy design. Such evaluations should consider not only immediate outcomes but also potential unintended consequences across different policy domains.

The dearth of cross-country comparative analyses represents another significant knowledge gap. Despite the considerable variation in economic structures, institutional capacities, and policy approaches across ASEAN member states, few studies systematically compare these differences to extract generalizable insights about effective policy design and implementation. Comparative research offers particular value in identifying transferable policy innovations while also highlighting contextual factors that may necessitate adaptation of otherwise promising approaches. Well-designed comparative studies could illuminate how similar fiscal instruments produce different outcomes across various national contexts, providing crucial guidance for regional policy learning and cooperation.

Perhaps most concerning from a sustainability perspective is the limited research examining the long-term impacts of current fiscal policies. Most existing studies focus on immediate or short-term effects, neglecting the intergenerational dimensions that are central to both climate change and structural inequality challenges. This temporal myopia hinders the development of truly sustainable policy frameworks that balance present needs with future wellbeing. Research incorporating longer time horizons—including scenario modelling and intergenerational accounting approaches—would provide essential insights into how current policy choices shape future possibilities and constraints. This long-term perspective is particularly important for assessing climate-related fiscal measures, where benefits may accrue decades after costs are incurred.

The effectiveness of regional policy coordination also remains insufficiently studied, despite its importance in addressing transboundary challenges like air pollution, climate migration, and competitive dynamics that may undermine individual countries' ability to implement ambitious reforms. Given the highly interconnected nature of ASEAN economies, understanding how policy decisions in one country affect outcomes in others is crucial for developing effective regional approaches. Research examining both formal coordination mechanisms and informal policy diffusion processes could identify opportunities to enhance collective action while respecting national sovereignty and differing development priorities.

The political economy of reform represents another critical knowledge gap. Technical policy design, while important, must be complemented by understanding the political and institutional factors that influence policy adoption and implementation. Limited research exists on how interest group dynamics, electoral incentives, administrative capacity constraints, and other governance factors shape fiscal policy outcomes in ASEAN countries. This gap is particularly significant given the potentially disruptive nature of transitions toward more sustainable and inclusive economic models, which may generate resistance from actors benefiting from status quo arrangements. Studies incorporating political economy analyses could identify strategies for building broader constituencies for reform and overcoming implementation barriers.

Finally, there is insufficient research on innovative financing mechanisms that could expand the resource envelope for sustainable development in ASEAN countries. Traditional fiscal instruments may be insufficient to meet the substantial investment needs for addressing both inequality and climate challenges, particularly in contexts of constrained public budgets and competing priorities. Emerging approaches like green bonds, sustainability-linked loans,

impact investment structures, and blended finance models offer potential pathways to leverage private capital for public policy objectives, but their application in ASEAN contexts remains underexplored. Research examining the enabling conditions, design features, and effectiveness of these innovative instruments could identify promising avenues for scaling up sustainable finance across the region.

The identified knowledge gaps require a multidisciplinary research approaches as they combine economic analysis with insights from political science, public administration, environmental studies, and other relevant fields. Developing integrated and empirically grounded, contextually sensitive understandings of sustainable fiscal policy, researchers can provide policymakers with the evidence base needed to effectively address these complex challenges of inequality and climate change in the rapidly evolving ASEAN region.

5.8 Reconciliation of Literature

This chapter has examined the main drivers and impediments of climate change and inequality issues in ASEAN, as well as the governmental responses to these challenges. The findings suggest that while ASEAN countries have recognized the importance of addressing inequality and climate change, there is significant variation in the extent and effectiveness of their policy responses. This heterogeneity reflects not only differences in economic development and institutional capacity but also varying political priorities and contextual factors that shape policy design and implementation (Nesadurai, 2017; Overland et al., 2021).

Growing awareness

ASEAN governments demonstrate increasing awareness of the need for inclusive and sustainable fiscal policies. This is evidenced by the growing number of policy documents and initiatives addressing these issues across the region. This evolution in policy discourse reflects both domestic pressures from increasingly informed and concerned populations and international influences, including multilateral agreements, development assistance frameworks, and global norm diffusion (Beeson, 2016; Falkner, 2016). The increasing volume of policy literature in both inequality and climate domains, as documented in the scoping review, provides tangible evidence of this rising awareness, though with notable variations in emphasis and approach across countries (Koh & Bhullar, 2019; Martinus et al., 2020).

This growing awareness has generated a proliferation of policy frameworks, strategies, and action plans that explicitly address inequality and climate change objectives, representing a significant advance from earlier periods when these issues received little formal policy attention (Anbumozhi & Kalirajan, 2017; Cook & Pincus, 2014). However, awareness and rhetoric have not always translated into substantive policy change, with significant gaps remaining between stated ambitions and implemented measures in many contexts (Hurley et al., 2019; Koch & Fritz, 2014).

Policy gaps

There is a lack of systematic integration of mitigation mechanisms into fiscal policy frameworks. Most countries rely on discretionary policy add-ons rather than comprehensive,

integrated approaches to addressing inequality and climate change. This fragmentation reflects both institutional silos that separate environmental, social, and economic policymaking and conceptual frameworks that have traditionally treated these domains as distinct rather than interconnected (Heffron & McCauley, 2018; OECD, 2021). The resulting policy landscape often consists of isolated initiatives that operate alongside, rather than within, mainstream fiscal frameworks, limiting their transformative potential and overall effectiveness (Addison et al., 2018; UNEP, 2016).

The separation between core fiscal policy instruments (taxation, expenditure, debt management) and specialized measures for addressing inequality or climate change creates several challenges. First, it limits the scale of resources available for addressing these challenges, as specialized programs often receive marginal funding relative to mainstream budget allocations (IMF, 2019; Stiglitz, 2019). Second, it creates potential for policy inconsistency, where measures designed to address one objective may undermine others, as seen in cases where fossil fuel subsidies persist alongside climate mitigation programs (Rentschler & Bazilian, 2017; Sovacool, 2017). Third, it reduces the stability and durability of policy interventions, as specialized programs may be more vulnerable to budget cuts or political shifts than core fiscal instruments (Michaelowa & Allen, 2018; Never & Betz, 2014).

Regional variations

Significant differences exist among ASEAN countries in terms of policy focus and effectiveness. Countries like Indonesia and Singapore appear to be leading in policy development and implementation, while others lag behind. These variations reflect multiple factors, including differences in economic development, institutional capacity, vulnerability to climate impacts, and domestic political dynamics (Raitzer et al., 2015; Thompson, 2016). The scoping review findings, which documented substantial disparities in research output across countries, provide an indirect indicator of these policy variations, suggesting that countries with more extensive research engagement may also have more developed policy frameworks (Booth et al., 2016; Liu et al., 2020).

Indonesia's leadership position in addressing both inequality and climate change reflects both the scale of these challenges within its context and its relatively strong institutional capacity for policy development and implementation. As the region's largest economy and most populous nation, Indonesia faces substantial challenges in both domains but has also developed comparatively sophisticated policy responses, including conditional cash transfer programs, forest conservation initiatives, and energy subsidy reforms (Case et al., 2018; Dartanto et al., 2020; Resosudarmo et al., 2020). Singapore's distinctive approach reflects its unique context as a high-income city-state, with policy innovations including progressive property taxation, comprehensive public housing, and the region's first carbon tax (Chang, 2017; Low, 2016; NEA, 2019).

Countries with less developed policy frameworks, including Myanmar, Laos, and Cambodia, face significant capacity constraints that limit their ability to design and implement comprehensive approaches. These constraints include limited fiscal resources, weaker institutional infrastructure, data limitations, and competing development priorities that may draw attention away from inequality and climate concerns (Huang & Bocchi, 2019; Rigg et al., 2016; Sovacool et al., 2017). These disparities highlight the need for differentiated approaches

to regional cooperation and capacity building that recognize the diverse starting points and constraints across ASEAN member states.

Implementation challenges

Many countries face difficulties in translating policy intentions into effective action. This is particularly evident in the persistent high levels of inequality in some countries and the overall rising trend in greenhouse gas emissions. The implementation gap between stated policy objectives and realized outcomes reflects multiple barriers, including resource constraints, coordination failures, political resistance, and technical capacity limitations (Hudson et al., 2019; Khan, 2010; Lipsky, 2010). These challenges are particularly acute for policies addressing complex, multi-sectoral issues like inequality and climate change, which require coordinated action across multiple government agencies and levels (Newell, 2021; Tanner & Allouche, 2011).

The persistent inequality observed in countries like the Philippines and Malaysia, despite explicit policy commitments to inclusive growth, illustrates the difficulties of addressing deeply rooted structural drivers of economic disparity (Jain-Chandra et al., 2018; Menon & Melendez, 2017). Similarly, the rising emissions trends across most ASEAN countries, even those with ambitious climate policy frameworks, highlight the challenges of decoupling economic growth from environmental impacts in rapidly developing economies (Overland et al., 2021; Tacconi & Muttaqin, 2019). These implementation challenges underscore the need for attention not only to policy design but also to the political, institutional, and capacity factors that shape policy realization on the ground.

Data challenges

The effectiveness of policies is often difficult to assess due to limited data availability and inconsistent reporting across ASEAN countries. This highlights the need for improved data collection and monitoring mechanisms. Data constraints affect both policy design and evaluation, limiting the ability of governments to target interventions effectively and assess their impacts (Hale et al., 2021; Woolcock, 2013). These limitations are particularly significant for distributional analyses that require detailed household-level data and environmental assessments that depend on comprehensive monitoring systems across multiple parameters (Jolliffe & Prydz, 2016; Teh et al., 2019).

The availability and quality of inequality data vary considerably across ASEAN countries, with more developed economies generally having more comprehensive and frequent data collection (World Bank, 2020; Yang et al., 2020). Similarly, climate and environmental data face significant gaps, particularly regarding non-CO2 greenhouse gases, land-use emissions, and localized environmental impacts (IPCC, 2022; UNEP, 2018). These data limitations constrain both research and policy development, making it difficult to establish robust baselines, track progress, and refine interventions based on evidence (Ramstetter & Sjöholm, 2013; Ravindranath et al., 2019).

5.9 Conclusion

This study has provided a comprehensive overview of the current state of fiscal policy in ASEAN with respect to inequality and climate change. While progress has been made in recognizing these challenges, significant work remains to be done in developing and implementing effective, integrated policy responses. The identified knowledge gaps and future research directions offer a roadmap for scholars and policymakers to advance understanding and practice in this critical area.

The research has revealed a complex policy landscape characterized by increasing awareness of inequality and climate challenges, but marked by fragmentation, implementation gaps, and significant regional variations. ASEAN governments have developed numerous policy initiatives addressing aspects of these challenges, yet truly integrated approaches remain rare. The documentation of both promising practices and persistent shortcomings provides a foundation for more effective policy development moving forward.

The findings highlight the importance of moving beyond siloed approaches to develop fiscal frameworks that systematically incorporate both social and environmental considerations. This integration is essential for addressing the interconnected nature of inequality and climate challenges, where policy interventions in one domain inevitably affect outcomes in the other. The evidence suggests that discrete, add-on policy measures are insufficient to address the scale and complexity of these issues in the context of rapid economic transformation across the region.

The study also underscores the need for contextually appropriate approaches that recognize the diverse starting points, constraints, and priorities of different ASEAN member states. While regional cooperation offers valuable opportunities for knowledge sharing and coordinated action, effective policies must be tailored to specific national circumstances, including economic structures, institutional capacities, and sociopolitical dynamics. This differentiated approach should inform both research and policy development moving forward.

As ASEAN continues to grow and develop, the need for inclusive and sustainable fiscal policies will only become more pressing. Building on the findings of this study and addressing the identified research gaps, ASEAN countries can work towards a future that balances economic growth with social equity and environmental sustainability. This will require sustained commitment, regional cooperation, and innovative policy approaches tailored to the unique contexts of ASEAN member states.

The path forward calls for not only technical innovation in policy design but also political leadership and inclusive governance processes that engage diverse stakeholders in shaping solutions. By developing fiscal frameworks that effectively internalize the social and environmental externalities of economic activity, ASEAN countries can pioneer approaches to sustainable development that address the defining challenges of the 21st century while creating more equitable and resilient societies.

5.10 Limitations and Future Research Directions

This study of sustainable fiscal policy in ASEAN countries faces several methodological limitations that should be considered when interpreting its findings. The focus on English-language publications potentially excludes valuable insights from local researchers publishing in national languages, creating a bias toward international perspectives. The 2001-2020 timeframe omits recent policy developments, particularly those following the Paris Agreement and COVID-19 pandemic. Reliance on specific academic databases may have missed relevant gray literature and documents published on institutional websites rather than in traditional publications.

Methodologically, the qualitative nature of the scoping review and document analysis introduces an element of subjectivity despite efforts to ensure analytical rigor. Perhaps most significantly, the study's focus on policy documents may not reflect actual implementation realities, as formal policies often face substantial barriers in practice, including resource constraints and political resistance. The multifaceted nature of inequality and climate change creates additional complexity that resists comprehensive analysis within a single research framework, while the dynamic nature of policymaking means some policies may have evolved since data collection.

Future research should address these limitations through several promising directions. Developing integrated policy frameworks that simultaneously address inclusive growth and climate mitigation objectives would contribute to the emerging field of "just transition" studies. In-depth comparative analyses across ASEAN countries could identify transferable best practices while recognizing contextual differences. Longitudinal studies examining long-term effects of current fiscal policies would enhance understanding of intergenerational implications, while research on regional coordination mechanisms could address transboundary challenges and competitive dynamics that constrain individual country actions.

Implementation research focusing on institutional capacities and political economy considerations would help bridge the gap between policy design and outcomes. Exploring innovative financing instruments such as green bonds and blended finance could identify new ways to leverage private capital for sustainability objectives. Research on policy coherence would address fragmentation between different policy domains, while stakeholder engagement studies could illuminate how diverse actors shape policy development and implementation.

Further pursuing these research directions, scholars can contribute to more effective and integrated fiscal policies that promote both inclusive growth and environmental sustainability in the ASEAN region. Building a stronger evidence base on effective policy approaches, implementation strategies, and financing mechanisms will support policymakers navigating complex economic, social, and environmental challenges in the twenty-first century.

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6 CHAPTER SIX: ANALYSIS & FINDINGS (RQ2)

6.1 Introduction

This chapter was published as independent paper "Inclusive growth and climate change mitigation programs and policies in the ASEAN: fiscal implications" (Weber, M., Chaiechi, T., & Beg, R., 2022). It addresses the second research question (RQ2), following the Integrated Methodology of this thesis:

The principal research question: *To what extent do existing policies and programs in ASEAN Member States (AMS) address climate change and inequality, and how do AMS governments engage in multilateral policy coordination?*

The impairment of intergenerational prosperity caused by economic inequality and climate change as externalities of economic activity threatens the very premise of economic, social, and ecological sustainability (Collier, 2010; Stiglitz, 2015; Rees, 1995). Within the greater paradigm of global and intergenerational sustainability, this study examines policy-relevant literature to assess the extent of balanced, inclusive, and sustainable fiscal policies and programs in ASEAN countries.

The Association of Southeast Asian Nations (ASEAN) represents a region of profound economic transformation over recent decades, with member states experiencing varied developmental trajectories but sharing common challenges related to environmental degradation and socioeconomic disparities. Despite impressive economic growth rates across much of the region, the benefits of this growth have not been distributed equitably, while environmental costs have often been externalized (Menon & Melendez, 2017; Zhuang et al., 2014). These twin challenges of inequality and climate change present ASEAN policymakers with complex trade-offs that necessitate innovative fiscal approaches capable of addressing multiple objectives simultaneously.

The urgency of addressing these challenges has intensified in recent years as climate-related impacts become more pronounced across Southeast Asia. The region is particularly vulnerable to climate change effects, with extensive coastlines, large agricultural sectors, and dense urban populations in low-lying areas (Hijioka et al., 2014; ADB, 2015). Meanwhile, despite poverty reduction achievements, income inequality has remained persistent or worsened in several ASEAN countries, threatening social cohesion and potentially undermining political stability (Kanbur et al., 2014; World Bank, (2018).

Fiscal policy represents a critical instrument for governments seeking to address these interconnected challenges. Through revenue generation, expenditure allocation, and regulatory frameworks, fiscal measures can create incentives for more sustainable economic activities while redistributing resources to promote more inclusive development outcomes (IMF, 2014; OECD, 2015). However, the design and implementation of such policies must navigate complex political economy constraints and consider both short-term economic impacts and long-term sustainability objectives.

Specifically, this chapter aims to:

Evaluate the extent of current fiscal policies and programs in ASEAN with pro-equity and pro-green outcomes. This evaluation encompasses taxation structures, public expenditure priorities, subsidy regimes, and targeted interventions designed to address both environmental and equity concerns. The assessment considers not only the existence of such policies but also their scale, scope, and effectiveness in achieving stated objectives. By examining the fiscal architecture across ASEAN member states, this analysis identifies both promising practices and critical gaps in policy frameworks.

Assess the level of multilateral and regional policy coordination among AMS. Environmental challenges, particularly climate change, transcend national boundaries and require coordinated responses. This aim explores the mechanisms, institutions, and agreements through which ASEAN countries collaborate on environmental and social policy issues. It examines both formal coordination frameworks and informal cooperation networks, assessing their effectiveness in facilitating coherent regional responses to shared challenges.

Determine whether mitigation measures are internalized into policies and programs by design or implemented as discretionary add-ons. This distinction is critical for understanding the sustainability and resilience of policy frameworks. Internalized measures reflect structural integration of environmental and equity considerations into core economic and fiscal policies, whereas discretionary add-ons suggest a more peripheral approach that may be vulnerable to changing political or economic circumstances. By analysing policy design and implementation processes, this aim seeks to assess the depth of commitment to addressing externalities within ASEAN fiscal frameworks.

The significance of this research lies in its potential to inform more effective policy-making in ASEAN countries, helping to address the pressing challenges of inequality and climate change through fiscal measures. By examining both national policies and regional coordination efforts, this study provides a comprehensive view of the current state of sustainable fiscal policy in the ASEAN region. The findings contribute to ongoing debates regarding optimal policy design for addressing externalities in developing and middle-income contexts, where trade-offs between immediate economic growth objectives and longer-term sustainability goals can be particularly pronounced (Barbier, 2016; Jakob et al., 2015). Furthermore, by identifying patterns of policy development across countries with diverse political systems, economic structures, and institutional capacities, this research generates insights that may be applicable beyond the ASEAN context to other regions facing similar sustainable development challenges.

6.2 Conceptual Framework

The analysis is guided by a two-dimensional conceptual framework that examines policy intent, construct, and sustainability impact alongside the geopolitical scope of policy intervention. This framework provides a structured analytical approach to understanding how policies addressing inequality and climate change develop across different jurisdictional levels and implementation stages within the ASEAN context.

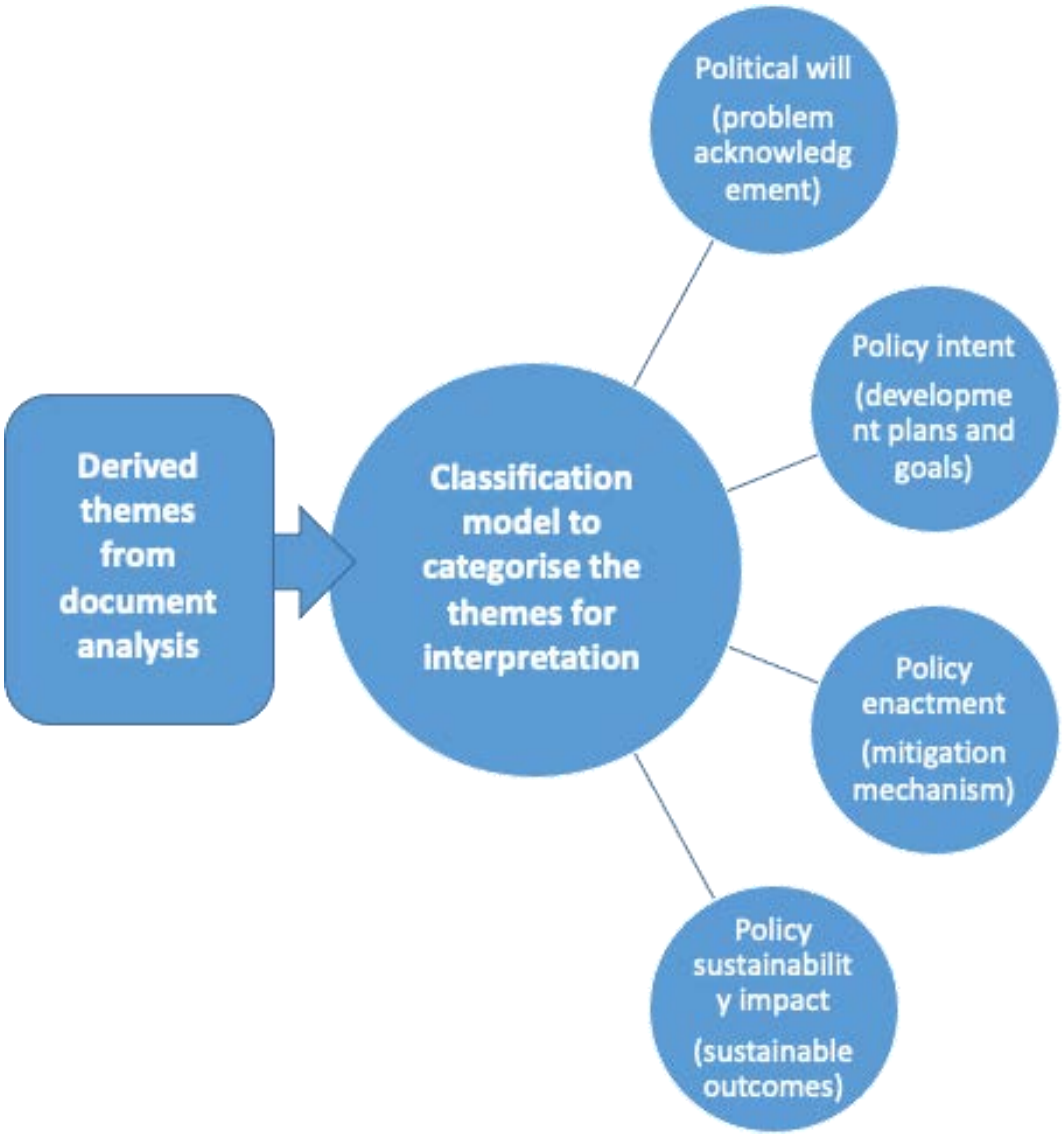

Figure 9: Conceptual model Policy intent, construct & sustainability impact, by authors

The first dimension of the framework categorizes policies according to their stage of development and implementation, representing a maturity continuum from initial political expressions to measurable outcomes. At the most preliminary stage, political will and rhetoric encompass statements of intent and public commitments made by government officials and institutional bodies. These declarations, while often criticized as merely symbolic, serve as important signaling mechanisms that establish normative expectations and can create momentum for more substantive policy action (Hajer, 1995; Schmidt, 2008). In the ASEAN context, such rhetorical commitments frequently appear in summit declarations, ministerial statements, and national development plans, indicating at least nominal recognition of climate change and inequality challenges.

As policy development advances beyond rhetoric, it enters the stage of formal policy intent, where abstract commitments transform into officially adopted policies and programs with defined objectives, governance structures, and implementation pathways. This stage represents a critical juncture where theoretical ideals encounter practical constraints related

to institutional capacity, stakeholder interests, and resource availability (Howlett, 2019; Beland & Cox, 2016). The formalization of policy intent requires technical specificity regarding policy instruments, target populations, and anticipated outcomes, creating a framework for accountability that mere rhetoric lacks.

The third stage in this dimension, policy enhancement through externality mitigation mechanisms, focuses on the operational instruments designed to address market failures related to environmental degradation and economic inequality. These mechanisms include carbon pricing schemes, progressive taxation structures, green subsidies, and targeted social expenditures that explicitly aim to internalize externalities and correct distributional imbalances. The design of these mechanisms reflects underlying theoretical assumptions about behaviour change, market response, and distributional impacts (Goulder & Parry, 2008; Bowen, 2015). Their effectiveness depends not only on technical design but also on complementary institutional arrangements, enforcement capacity, and political legitimacy.

The final stage, sustainable policy impact, concentrates on the measurable outcomes of implemented policies, assessing whether interventions achieve their intended environmental and equity objectives. This stage acknowledges that policy effectiveness ultimately must be judged by empirical results rather than design intentions, requiring robust measurement frameworks and data collection systems (Hák et al., 2016; Stiglitz et al., 2018). Impact assessment also necessitates consideration of policy consistency over time, as sustainable outcomes often require long-term commitment beyond electoral cycles or economic fluctuations.

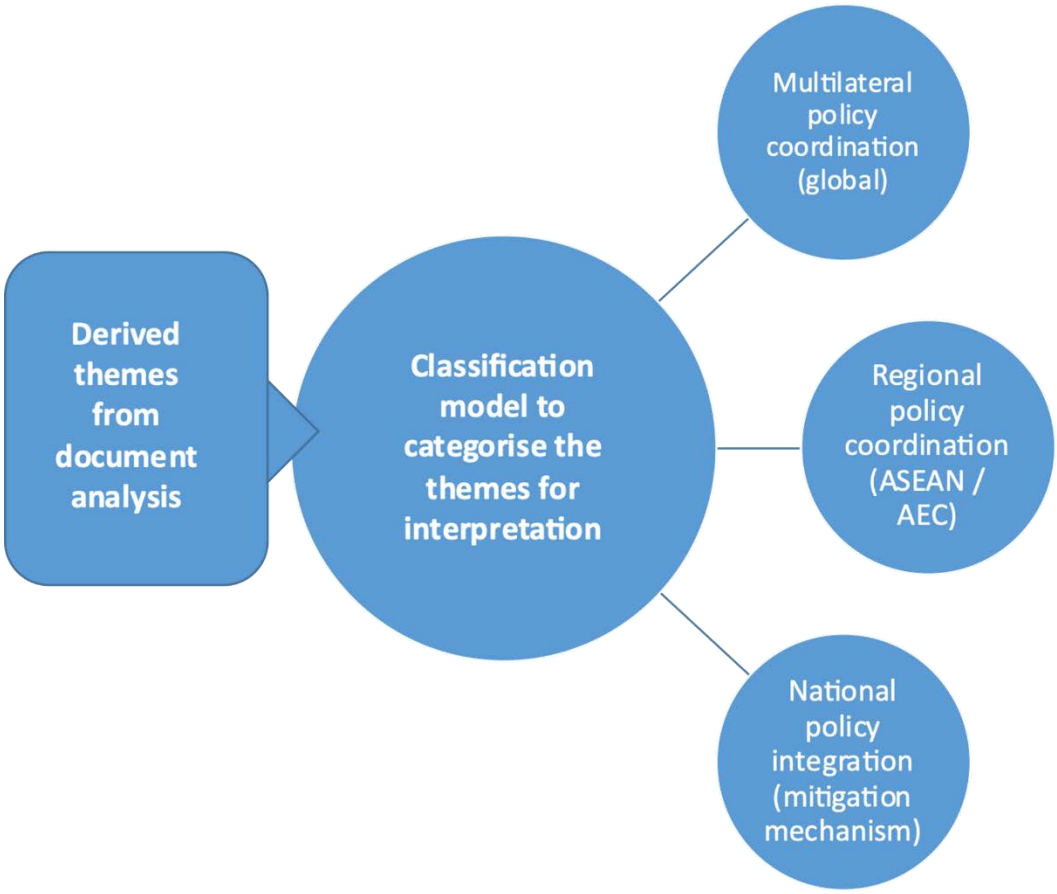

Figure 10: Conceptual model - Geopolitical scope of policy intervention, source: authors

The second dimension considers the level at which policies are coordinated and implemented, recognizing that externalities often transcend jurisdictional boundaries and therefore require coordinated responses across governance levels. At the broadest level, multilateral policy coordination encompasses global agreements, international standards, and transnational governance mechanisms that establish overarching normative frameworks and collective targets (Keohane & Victor, 2016; Biermann, 2014). These include instruments such as the Paris Climate Agreement, the Sustainable Development Goals, and various United Nations frameworks that create reference points for national and regional policy development.

At an intermediate level, regional policy coordination focuses specifically on ASEAN mechanisms for collaborative governance, including formal institutions like the ASEAN Ministerial Meeting on Environment and the ASEAN Economic Community, as well as more informal networks of policy exchange and learning (Nesadurai, 2017; Elliott, 2012). Regional coordination offers potential efficiencies through harmonized standards, pooled resources, and knowledge sharing, while accommodating shared geographical, cultural, and economic characteristics that may not be addressed in global frameworks.

At the most localized level, national policy integration involves the incorporation of sustainability and equity objectives into domestic governance systems, aligning with national priorities, institutional structures, and development trajectories. This integration requires horizontal coordination across government ministries and agencies as well as vertical coordination between central and subnational authorities (Peters, 2018; Candel & Biesbroek,

2016). The effectiveness of national policy integration depends significantly on administrative capacity, political commitment, and fiscal resources, which vary considerably across ASEAN member states.

This framework allows for a systematic examination of AMS policies across different levels of governance and stages of policy development, from rhetoric to implementation and impact. It provides a structure for analysing how policies evolve from political commitments to concrete actions and measurable outcomes, while also considering the interplay between national, regional, and global policy efforts. By mapping policies according to these two dimensions, researchers can identify governance gaps, implementation challenges, and opportunities for enhanced policy coherence.

The conceptual framework draws upon several theoretical traditions in policy analysis, including the policy cycle model (Lasswell, 1956; Jann & Wegrich, 2007), multi-level governance theory (Hooghe & Marks, 2003; Bache & Flinders, 2004), and institutional approaches to environmental politics (Young, 2002; Ostrom, 2010). It synthesizes these perspectives to create an analytical lens particularly suited to examining complex externality problems in the context of developing economies with evolving governance capacities.

Moreover, this analytical approach enables identification of divergences between policy commitments and implementation realities, helping to distinguish between symbolic policy adoption and substantive policy implementation. Such distinctions are particularly relevant in environmental and social policy domains, where governments may have incentives to claim policy leadership while minimizing actual economic or political costs (Dimitrov, 2016; Purdon, 2015). By systematically analysing policies across both dimensions, this framework facilitates more nuanced assessment of ASEAN member states' progress in addressing the twin challenges of climate change and inequality.

6.3 Methodology

Document and Content Analysis Approach

This study employs a combined document and content analysis approach, which is particularly well-suited for policy research (Owen, 2014, 2016, and Linton et. al., 2019). This method allows for the systematic examination of policy documents while also enabling the interpretation of themes and patterns within the context of ASEAN's fiscal policies.

The methodology involves three major steps: systematic collection of policy documents; qualitative content analysis to identify themes and patterns; and contextualization of findings within the ASEAN policy landscape. This approach was chosen for its ability to handle large volumes of textual data and its flexibility in uncovering both explicit and implicit meanings in policy documents. It allows for a nuanced understanding of policy intentions, implementations, and impacts across the ASEAN region.

Document and content analysis represents a methodologically robust approach for examining policy frameworks, particularly when investigating complex, multi-jurisdictional issues such as climate change and inequality (Bowen, 2009; Krippendorff, 2018). Unlike purely quantitative

approaches that may reduce policy content to numerical indicators, this mixed-methods approach preserves the contextual richness of policy documents while still allowing for systematic comparison across different sources and jurisdictions. The methodology acknowledges that policy documents are not merely technical instruments but also socio-political texts that reflect underlying power dynamics, ideological perspectives, and institutional constraints (Bacchi, 2009; Fischer, 2003).

The document analysis component focuses on the examination of official texts as primary sources of evidence regarding policy commitments and frameworks. This approach recognizes that formal policy documents represent authoritative statements of government intent and provide crucial insights into how externalities are conceptualized and addressed within official discourse (Prior, 2003; Yanow, 2000). By systematically analysing these documents, the study identifies not only explicit policy objectives and instruments but also implicit assumptions and priorities that shape policy development and implementation.

The content analysis component complements document analysis by employing more structured analytical techniques to identify patterns, themes, and relationships within and across policy texts. This approach enables both quantitative assessment of textual features (such as frequency of key terms and co-occurrence patterns) and qualitative interpretation of meaning in context (Hsieh & Shannon, 2005; Mayring, 2004). Through this dual focus, the methodology bridges positivist concerns with measurement and interpretive interests in meaning, creating a more comprehensive understanding of ASEAN policy landscapes.

Data Collection and Corpus Development

The study utilized a stratified corpus of policy documents, collected through a structured search process. The corpus was developed using the following steps: identification of relevant document types; systematic search using predefined criteria; document screening and classification; and corpus evaluation using established metrics. The following associates the relevant document types with the corresponding evidence classes to structure the corpus in alignment with the conceptual model.

Table 3: Stratified data model for structured corpus composition

DOCUMENT TYPE	EVIDENCE CLASS
Ratified Multilateral Agreements, Declarations & Official Announcements (treaty, fora)	a) Global and regional sources of potential evidence of multilateral political will, policy intent and evaluation
National Medium & Long-term Development Plans (political will, policy intent)	b) National sources of potential evidence of political will and policy intent
Policy Framework & Policy Action Plans (by political mandate)	c) National sources of potential evidence of policy integration
Funded Policy Action and Programs (Fiscal Budget)	d) Sources of potential evidence of enacted (funded existing) policy and programs

Independent Policy Analysis & Advisory (Institutions and Consulting Firms)	e) Sources of potential evidence of independent polity evaluation and analysis

The table stratifies data model for structured corpus composition DOCUMENT TYPE EVIDENCE CLASS Ratified Multilateral Agreements, Declarations & Official Announcements (treaty, fora) a) Global and regional sources of potential evidence of multilateral political will, policy intent and evaluation National Medium & Long-term Development Plans (political will, policy intent) b) National sources of potential evidence of political will and policy intent Policy Framework & Policy Action Plans (by political mandate) c) National sources of potential evidence of policy integration Funded Policy Action and Programs (Fiscal Budget) d) Sources of potential evidence of enacted (funded existing) policy and programs Independent Policy Analysis & Advisory (Institutions and Consulting Firms) e) Sources of potential evidence of independent polity evaluation and analysis

This table categorizes document types according to their source and potential evidence class, ensuring thematic mapping of policy-related documents from multilateral agreements to independent policy analyses. The corpus structure plays an essential role in providing an object classification scheme with containers to hold the identified source documents for further analysis with respect to the research objective.

The stratification approach reflects methodological advances in policy document analysis that emphasize the importance of source diversity and hierarchical organization of evidence (Wesley, 2010; Karppinen & Moe, 2019). By classifying documents according to their institutional origin and evidentiary role, the methodology creates a more nuanced analytical framework that acknowledges the varied authority, scope, and purpose of different policy texts. This approach is particularly valuable in the ASEAN context, where policy development often involves complex interactions between global normative frameworks, regional coordination mechanisms, and national implementation processes.

The first stratum, comprising ratified multilateral agreements and declarations, provides evidence of high-level political commitments and normative frameworks that shape subsequent policy development. These documents represent what Schmidt (2008) terms "coordinative discourse" among policy elites, establishing shared understandings and expectations regarding appropriate policy responses to externalities. The second and third strata, focusing on national development plans and policy frameworks, capture the translation of these broader commitments into country-specific priorities and approaches. These documents reflect what Sabatier and Jenkins-Smith (1993) describe as "policy subsystem" dynamics, where broader objectives are filtered through domestic institutional arrangements and stakeholder interests. The fourth stratum, addressing funded programs, acknowledges the critical distinction between policy aspiration and implementation, recognizing that budgetary allocations represent perhaps the most concrete evidence of actual government priorities (Wildavsky, 1964; Rubin, 2019). Finally, the inclusion of independent analyses provides external perspectives that can offer critical assessment of the gap between policy rhetoric and reality.

Table 4: A priori protocol for document search & section (adopted: Weber & Chaiechi, 2022)

CRITERION	INCLUSION	EXCLUSION
Publication Year	2001-2022	Studies outside this period
Search Language	English	Non-English Literature
Type of Literature	Peer-reviewed original research, conference proceedings, working papers, governmental reports	Non-scholarly, non-official or non-reputable sources
	Grey-literature including: reputable advisory reports and pertinent published articles and books	
Concepts	Policy relevant documents from original sources in context of Inclusive Sustainable Fiscal Policy (ISFP), including fiscal policy in context of pro-equity and pro-green and sustainable development outcomes	Documents without thematic relevance
Coverage	Document must cover Inequality, Climate Change issues in Sustainable Fiscal Policy context	Documents with only partial coverage
Relevance	Title and abstract relevant to the guiding question	Irrelevant titles and abstracts
Validation	Each source document validated for authenticity, credibility, representativeness and meaning (Kridel 2015, Scott 1990, etc.)	Exclude documents that are not genuine, are not free of errors, are atypical relative to subject or of insignificant source

The a priori protocol guided the document search and selection process, ensuring consistency and relevance in the corpus development. Key criteria included publication year (2001-2022), language (English), and relevance to inclusive sustainable fiscal policy in the ASEAN context. This structured approach to document selection aligns with recommendations from

methodologists who emphasize the importance of transparent, systematic procedures for corpus development in policy analysis (Mackay et al., 2018; Paré et al., 2015). By establishing clear inclusion and exclusion criteria before initiating the search process, the methodology reduces potential researcher bias and enhances the replicability of the study.

The temporal scope of 2001-2022 captures a significant period in the evolution of sustainability policy, encompassing key global developments such as the transition from the Millennium Development Goals to the Sustainable Development Goals, the emergence of the Paris Climate Agreement, and several cycles of ASEAN policy development. This timeframe allows for the examination of policy evolution over multiple political cycles while maintaining contemporary relevance. The focus on English-language documents represents a pragmatic methodological choice, reflecting both the lingua franca status of English in international policy discourse and the practical constraints of multilingual analysis. However, this approach necessarily prioritizes documents produced for international or regional audiences, potentially limiting access to some national-level policy discussions conducted in local languages.

The document validation criteria draw on Scott's (1990) influential framework for assessing documentary sources, which emphasizes authenticity (genuineness), credibility (freedom from error), representativeness (typicality), and meaning (comprehensibility). This multidimensional approach to source validation enhances methodological rigor by ensuring that the corpus comprises reliable and relevant policy documents rather than derivative or misleading sources. The explicit adoption of these criteria represents what Baxter and Jack (2008) describe as "establishing the boundaries of the case," creating clear parameters for what constitutes valid evidence within the study.

Prior to content analysis a set of crude corpus metrics was adopted, following Yao (2009), to evaluate the informational quality and representativeness (Onwuegbuzie, 2007) of the corpus instance while balancing subject coverage and diversity (Pham, 2014) and controlling, through structured design (Bauer, 2000) for selection bias (Silverman, 2015; Arksey and O'Malley, 2005). According to Yao, the following crude corpus metrics (Table 3) provide a robust characterisation of the corpus instance and indication of fitness and readiness for feature analysis.

Table 5: Corpus evaluation metrics

Qualitative and statistical measures of corpus constitution, content depth and constructs	Documents included in this repository - from positive index search and after screening	Document bibliographic data - author, title and publisher references	Document metadata - language, version/date, text length, structure, relevant keywords in title, header and abstract	Document crude syntactic and semantic text statistics - token frequency, recognised expressions and subject relevance	Corpus contextual and conceptual content analysis - relevant token entropy, clustering and exclusiveness of extracted features

Universe	643 html, pdf, txt - text only	all documents in corpus universe	all documents in corpus universe	all documents in corpus universe	all metrics in range
Corpus strata 1	217 html, pdf, txt - text only	all documents in corpus strata	all documents in corpus strata	all documents in corpus strata	all metrics in range
Corpus strata 2	92 html, pdf, txt - text only	all documents in corpus strata	all documents in corpus strata	all documents in corpus strata	all metrics in range
Corpus strata 3	48 html, pdf, txt - text only	all documents in corpus strata	all documents in corpus strata	all documents in corpus strata	all metrics in range
Corpus unclassified documents	286 html, pdf, txt, doc, xls, ppt, csv, rtf	all documents in corpus strata	all documents in corpus strata	all documents in corpus strata	all metrics in range

Universe 643 html, pdf, txt - text only all documents in corpus universe all documents in corpus universe all documents in corpus universe all metrics in range Corpus strata 1 217 html, pdf, txt - text only all documents in corpus strata all documents in corpus strata all documents in corpus strata all metrics in range Corpus strata 2 92 html, pdf, txt - text only all documents in corpus strata all documents in corpus strata all documents in corpus strata all metrics in range Corpus strata 3 48 html, pdf, txt - text only all documents in corpus strata all documents in corpus strata all documents in corpus strata all metrics in range Corpus unclassified documents 286 html, pdf, txt, doc, xls, ppt, csv, rtf all documents in corpus strata all documents in corpus strata all documents in corpus strata all metrics in range

These metrics were used to assess the quality and representativeness of the corpus, including measures of content depth, diversity, and relevance to the research question. The application of corpus linguistics principles to policy analysis represents a methodological innovation that enhances the rigor of documentary research (Baker, 2006; Mautner, 2016). By examining statistical properties of the text collection, such as token frequency, expression recognition, and feature extraction patterns, the methodology establishes a quantitative foundation for subsequent qualitative interpretation. This approach aligns with what Fairclough (2003) and Wodak and Meyer (2015) describe as the "linguistic turn" in policy analysis, which emphasizes the importance of systematic textual analysis for understanding policy discourse.

The final corpus consisted of 643 documents, with 357 classified into three strata aligned with the research objectives, and 286 unclassified documents retained for contextual analysis. This stratified approach ensures that the analysis covers a wide range of policy documents while maintaining focus on the most relevant sources for addressing the research question. The substantial size of the corpus enhances the credibility of findings by providing a comprehensive overview of policy developments across multiple jurisdictions and time periods. At the same time, the stratification approach creates what Stake (1995) describes as

"instrumental cases" that illuminate particular aspects of the research question, allowing for both breadth and depth in the analysis.

6.4 Data Analysis

The analysis process involved several stages: document dissection and feature extraction; thematic analysis using both inductive and deductive approaches; classification of themes according to the conceptual framework; and interpretation of themes in relation to RQ2.

In the first stage, each document was systematically analysed to extract relevant text artifacts, which involved tokenisation, removal of stop words, and identification of key phrases and concepts. This process of text preprocessing represents standard practice in computational text analysis (Grimmer & Stewart, 2013; Welbers et al., 2017), creating a more structured dataset that facilitates subsequent pattern identification while removing linguistic elements that contribute little to substantive meaning. The systematic nature of this process enhances methodological transparency by making explicit the transformations applied to raw textual data before interpretation.

The second stage employed thematic analysis using both inductive and deductive approaches. The inductive approach allowed for the emergence of themes directly from the data without imposing predetermined categories, enabling the identification of patterns that might not be anticipated in the conceptual framework (Braun & Clarke, 2006; Thomas, 2006). This openness to emergent themes acknowledges the complex and evolving nature of policy discourse around externalities, where new concepts and approaches may emerge over time. Simultaneously, the deductive approach used the conceptual framework to guide the identification of relevant themes, ensuring analytical focus on the research questions while facilitating systematic comparison across documents and jurisdictions. This dual approach represents what Fereday and Muir-Cochrane (2006) describe as "hybrid thematic analysis," combining the strengths of theory-driven and data-driven analytical strategies.

The third stage involved classification of themes according to the conceptual framework, mapping identified themes onto the two-dimensional framework that considers both policy stage and geopolitical scope. This classification process reflects what Maxwell (2013) terms "connecting strategies" in qualitative analysis, identifying relationships between concepts and contexts that illuminate broader patterns of policy development. By situating specific policy elements within this matrix, the analysis reveals not only what policies exist but also how they relate to different stages of development and levels of governance.

The final stage focused on the interpretation of themes in relation to RQ2, analysing themes for their relevance to addressing climate change and inequality, as well as evidence of multilateral coordination. This interpretive process draws on principles of critical policy analysis (Fischer et al., 2015; Yanow, 2000) that emphasize the importance of contextual understanding and normative assessment in policy research. Rather than merely documenting policy content, this approach evaluates its substantive contribution to addressing the externalities in question, considering both explicit policy objectives and potential implementation challenges.

Techniques such as Comparative Keyword Analysis (CKA) and Latent Dirichlet Allocation (LDA) were employed to enhance the rigor of the analysis process. CKA allowed for the

systematic comparison of key terms across documents, revealing patterns of emphasis and omission that might not be apparent in manual coding (Scott & Tribble, 2006; Baker, 2004). This technique is particularly valuable for identifying subtle differences in how externalities are conceptualized across different jurisdictions or policy domains. LDA helped in identifying latent topics within the corpus, using probabilistic models to group documents and terms based on patterns of co-occurrence (Blei et al., 2003; DiMaggio et al., 2013). This approach uncovers thematic structures that may not align with official policy categories, potentially revealing hidden priorities or neglected issues within the policy landscape.

The use of NVivo and Rapid Miner software facilitated the coding and analysis process, allowing for efficient management of the large corpus and enabling complex queries across the dataset. These computational tools enhance methodological capabilities by allowing for the systematic processing of large text collections that would be impractical to analyse manually (Hutchison et al., 2010; Woods et al., 2016). However, the methodology acknowledges that software functions as an analytical aid rather than a substitute for interpretive judgment, maintaining what Kuckartz (2014) describes as a "human-cantered approach" to qualitative data analysis that leverages computational efficiency while preserving hermeneutic sensitivity.

6.5 Findings and Synthesis

Extent of Sustainable Fiscal Policies in ASEAN

The analysis reveals varying degrees of commitment and implementation of sustainable fiscal policies across ASEAN countries. This section presents the findings according to the three categories of the policy intent dimension of our conceptual framework.

Political Will and Rhetoric:

All ASEAN Member States (AMS), except Lao PDR, engage in pro-green and pro-equity rhetoric at the global level. This is evidenced by statements in international forums and commitments to global initiatives such as the Sustainable Development Goals (SDGs). The rhetorical commitment to addressing externalities reflects growing recognition across the region that environmental degradation and socioeconomic inequality represent significant threats to long-term prosperity and stability (Koh & Robinson, 2002; OECD, 2018). However, as Bernstein (2001) and Hajer (2006) have observed in other contexts, rhetorical adoption of sustainability discourses does not necessarily translate into substantive policy change, raising questions about the depth of commitment beyond diplomatic positioning.

Indonesia stands out for its transparent reporting through Voluntary National Reviews (VNR). These reviews provide detailed accounts of Indonesia's progress towards the SDGs, including efforts to address inequality and climate change. Indonesia's approach aligns with what Gupta et al. (2014) term "informational governance," where transparency and public disclosure create mechanisms for accountability in environmental and social governance. The country's willingness to subject its policies to international scrutiny suggests a relatively high level of commitment to addressing externalities, though challenges remain in implementation consistency (Ardiansyah et al., 2021).

At the regional level, all AMS have committed to initiatives supporting sustainable fiscal outcomes. This is reflected in documents such as the ASEAN Socio-Cultural Community Blueprint 2025, which outlines regional goals for sustainable development. The blueprint represents a significant advancement in regional coordination on sustainability issues, establishing shared normative understandings that potentially influence national policy development (Elliott, 2012; Nesadurai, 2017). However, as Rüland (2018) notes, ASEAN's institutional preference for non-interference and consensus-based decision-making may limit the effectiveness of regional frameworks in driving national policy innovation.

Notable examples of rhetorical commitment include Singapore's "30 by 30" goal to produce 30% of its nutritional needs locally by 2030, addressing both food security and environmental sustainability, and Vietnam's National Green Growth Strategy, which articulates the country's commitment to sustainable economic development. These high-profile initiatives demonstrate attempts to frame environmental and social challenges as opportunities for innovation rather than constraints on growth, reflecting what Jacobs (2013) describes as "green growth discourse" that seeks to reconcile economic and environmental objectives. Nevertheless, the specific design and implementation of these initiatives require further examination to assess their potential effectiveness in addressing externalities.

Formal Policy Intent:

Indonesia leads in publicly committing to pro-green and pro-equity goals across all intervention levels. This is evident in its Medium-Term National Development Plan (RPJMN) 2020-2024, which explicitly incorporates sustainability and equity objectives. Indonesia's approach represents what Meadowcroft (2007) terms "purposive governance," where sustainability transitions are deliberately promoted through coordinated policy frameworks. The integration of environmental and social objectives into core development planning suggests a relatively advanced level of policy maturation, though implementation challenges remain significant given Indonesia's complex governance structure and resource constraints (McCarthy & Robinson, 2016).

Singapore, Thailand, Vietnam, and Malaysia show increasing commitment to sustainable fiscal policies. For instance, Singapore's Carbon Pricing Act of 2018 demonstrates a formal policy intent to address climate change through fiscal measures, while Thailand's 20-Year National Strategy (2018-2037) includes specific targets for reducing inequality and promoting environmental sustainability. These policies reflect growing recognition among middle and high-income ASEAN countries of the need to transition toward more sustainable development models, influenced by both domestic pressures and international norms (Rigg et al., 2017; Francesch-Huidobro, 2016). The increasing prominence of environmental and social objectives in formal policy documents suggests an evolution beyond mere rhetorical commitment, though questions remain about prioritization relative to traditional economic goals.

Other AMS lack clear documentary evidence of specific commitments or transparent reporting on sustainable fiscal policies. This pattern aligns with observations by Roberts and Parks (2007) regarding the relationship between economic development and environmental governance capacity, with less developed countries facing greater constraints in policy formulation and implementation. The absence of documented commitments may reflect not only lower prioritization of externality issues but also limited administrative capacity to develop and communicate coherent policy frameworks (Howlett & Ramesh, 2016).

Notable policy examples include Malaysia's Green Technology Financing Scheme, providing financial incentives for green technology investments, and Philippines' Conditional Cash Transfer Program, addressing inequality through targeted fiscal measures. These initiatives represent attempts to leverage fiscal instruments for specific environmental and social objectives, though their scope and scale vary considerably. The Green Technology Financing Scheme exemplifies what Grubb et al. (2014) term "innovation policy," using public finance to accelerate technological transitions, while the Conditional Cash Transfer Program reflects an approach to addressing inequality through direct income supplementation rather than structural economic reforms (Hayles & Prawiro, 2021).

Sustainable Policy Impact:

The impact of these policies varies across the region, with mixed evidence regarding their effectiveness in addressing externalities. Indonesia shows a downward trend in its Gini coefficient (from 0.41 in 2012 to 0.38 in 2019), indicating some success in addressing inequality. This improvement suggests that Indonesia's relatively comprehensive approach to sustainable development may be yielding distributional benefits, though causality is difficult to establish given multiple influencing factors (Dartanto, 2017; World Bank, 2020). The declining Gini coefficient represents a significant achievement in a context of economic growth, as many developing economies experience increasing inequality during rapid development periods.

Singapore, despite advanced policies, still has high per capita CO2 emissions (8.4 metric tons in 2018), highlighting the challenges in translating policy to impact. This apparent contradiction illustrates what Christoff (1996) and Dryzek (2013) term the "ecological modernization dilemma," where technological and policy innovation within existing economic structures may be insufficient to achieve absolute reductions in environmental impacts. Singapore's experience suggests that even well-designed fiscal policies may face limitations in addressing deeply embedded patterns of resource consumption without more fundamental structural changes (Hamilton, 2016).

Thailand has shown moderate success, with stable CO2 emissions (3.7 metric tons per capita in 2018) and a decreasing Gini coefficient. This relatively balanced performance suggests possible synergies between environmental and social policy objectives, aligning with arguments by Boyce (2008) and Islam (2015) regarding potential complementarities between equity and sustainability. Thailand's experience provides a potentially instructive model for other middle-income ASEAN countries seeking to manage externalities while maintaining economic development, though contextual factors limit direct transferability (Marks, 2011; Baker & Phongpaichit, 2014).

Multilateral and Regional Policy Coordination

Evidence suggests a growing trend towards regional coordination, but with varying levels of engagement. This trend reflects broader developments in environmental and social governance, where the transboundary nature of externalities necessitates collaborative approaches beyond individual national jurisdictions (Biermann et al., 2009; Jordan et al., 2018). However, the effectiveness of regional coordination mechanisms appears constrained by institutional limitations and divergent national priorities, creating what Young (2011) describes as an "implementation gap" between formal commitments and practical outcomes.

ASEAN-wide initiatives

The ASEAN Socio-Cultural Community Blueprint 2025 outlines regional goals for sustainable development, including measures to address climate change and reduce inequality. This document represents a significant advancement in regional norm development around sustainability issues, potentially creating what Finnemore and Sikkink (1998) term a "norm cascade" effect on national policies. However, the blueprint's broad scope and emphasis on national sovereignty in implementation may limit its direct impact on specific policy innovations (Katsumata, 2003; Stubbs, 2008). The ASEAN Agreement on Disaster Management and Emergency Response (AADMER), while primarily focused on disaster response, includes provisions for climate change adaptation. This agreement demonstrates connections between immediate disaster management concerns and longer-term climate resilience objectives, reflecting growing recognition of the relationship between extreme weather events and climate change (Petz, 2014; Rumbach & Foley, 2014). However, the agreement's emphasis on response rather than prevention may limit its effectiveness in addressing underlying climate change drivers.

Bilateral cooperation

Singapore-Indonesia collaboration on carbon pricing mechanisms demonstrates cross-border efforts to address climate change, while Thailand-Vietnam cooperation on sustainable agriculture practices addresses both environmental and economic concerns. These bilateral initiatives reflect what Balsiger and VanDeveer (2012) term "regional environmental politics," where geographical proximity and shared ecological contexts create incentives for cooperation beyond formal multilateral frameworks. Such bilateral arrangements may offer greater flexibility and responsiveness than region-wide initiatives, though their limited scope restricts potential impact on broader externality challenges (Jetschke & Murray, 2012).

Global commitments

All AMS have ratified the Paris Agreement, indicating engagement in global climate policy coordination. This universal participation reflects the mainstreaming of climate change as a policy concern across development contexts, though significant variation exists in implementation approaches and ambition levels (Falkner, 2016; Chan et al., 2018). The Paris Agreement's hybrid architecture, combining binding procedural commitments with nationally determined substantive contributions, accommodates this diversity while establishing minimum expectations for policy development.

Participation in global forums such as the High-Level Political Forum on Sustainable Development, where AMS report on their progress towards the SDGs, further demonstrates engagement with international sustainability governance. These reporting mechanisms create potential for what Keohane and Victor (2011) describe as "orchestration effects," where international institutions influence domestic policy development through information sharing, peer pressure, and reputation concerns. However, the voluntary nature of these reporting processes may limit their impact on domestic policy priorities without complementary incentives or enforcement mechanisms.

Despite these coordination efforts, the analysis reveals a gap between regional commitments and national implementation, with limited evidence of harmonized policies across AMS. This is particularly evident in areas such as carbon pricing and social protection policies, where

approaches vary significantly across the region. This implementation gap reflects what Acharya (2004) terms "localization processes," where international norms are selectively adapted to fit domestic institutional contexts and political constraints. The resulting policy heterogeneity complicates regional coordination efforts but may also allow for context-appropriate innovations that reflect varying national circumstances (Morrison, 2017).

Internalization of Mitigation Measures

The study found limited evidence of systematic internalization of mitigation measures in fiscal policies:

Discretionary approach:

Most AMS rely on discretionary policy add-ons rather than integrated approaches to address climate change and inequality. For example, many countries have separate environmental protection agencies or social welfare departments, but these often operate in silos rather than as part of an integrated fiscal strategy. This institutional fragmentation reflects what Meadowcroft (2007) terms the "administrative rationality" approach to environmental governance, where externalities are addressed through specialized agencies rather than mainstreamed across policy domains. While such arrangements may enhance technical expertise in specific areas, they risk marginalizing externality concerns in broader economic decision-making (Mickwitz et al., 2009).

Sector-specific policies:

There is evidence of sector-specific policies, particularly in energy and agriculture sectors. For instance, Vietnam's renewable energy feed-in tariffs and Indonesia's palm oil sustainability certifications target environmental externalities in particular economic sectors. However, these policies often lack integration with broader fiscal frameworks. This sectoral approach reflects the influence of what Hajer (1995) terms "discourse coalitions" around specific issues, where concentrated interests and established policy communities shape interventions in particular domains. While sectoral policies may achieve targeted improvements, their limited scope restricts potential for transformative change across economic systems (Kern & Howlett, 2009).

Variation across countries

More advanced economies like Singapore show greater integration of sustainability concerns in fiscal policy. Singapore's carbon tax, for instance, is designed to impact broader economic decision-making by creating economy-wide price signals regarding carbon emissions. This approach aligns with what Jacobs (2012) terms "green Keynesianism," where fiscal instruments are deliberately deployed to reshape market incentives toward sustainability objectives. Singapore's relatively advanced policy integration likely reflects both higher administrative capacity and economic structure, with fewer political constraints from carbon-intensive industries than some neighbouring countries (Neo, 2007).

Less developed AMS tend to have more fragmented approaches, often relying on international aid or specific projects rather than comprehensive fiscal strategies. This pattern reflects what Roberts and Parks (2007) term the "capacity-constraints thesis" regarding environmental

governance in developing countries, where limited administrative resources and competing development priorities create barriers to policy integration. The resulting project-based approach may achieve localized improvements but risks sustainability and fragmentation challenges in the absence of stronger institutional frameworks (Howlett & Ramesh, 2016).

Country-Specific Findings

Indonesia

Indonesia leads in policy commitments and transparent reporting through VNRs, with evidence of efforts to restrict deforestation and improve pollution controls. This relatively advanced policy position reflects Indonesia's growing international prominence and domestic recognition of sustainability challenges, particularly regarding forest management and climate change (Resosudarmo, 2005; Edwards & Lawrence, 2022). The country's downward trend in GINI coefficient (from 0.41 in 2012 to 0.38 in 2019) suggests some success in addressing distributional concerns alongside environmental objectives, though significant inequality persists.

Challenges remain in translating national policies to local implementation, reflecting Indonesia's complex multi-level governance structure and historical tensions between central and regional authorities (Erb et al., 2005; McCarthy, 2004). This implementation gap illustrates what Pressman and Wildavsky (1984) identified as the "complexity of joint action" challenge in policy implementation, where multiple decision points create opportunities for policy distortion or obstruction. Indonesia's experience highlights the importance of vertical policy coherence in addressing externalities, particularly in decentralized governance contexts.

Singapore

Singapore demonstrates advanced integration of sustainability in fiscal policy, exemplified by its carbon tax implemented in 2019. This policy sophistication reflects Singapore's high administrative capacity and technocratic governance approach, which facilitates policy innovation and implementation (Neo, 2007; Francesch-Huidobro, 2016). However, Singapore's high per capita CO2 emissions (8.4 metric tons in 2018) despite policy efforts illustrates the challenges in achieving absolute environmental improvements within existing economic structures.

The country's strong focus on technology and innovation in addressing sustainability challenges reflects what Hajer (1995) terms "ecological modernization discourse," which emphasizes technological solutions to environmental problems within market frameworks. While this approach leverages Singapore's economic strengths, it may face limitations in addressing consumption-based emissions and deeper structural sustainability challenges (Christoff, 1996; Hamilton, 2016).

Thailand

Thailand demonstrates commitment to renewable energy through its Alternative Energy Development Plan, with clear downward trends in inequality measures and moderate CO2 emissions (3.7 metric tons per capita in 2018). This relatively balanced performance suggests

potential synergies between environmental and social objectives, though challenges remain in balancing economic growth with environmental protection (Marks, 2011; Baker & Phongpaichit, 2014).

Thailand's experience illustrates what Grin et al. (2010) term "sustainability transitions," where established development pathways gradually shift toward more sustainable configurations through policy interventions and technological change. The country's middle-income status and relatively diversified economy may provide flexibility for such transitions, though political instability has periodically disrupted policy continuity (Rigg, 2016).

Vietnam

Vietnam shows evidence of regional policy alignment, exemplified by its Green Growth Strategy, though with slight increases in inequality measures and low but rising CO2 emissions. This pattern reflects Vietnam's rapid economic development trajectory, with associated environmental pressures and distributional challenges (Beresford, 2008; Hansen, 2016). The country's adaptation of regional sustainability frameworks to national development priorities illustrates what Acharya (2004) terms "norm localization," where international concepts are reconfigured to fit domestic contexts.

Rapid economic growth presents challenges for sustainable development, creating tensions between immediate development imperatives and longer-term sustainability concerns. This dilemma reflects what Meadowcroft (2011) identifies as the "governance of sustainability transitions" challenge, where existing economic structures and interests may resist transformative change despite policy commitments.

Philippines

The Philippines demonstrates strong social protection policies, exemplified by its Conditional Cash Transfer Program, with high inequality but declining trends. This emphasis on social protection reflects both domestic political imperatives and international influence from multilateral development institutions (Hayles & Prawiro, 2021; Reyes et al., 2017). The country's vulnerability to climate change has driven adaptation policies, creating potential linkages between climate resilience and social welfare objectives.

Challenges in fiscal resource allocation for sustainable development reflect broader constraints in Philippine governance, including limited revenue generation capacity and competing development priorities (Hutchcroft, 2008; Sidel, 2014). These constraints illustrate the importance of fiscal capacity in addressing externalities, particularly in contexts where immediate socioeconomic needs create pressure for short-term policy priorities.

Malaysia

Malaysia demonstrates advanced environmental policies, exemplified by its National Policy on Climate Change, with moderate levels of inequality and emissions. The country's focus on green technology and sustainable finance reflects attempts to leverage existing industrial capacity for sustainability objectives, aligning with what Grubb et al. (2014) term "innovation policy" approaches to environmental governance. However, challenges in translating national

policies to state-level implementation reflect Malaysia's federal structure and associated coordination challenges (Hezri & Hasan, 2006; Robertson, 2012).

Malaysia's experience illustrates the importance of horizontal policy coherence in addressing externalities, particularly in federative systems where authority is divided across governance levels. This coordination challenge reflects broader tensions in sustainable development governance, where institutional fragmentation may undermine policy effectiveness despite ambitious formal commitments (Peters, 2015).

Other AMS (Cambodia, Laos, Myanmar, Brunei)

These countries show limited evidence of comprehensive sustainable fiscal policies, with varying levels of engagement in regional initiatives. While generally demonstrating lower CO2 emissions, they face persistent inequality challenges and significant capacity constraints in policy development and implementation. This pattern reflects what Roberts and Parks (2007) term "developmental constraints" in environmental governance, where limited resources and competing priorities restrict policy attention to externality issues.

The experience of these countries highlights the relationship between economic development and governance capacity, with implications for regional policy coordination and support mechanisms. Their situation suggests the importance of differentiated approaches to regional sustainability governance that acknowledge varying national circumstances while promoting shared objectives (Kanie et al., 2018; Sachs et al., 2019).

6.6 Discussion

The findings indicate that while ASEAN countries have made progress in recognizing the importance of sustainable fiscal policies, significant challenges remain in implementation. The uneven development of sustainable fiscal policies across the region reflects broader patterns in environmental and social governance, where formal policy adoption often precedes effective implementation (Meadowcroft, 2009; Newell, 2008). This section explores key challenges that emerge from the analysis and their implications for addressing externalities in the ASEAN context.

Policy-Practice Gap

There is a noticeable discrepancy between policy rhetoric and actual implementation across most AMS. This gap is particularly evident in less developed members of ASEAN, where resource constraints and competing priorities often hinder the full implementation of sustainable fiscal policies. This implementation deficit reflects what Dimitrov (2005) and Pressman and Wildavsky (1984) identify as common challenges in policy execution, where complex causal chains between policy formulation and outcomes create multiple opportunities for distortion or derailment. In the ASEAN context, this gap is often exacerbated by limited institutional capacity, fragmented governance structures, and competing development imperatives (Jones, 2016; Nesadurai, 2017).

Vietnam provides a notable example of this policy-practice gap. While the country has developed a comprehensive Green Growth Strategy with ambitious objectives for sustainable

development, the implementation of specific fiscal measures to support this strategy has been limited. This disconnect between strategic vision and operational reality reflects what Brunner (1996) terms the "problem of integration" in environmental policy, where conceptual frameworks often struggle to translate into practical interventions. Vietnam's experience illustrates how even well-designed policies may face implementation challenges without adequate financial resources, technical capacity, and political commitment (Beresford, 2008; Hansen, 2016). The policy-practice gap also manifests in what Howlett and Rayner (2006) describe as "policy layering," where new sustainability objectives are added to existing policy frameworks without substantive integration or reconciliation of potential conflicts. This approach may create the appearance of comprehensive policy coverage while leaving fundamental contradictions unresolved, such as between fossil fuel subsidies and climate change mitigation goals. Such layering has been observed across multiple ASEAN countries, where sustainability initiatives often exist alongside policies that incentivize resource-intensive development patterns (Giessen, 2011; Rigg, 2012).

Regional Variation

More economically advanced AMS (e.g., Singapore, Indonesia) show greater progress in policy development and implementation compared to less developed members. This variation reflects differences in fiscal capacity, technical expertise, and political prioritization of sustainability issues. The pattern aligns with observations by Roberts and Parks (2007) and Dasgupta et al. (2015) regarding the relationship between economic development and environmental governance capacity, where higher income levels often correlate with more sophisticated policy frameworks and implementation mechanisms.

Singapore's implementation of a carbon tax demonstrates its capacity for innovative fiscal policy, while Cambodia's sustainable development efforts are more focused on basic infrastructure and poverty reduction. This contrast reflects not only different stages of economic development but also varying conceptualizations of sustainability priorities appropriate to national circumstances. Singapore's approach exemplifies what Dryzek (2013) terms "administrative rationalism," where technical expertise and regulatory capacity enable sophisticated policy interventions. In contrast, Cambodia's focus on basic needs reflects what Martínez-Alier (2002) describes as the "environmentalism of the poor," where immediate socioeconomic concerns necessarily take precedence over longer-term environmental considerations.

These regional variations create challenges for coordinated policy responses but also opportunities for context-appropriate innovation and learning across development contexts. The diversity of approaches within ASEAN represents what Ostrom (2010) identifies as "polycentric governance," where multiple centres of decision-making develop varied responses to shared challenges. This diversity may enhance adaptive capacity and experimentation, though it complicates efforts to establish region-wide standards or harmonized approaches (Morrison, 2017; Zelli & van Asselt, 2013).

Sectoral Approach

Many AMS adopt sector-specific policies rather than comprehensive fiscal frameworks for addressing climate change and inequality. This approach, while potentially easier to implement, may lead to policy inconsistencies and missed opportunities for synergies. The

sectoral pattern reflects institutional realities in most governance systems, where ministries and agencies often operate within defined domains with limited horizontal coordination (Peters, 2018; Trein et al., 2019). While this specialization enhances technical expertise in specific areas, it poses challenges for addressing cross-cutting issues like sustainability that transcend traditional sectoral boundaries.

Thailand's strong policies in renewable energy contrast with less developed policies in sustainable transportation, highlighting the challenges of a sectoral approach. This imbalance reflects what Meadowcroft (2009) terms "sectoral selectivity" in sustainability transitions, where progress occurs unevenly across economic domains due to varying political conditions, stakeholder interests, and institutional arrangements. The resulting policy landscape may achieve progress in specific sectors while maintaining unsustainable practices in others, limiting overall effectiveness in addressing externalities (Kern & Howlett, 2009; Loorbach, 2010).

The sectoral approach also complicates policy coherence and integration, creating potential for what Howlett and Rayner (2007) describe as "layering," where new sustainability objectives are added to existing policy frameworks without substantive reconciliation of potential conflicts. This challenge is particularly evident in domains like energy, where renewable energy incentives may coexist with fossil fuel subsidies, creating contradictory signals for market actors and undermining overall policy effectiveness (Sovacool, 2010; Tanner & Allouche, 2011).

Data Transparency

Limited availability of consistent, comparable data across AMS hinders accurate assessment of policy effectiveness. This challenge is particularly acute in areas such as inequality measurement and environmental impact assessment. The data deficit reflects broader challenges in sustainability governance, where information asymmetries and measurement complexities create obstacles for evidence-based policy development and evaluation (Hák et al., 2016; Lehtonen, 2015). In the ASEAN context, varying statistical capacities and reporting protocols further complicate efforts to establish comparable metrics across countries.

The lack of standardized reporting mechanisms across ASEAN makes it difficult to compare the effectiveness of different national approaches to sustainable fiscal policy. This measurement challenge reflects what Meadowcroft (2011) terms the "governance of measurement" problem in sustainability transitions, where defining and quantifying progress requires not only technical capacity but also normative judgments about priorities and trade-offs. Without robust, comparable data, policymakers face difficulties in identifying best practices, learning from peers, and holding governments accountable for commitments (Biermann et al., 2017; Gupta et al., 2012).

Data limitations also create challenges for internalizing externalities in fiscal policy, as effective pricing mechanisms require reliable information about environmental impacts and distributional effects. This information deficit represents what Stiglitz (2000) identifies as a market failure in itself, where insufficient data creates barriers to efficient resource allocation and effective policy intervention. Addressing this challenge requires not only enhanced statistical capacity but also institutional arrangements for data sharing and standardization across jurisdictions (Haas et al., 2018; Mol, 2008).

Multilateral Coordination: Opportunities and Limitations

The analysis reveals both opportunities and limitations in ASEAN's approach to multilateral policy coordination. This mixed picture reflects broader tensions in regional environmental governance, where shared challenges create incentives for cooperation while sovereign interests and institutional constraints limit integration depth (Balsiger & VanDeveer, 2012; Jordan et al., 2018). The ASEAN experience highlights both the potential and limitations of regional approaches to addressing transboundary externalities.

Opportunities

Existing regional frameworks, such as the ASEAN Socio-Cultural Community Blueprint, provide a foundation for enhanced cooperation. These frameworks establish shared normative understandings and procedural routines that reduce transaction costs for collaborative governance (Acharya, 2009; Jetschke & Murray, 2012). The Blueprint's comprehensive approach to sustainable development, encompassing environmental, social, and economic dimensions, creates potential entry points for addressing various externalities through coordinated regional actions.

Shared challenges across AMS create incentives for collaborative solutions, particularly in areas like transboundary pollution and regional economic integration. These common concerns reflect what Haas (1992) terms "epistemic communities" around specific issues, potentially facilitating knowledge exchange and policy coordination. The regional context of environmental challenges like air pollution, water management, and climate vulnerability creates natural constituencies for cooperation that transcends national boundaries (Elliott, 2012; Nesadurai, 2017).

The region also presents potential for knowledge sharing and capacity building, leveraging the experiences of more advanced AMS to support regional development. This opportunity reflects what Stone (2004) identifies as "policy transfer" processes, where successful approaches in one jurisdiction inform policy development in others. Singapore's relatively advanced environmental governance systems, for instance, potentially offer lessons for other ASEAN members, though contextual differences necessitate adaptation rather than simple replication (Francesch-Huidobro, 2016; Neo, 2007).

Observations

Varying levels of economic development complicate unified policy approaches, as countries face different priorities and constraints. This heterogeneity creates what Kanie et al. (2018) term "differentiation challenges" in sustainability governance, where universal frameworks must accommodate diverse national circumstances and capabilities. ASEAN's significant development disparities, from high-income Singapore to lower-income Myanmar and Cambodia, create fundamentally different starting points for sustainability transitions (Rigg, 2012; Sovacool, 2010).

National sovereignty concerns may impede deeper policy integration, particularly in sensitive areas like fiscal policy. This limitation reflects ASEAN's institutional design principles, particularly the "ASEAN Way" of non-interference and consensus-based decision-making (Acharya, 2009; Katsumata, 2003). While this approach has facilitated cooperation among diverse political systems, it creates significant constraints on developing binding regional

frameworks that might limit national policy autonomy, particularly in economically sensitive domains.

Limited enforcement mechanisms for regional agreements reduce their effectiveness in driving national policy changes. This constraint reflects what Abbott and Snidal (2000) describe as "soft law" approaches to international governance, where commitments lack formal sanctions for non-compliance. ASEAN's institutional preference for voluntary cooperation rather than binding obligations creates flexibility but potentially undermines accountability for implementation of regional frameworks (Rüland, 2018; Yoshimatsu, 2006).

The ASEAN Agreement on Transboundary Haze Pollution illustrates both the potential and challenges of regional coordination. While it provides a framework for cooperation, implementation has been hindered by national interests and capacity constraints. This case exemplifies what Young (2011) terms the "problem of fit" in environmental governance, where institutional arrangements may not align effectively with the scale and complexity of the environmental challenges they address. Despite formal commitments to address transboundary pollution, implementation has been undermined by domestic political economies of land use and limited institutional capacity for monitoring and enforcement (Varkkey, 2016; Cotton, 2018).

Internalisation of Mitigation Measures: A Work in Progress

The study finds that the internalization of mitigation measures in fiscal policies is still in its early stages. This developmental pattern reflects broader challenges in environmental and social policy integration, where externality considerations often remain peripheral to core economic decision-making (Jordan & Lenschow, 2010; Lafferty & Hovden, 2003). The findings highlight both progress and persistent challenges in embedding sustainability considerations within fiscal frameworks.

Most AMS rely on discretionary measures rather than integrated policy frameworks. This approach often results in a patchwork of policies that may not effectively address the systemic nature of climate change and inequality challenges. The pattern aligns with observations by Meadowcroft (2007) and Hajer (1995) regarding the challenges of transitioning from isolated environmental policies to more integrated sustainability governance. Discretionary approaches may create the appearance of policy action while maintaining fundamental inconsistencies between economic incentives and sustainability objectives.

There is limited evidence of systematic approaches to internalizing externalities in fiscal policy design. Few countries have comprehensive mechanisms for pricing environmental externalities or addressing the distributional impacts of economic policies. This gap reflects what Barbier (2011) and Stiglitz et al. (2010) identify as persistent market failures in environmental and social domains, where private costs and benefits continue to diverge significantly from social ones despite decades of policy development. The limited adoption of mechanisms like carbon pricing, environmental taxes, or comprehensive social protection systems suggests that market-based instruments remain underutilized in addressing externalities.

Advanced economies like Singapore show more progress in this area, suggesting a potential model for other AMS. Singapore's carbon tax, for instance, demonstrates an attempt to internalize environmental costs into broader economic decision-making. This approach aligns with what Pearce and Turner (1990) and Tietenberg (1990) identify as efficient instruments for

addressing environmental externalities through price signals that influence market behaviour. Singapore's relatively advanced policy integration likely reflects both technical capacity and political feasibility conditions that may not be immediately replicable in other ASEAN contexts (Neo, 2007; Francesch-Huidobro, 2016).

Indonesia's efforts to incorporate environmental considerations into its national budgeting process represent a step towards internalizing sustainability concerns in fiscal policy. This approach reflects what Nilsson and Persson (2017) and Runhaar et al. (2014) term "environmental policy integration," where sustainability objectives are mainstreamed into core governance processes rather than addressed through separate policy tracks. Indonesia's experience suggests potential pathways for other developing economies to enhance policy coherence despite capacity constraints and competing priorities.

A persistent challenge across the region is the difficulty of quantifying and incorporating long-term environmental and social costs into short-term fiscal decision-making. This challenge reflects what Jacobs (2011) and Meadowcroft (2011) identify as fundamental tensions between political timeframes and sustainability transitions, where immediate economic and political imperatives often overshadow longer-term considerations. Addressing this challenge requires not only technical capacity for valuing externalities but also institutional innovations that create constituencies for long-term thinking within governance systems (Boston, 2017; Dryzek, 2016).

6.7 Implications for Policy and Practice

Based on the findings, several implications for policy and practice can be drawn for ASEAN Member States seeking to address inequality and climate change through fiscal measures. These implications reflect both the contextual realities of the ASEAN region and broader principles of effective sustainability governance identified in scholarly literature.

Need for Integrated Policy Frameworks

AMS should work towards developing more integrated fiscal policy frameworks that simultaneously address economic, social, and environmental objectives. This could involve creating cross-ministerial taskforces or integrated budgeting processes. The current sectoral and discretionary approaches to sustainable fiscal policy limit effectiveness by creating potential inconsistencies and missing opportunities for synergies across policy domains (Jordan & Lenschow, 2010; Nilsson & Persson, 2017). Integrated approaches would help address what Meadowcroft (2007) identifies as the "problem of coordination" in sustainability governance, where fragmented institutional arrangements undermine policy coherence and effectiveness.

Practical implementations could include environmental fiscal reform initiatives that simultaneously address climate objectives and distributional concerns, such as carbon pricing with progressive revenue recycling (Bowen, 2015; Metcalf, 2019). Indonesia's early efforts to incorporate environmental considerations into budgeting processes offer a potential regional model that could be adapted and expanded. Such integration requires not only technical tools like sustainability impact assessments but also institutional innovations that create spaces for cross-sectoral coordination and holistic policy design (Runhaar et al., 2014; Hogl et al., 2016).

Strengthening Regional Mechanisms

ASEAN could benefit from strengthening its mechanisms for policy coordination and implementation. This might include developing more robust monitoring and enforcement mechanisms for regional agreements. The current implementation gap between regional commitments and national action undermines the effectiveness of collaborative governance efforts, particularly for addressing transboundary externalities like air pollution and shared watershed management (Elliott, 2012; Varkkey, 2016). Enhanced regional mechanisms would support what Biermann et al. (2009) term "architecture-based governance," where institutional design features facilitate more effective collective action.

While respecting ASEAN's traditional emphasis on national sovereignty, incremental institutional innovations could enhance implementation effectiveness without requiring fundamental organizational restructuring. These might include expanded peer review processes, improved information sharing platforms, and more systematic follow-up procedures for regional agreements (Jetschke & Murray, 2012; Nesadurai, 2017). The experience with the ASEAN Agreement on Transboundary Haze Pollution highlights both the potential and limitations of current approaches, suggesting the need for more robust monitoring and compliance mechanisms that maintain flexibility while enhancing accountability.

Capacity Building Initiatives

There is a clear need for capacity building initiatives, particularly for less developed AMS. This could involve knowledge sharing programs, technical assistance, and training in areas such as environmental fiscal reform and inequality impact assessment. The significant capacity disparities across ASEAN create challenges for implementing sophisticated policy frameworks, particularly in less developed member states where technical expertise, fiscal resources, and institutional infrastructure may be limited (Roberts & Parks, 2007; Andrews et al., 2013). Addressing these disparities is essential for enhancing regional policy coordination and enabling all member states to participate effectively in sustainability transitions.

Capacity building efforts should focus not only on technical skills but also on institutional development that enhances policy implementation capabilities. This approach aligns with Grindle's (2004) concept of "good enough governance," which emphasizes sequential improvements in governance capacity rather than attempting comprehensive transformations that exceed current resources. Regional knowledge networks, technical assistance programs, and educational initiatives could facilitate learning processes that accelerate capacity development across different development contexts (Keohane & Victor, 2011; Stone, 2004).

Improving Data Collection and Transparency

Efforts should be made to improve the collection and standardization of data related to sustainable development across ASEAN. This could facilitate better policy evaluation and cross-country comparisons. The current data limitations create significant obstacles for evidence-based policy development, implementation monitoring, and outcome assessment (Hák et al., 2016; Lehtonen, 2015). Enhanced data availability would support what Gupta et

al. (2014) term "informational governance," where transparency and knowledge sharing create mechanisms for accountability and learning.

Standardized metrics and reporting protocols for key sustainability indicators would enhance comparability across jurisdictions while respecting varying national contexts. These could include not only environmental and economic indicators but also metrics related to distributional impacts and policy implementation processes (Stiglitz et al., 2018; Häyhä et al., 2016). Collaborative initiatives to enhance statistical capacity and data infrastructure across the region would support both national policy development and regional coordination efforts while potentially reducing reporting burdens through harmonized approaches.

Leveraging Advanced Economies' Experiences

ASEAN could create more formal mechanisms for sharing best practices from more advanced economies like Singapore, adapting these experiences to the contexts of other member states. The varying levels of policy development across the region create opportunities for learning from more advanced approaches while avoiding potential pitfalls (Dolowitz & Marsh, 2000; Stone, 2004). Singapore's relatively sophisticated environmental governance systems and Indonesia's progress in policy transparency offer potential models that could inform developments elsewhere, though adaptation to different contexts remains essential.

These knowledge transfer mechanisms should emphasize contextual adaptation rather than uncritical replication, recognizing that what works in one national context may require significant modification for effectiveness elsewhere. This approach aligns with Rose's (1993) concept of "lesson-drawing," where policy learning involves careful consideration of contextual factors that influence transferability. Regional platforms for sharing experiences, policy dialogues, and collaborative demonstration projects could facilitate such contextualized learning processes while building regional knowledge networks.

Enhancing Stakeholder Engagement

Policymakers should seek to enhance engagement with a wide range of stakeholders, including civil society, the private sector, and local communities, in the design and implementation of sustainable fiscal policies. The current top-down approach to policy development in many ASEAN countries may limit effectiveness by failing to incorporate diverse perspectives and expertise while potentially undermining legitimacy and implementation support (Reed, 2008; Newig & Fritsch, 2009). More inclusive governance processes would enhance what Dryzek (2010) terms the "deliberative capacity" of policy systems to address complex sustainability challenges.

Practical approaches to enhanced engagement could include formal consultative mechanisms, collaborative governance arrangements, and participatory policy development processes that incorporate diverse stakeholder perspectives (Ansell & Gash, 2008; Fung, 2015). Such approaches would need to be adapted to varying political contexts across ASEAN, recognizing that participation mechanisms must align with broader governance systems to be effective. The potential benefits include not only enhanced policy design but also greater implementation support and legitimacy, particularly for policies that involve significant change from established practices.

Balancing Short-term and Long-term Objectives

AMS need to develop strategies for balancing short-term economic objectives with long-term sustainability goals. This might involve developing long-term fiscal planning frameworks that incorporate sustainability metrics. The current emphasis on immediate economic concerns in many ASEAN countries creates challenges for addressing externalities with long-term impacts, particularly climate change (Jacobs, 2011; Boston, 2017). More balanced approaches would help address what Meadowcroft (2011) identifies as fundamental tensions between political timeframes and sustainability transitions.

Institutional innovations that create space for longer-term considerations in fiscal policy development could include independent advisory bodies, long-term budgeting frameworks, and sustainability impact assessments for major policy decisions (Dryzek, 2016; Nilsson & Persson, 2017). These mechanisms would help illuminate potential trade-offs and synergies between short and long-term objectives while creating constituencies for intergenerational considerations within governance systems. Singapore's relatively advanced approach to long-term planning offers potential regional insights, though adaptation to different political and institutional contexts remains essential.

These implications collectively suggest pathways for enhancing the effectiveness of sustainable fiscal policies across ASEAN, recognizing both the shared challenges facing the region and the diverse contexts of individual member states. By strengthening policy integration, regional coordination, institutional capacity, data systems, knowledge sharing, stakeholder engagement, and temporal balance, ASEAN countries could make significant progress in addressing the twin externalities of climate change and inequality while maintaining economic development trajectories. While implementation would necessarily vary across national contexts, these broad directions offer potential frameworks for enhancing sustainability governance throughout the region.

6.8 Conclusion

This study set out to examine the extent of sustainable fiscal policies and programs in ASEAN Member States and the level of multilateral policy coordination in addressing inequality and climate change issues. The findings reveal a complex landscape of policy development and implementation across the region, characterized by significant variation in commitment levels, implementation capacities, and policy effectiveness.

The analysis demonstrates that ASEAN has made notable progress in establishing normative frameworks for addressing externalities at both regional and national levels. However, translating these frameworks into effective implementation remains a persistent challenge that varies considerably across member states. This implementation gap reflects broader patterns in sustainability governance, where the complexity of addressing systemic externalities often exceeds existing institutional capacities and political will (Biermann et al., 2017; Newell & Bulkeley, 2017). The ASEAN experience thus provides valuable insights into the challenges of managing sustainability transitions in diverse development contexts.

Recognition without Full Implementation

ASEAN countries have recognized the urgency of addressing climate change and inequality, but the translation of this recognition into effective policies varies significantly across the region. While high-level commitments are common, the depth and breadth of policy implementation differ substantially among AMS. This pattern reflects what Bernstein and Cashore (2012) and Dimitrov (2016) identify as the distinction between symbolic and substantive policy adoption, where formal commitments may serve diplomatic or legitimacy purposes without necessarily driving transformative change. The varying implementation levels across ASEAN illustrate how economic conditions, governance capacity, and political priorities shape the translation of shared normative commitments into operational reality.

This implementation gap creates substantial challenges for addressing externalities effectively, as rhetorical commitments without corresponding action may create an illusion of progress while maintaining unsustainable development patterns. As Hajer (2006) and Davidson (2014) observe, this phenomenon risks undermining the credibility of sustainability initiatives and potentially creating cynicism about governance responses to environmental and social challenges. Bridging this gap requires not only enhanced implementation capacity but also stronger accountability mechanisms that connect commitments to measurable outcomes (Jordan et al., 2018; Meadowcroft, 2011).

Emerging Regional Coordination

There is a growing trend towards regional policy coordination, particularly through ASEAN frameworks. However, significant gaps remain between regional commitments and national implementation. The effectiveness of regional initiatives is often limited by national constraints and varying priorities. This mixed picture reflects broader tensions in regional environmental governance, where shared challenges create incentives for cooperation while sovereign interests and institutional constraints limit integration depth (Balsiger & VanDeveer, 2012; Elliott, 2012).

ASEAN's institutional design, particularly its emphasis on national sovereignty and consensus-based decision-making, creates both opportunities and limitations for addressing transboundary externalities. While this approach accommodates diverse political systems and development stages, it may also constrain the development of binding mechanisms that could enhance policy effectiveness across the region. This institutional characteristic aligns with what Acharya (2009) and Katsumata (2003) identify as the "ASEAN Way," which prioritizes flexibility and national autonomy over deeper integration.

Early Stages of Policy Internalization

The internalization of mitigation measures in fiscal policies is still in its nascent stages across most of ASEAN. Countries largely rely on discretionary add-ons rather than integrated policy frameworks, indicating a need for more comprehensive approaches to sustainable fiscal policy. This pattern reflects what Jordan and Lenschow (2010) and Runhaar et al. (2014) identify as persistent challenges in environmental policy integration, where sustainability considerations often remain peripheral to core economic decision-making despite formal commitments to integration.

The limited internalization of externalities in fiscal frameworks suggests that market failures in environmental and social domains persist despite policy development efforts. Few ASEAN countries have implemented comprehensive mechanisms for pricing environmental

externalities or addressing the distributional impacts of economic policies, limiting the effectiveness of market signals in driving more sustainable behaviour (Barbier, 2011; Helm, 2020). This gap highlights the need for more systematic approaches to policy design that incorporate externality considerations into core economic governance rather than treating them as separate domains.

Leadership of Advanced Economies

More economically advanced AMS, particularly Singapore and to some extent Indonesia, are leading in policy development and implementation. Their experiences offer potential models for other member states, although adaptation to different national contexts remains a challenge. This pattern aligns with observations by Roberts and Parks (2007) and Dasgupta et al. (2015) regarding the relationship between economic development and environmental governance capacity, where higher income levels often correlate with more sophisticated policy frameworks and implementation mechanisms.

The leadership of advanced economies creates opportunities for knowledge transfer and policy learning across development contexts, potentially accelerating sustainability transitions in less developed member states. However, as Stone (2004) and Dolowitz and Marsh (2000) caution, effective policy transfer requires careful adaptation to local conditions rather than uncritical replication of models from different economic and political contexts. The diversity of ASEAN member states necessitates context-sensitive approaches to policy development that acknowledge varying constraints and opportunities across the region.

Data and Transparency Challenges

The effectiveness of current policies in achieving sustainable outcomes remains unclear, highlighting the need for improved data collection and transparency across the region. Standardized metrics and reporting mechanisms could significantly enhance policy evaluation and regional comparisons. This data deficit reflects broader challenges in sustainability governance, where information asymmetries and measurement complexities create obstacles for evidence-based policy development and evaluation (Hák et al., 2016; Lehtonen, 2015).

Addressing these challenges requires not only enhanced statistical capacity but also institutional arrangements for data sharing and standardization across jurisdictions. Such improvements would support what Haas et al. (2018) and Gupta et al. (2014) term "informational governance," where transparency and knowledge-sharing create accountability mechanisms and facilitate learning processes. Enhanced data availability would also support more accurate internalization of externalities in fiscal policy, as effective pricing mechanisms require reliable information about environmental impacts and distributional effects.

Sectoral Disparities

Progress in sustainable fiscal policy is uneven across different sectors. While some areas, such as renewable energy, have seen significant policy development, others like sustainable transport or biodiversity conservation often lag behind. This pattern reflects what Meadowcroft (2009) terms "sectoral selectivity" in sustainability transitions, where progress occurs unevenly across economic domains due to varying political conditions, stakeholder interests, and institutional arrangements.

These disparities create challenges for policy coherence and integration, potentially undermining overall effectiveness in addressing externalities. As Kern and Howlett (2009) and Loorbach (2010) observe, sectoral imbalances may maintain unsustainable practices in certain domains despite progress in others, limiting systemic transformation toward sustainability. Addressing these disparities requires more integrated policy approaches that consider interactions between sectors and seek to align incentives across economic domains.

Capacity Constraints

Less developed AMS face significant capacity constraints in designing and implementing comprehensive sustainable fiscal policies. This includes limitations in technical expertise, fiscal resources, and institutional frameworks. These constraints reflect what Roberts and Parks (2007) term "developmental constraints" in environmental governance, where limited resources and competing priorities restrict policy attention to externality issues.

Addressing these capacity constraints requires not only financial and technical support but also institutional innovations that enhance policy effectiveness within existing resource limitations. As Grindle (2004) and Andrews et al. (2013) argue, this may involve "good enough governance" approaches that prioritize high-impact interventions and sequential reforms rather than comprehensive transformations that exceed current capacities. Regional cooperation mechanisms offer potential pathways for addressing these constraints through knowledge sharing, resource pooling, and coordinated capacity building efforts.

These findings have important implications for policymakers, advisors, and researchers concerned with developing effective strategies to mitigate inequality and climate change externalities in the ASEAN context. The research highlights both progress and persistent challenges in sustainable fiscal policy development across the region, offering insights into potential pathways for enhancing policy effectiveness through regional cooperation, capacity building, and institutional innovation. By identifying patterns of policy evolution across diverse national contexts, this study contributes to broader understanding of the opportunities and constraints in addressing complex externalities through multilevel governance approaches.

6.9 Limitations and Future Research

This study's limitations include its reliance on publicly available documents, which may not capture the full extent of policy development and implementation. The focus on English-language sources may also have limited the scope of analysis, particularly for countries where English is not widely used in policy documents. These methodological constraints reflect broader challenges in policy research, where formal documents may not fully represent implementation realities and language barriers may restrict access to certain policy discourses (Yanow, 2000; Patton, 2015). Additionally, the documentary approach necessarily emphasizes formal policy frameworks over informal governance arrangements that may significantly influence sustainability outcomes in practice (Helmke & Levitsky, 2004; Pahl-Wostl, 2009).

The textual focus of the methodology also limits insights into implementation processes and on-the-ground realities of policy execution. As Pressman and Wildavsky (1984) and Lipsky (2010) observe, significant gaps often exist between policy designs and implementation

practices, where street-level bureaucrats and local conditions substantially influence policy outcomes. Without direct observation of implementation processes or engagement with implementing actors, the study cannot fully capture these dynamics. Furthermore, the methodology's emphasis on official policy documents may not adequately address what Bachrach and Baratz (1962) term "non-decision making," where certain issues are systematically excluded from formal policy agendas despite their relevance to addressing externalities.

The cross-sectional nature of the analysis also limits understanding of policy evolution over time, potentially obscuring important developmental trajectories and learning processes. As Sabatier and Jenkins-Smith (1993) and Hall (1993) note, policy development often involves gradual adaptation based on experience and changing conditions rather than discrete shifts, making temporal dynamics crucial for understanding policy effectiveness. Additionally, the study's broad regional scope may limit depth of analysis for specific national contexts, where distinctive historical, institutional, and cultural factors shape unique policy landscapes that merit more focused examination (Rigg, 2012; Balsiger & VanDeveer, 2012).

Future research could benefit from a range of methodological and substantive extensions to address these limitations and deepen understanding of sustainable fiscal policy development in ASEAN:

In-depth case studies of specific AMS to provide more granular analysis of policy implementation. This could involve field research and interviews with policymakers to understand the nuances of policy development and implementation. Such studies would address what Flyvbjerg (2006) identifies as the value of context-dependent knowledge in understanding governance processes, revealing implementation dynamics that documentary analysis alone cannot capture. Ethnographic approaches or institutional ethnography methods could be particularly valuable for illuminating the lived realities of policy implementation and the informal practices that shape outcomes alongside formal frameworks (Smith, 2005; Schatz, 2009).

Quantitative analysis of policy outcomes to complement the qualitative findings presented here. This could include econometric studies on the impact of specific fiscal policies on inequality and environmental indicators. Such approaches would help address what Pawson and Tilley (1997) term the "what works for whom in what circumstances" question in policy evaluation, identifying causal relationships between policy interventions and outcomes while accounting for contextual factors. Panel data analyses that leverage variation across jurisdictions and time periods could be particularly valuable for isolating policy effects from broader economic and social trends (Angrist & Pischke, 2009; Wooldridge, 2010).

Comparative studies with other regional blocs (e.g., EU, African Union) to identify best practices in multilateral policy coordination for sustainable development. These comparisons would illuminate what Lijphart (1971) and George and Bennett (2005) describe as the value of controlled comparison in identifying institutional designs and governance approaches that enhance policy effectiveness across different contexts. Such research could specifically examine how varying institutional architectures influence the translation of regional commitments into national implementation, potentially offering insights for ASEAN institutional development (Raustiala & Slaughter, 2002; Abbott et al., 2016).

Longitudinal studies tracking the evolution of sustainable fiscal policies in ASEAN over time, to better understand policy trajectories and long-term impacts. This approach would address what Pierson (2004) and Mahoney and Thelen (2010) identify as the critical importance of temporal processes in institutional development, revealing patterns of policy learning, adaptation, and transformation that cross-sectional analyses cannot capture. Such studies could employ process tracing methods to identify key junctures in policy development and the causal mechanisms that drive evolutionary trajectories (Beach & Pedersen, 2013; Collier, 2011).

Analysis of the political economy of sustainable fiscal policy in ASEAN, examining the role of different stakeholders and power dynamics in shaping policy outcomes. This research would address what Newell and Paterson (2010) and Levy and Newell (2005) describe as the crucial influence of power relations on environmental governance, illuminating how economic interests, political institutions, and ideational factors interact to enable or constrain policy development. Critical political economy approaches could be particularly valuable for identifying structural barriers to more transformative policy approaches (Newell, 2008; Bernstein, 2001).

Research on innovative financing mechanisms for sustainable development in the ASEAN context, such as green bonds or blended finance approaches. Such studies would explore what Mazzucato (2015) and Perez (2013) identify as the potential for financial innovation to redirect capital flows toward sustainability objectives, examining how novel instruments might overcome traditional financing constraints in developing economies. This research could combine institutional analysis of enabling conditions with empirical assessment of financing outcomes to identify scalable approaches for the region (Bracking, 2015; Buchner et al., 2015).

Studies on the impact of global events (e.g., COVID-19 pandemic) on the development and implementation of sustainable fiscal policies in ASEAN. This research would address what Boin et al. (2009) and Kingdon (2003) describe as the potential for crises to create policy windows that enable institutional innovation and paradigm shifts. Examining how exogenous shocks influence sustainability governance could reveal both opportunities for accelerated transitions and risks of policy regression during periods of economic stress (Aklin & Mildenberger, 2020; Hepburn et al., 2020).

Addressing these areas, future research can contribute to a more comprehensive understanding of sustainable fiscal policy development in the ASEAN region and beyond. This knowledge will be crucial in supporting ASEAN's transition towards more inclusive and environmentally sustainable economic models. By combining methodological pluralism with substantive focus on critical governance challenges, such research could not only advance academic understanding but also provide practical insights for policymakers navigating the complex terrain of sustainability transitions in diverse development contexts.

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7 CHAPTER SEVEN: ANALYSIS & FINDINGS (RQ3)

This chapter focuses on the integration question of the externality mitigation mechanism into the fiscal policy framework and through policy integration at the regional (ASEAN) level. It is based on a separate paper that discusses the statistical and econometric panel regression models in more details.

7.1 Introduction

The ASEAN Member States (AMS) are navigating a complex period of economic transition and development, grappling with challenges such as mitigating economic inequality, addressing climate change, and protecting public goods. To achieve the dual goals of inclusive growth and Net-Zero emissions by 2050, fiscal policy must evolve to not only compensate for negative externalities but to actively neutralize them. This is particularly crucial for AMS, which face the intricate task of managing economic growth while harmonizing political, social, and environmental contexts.

Externalities, especially those arising from fiscal policy actions, can significantly impact economic and social environments. As Foley et al. (2012) note, these effects can be immediate and measurable, or latent and only observable over extended periods. Rotaru (2019) emphasizes that recognizing and anticipating latent externalities is key to sustainable long-term fiscal planning. These externalities can manifest in various forms, from environmental degradation (Feiock et al., 2008) to disparities in income, public health, or education outcomes (McKay, 2002; Gupta, 2018).

Climate change externalities, stemming from the market's failure to account for the ecological costs of carbon emissions (Stern, 2007), and inequality externalities, arising from unequal distribution of income and wealth (Piketty, 2014), are at the forefront of sustainable fiscal policy challenges. The OECD (2011) underscores the importance of internalizing these externalities to promote long-term economic growth and development.

The debate on government intervention in mixed economies continues to evolve. While proponents of "laissez-faire economics" like Friedman (1962) argue against intervention, advocates such as Stiglitz (2000) contend that government action is necessary to correct market failures.

This paper addresses the triple challenge of reconciling economic, social, and environmental objectives within a coherent fiscal framework. Traditionally, these goals have been viewed as incompatible, presenting policymakers with a trade-off between pro-green environmental goals and pro-equity social aspirations (Halpern et al., 2013). However, our research charts an innovative course to harmonize these critical goals while avoiding interference with existing policy directions.

We introduce a novel perspective by advocating for the integration of negative externality mitigation and social equity promotion within sustainable fiscal policy. The core innovation lies in the concept of "moderating progressivity and targeting parameters" within Taxation and spending instruments while preserving net fiscal incidence (Goulder & Stavins, 2011). This approach aims to optimize resource allocation, reduce environmental externalities, and enhance social equity without disrupting established policy paradigms.

Progressivity and targeting are essential instruments in fiscal policy design for mitigating externalities. Progressivity, as defined by Atkinson (2015), refers to biasing Taxation and

spending incidences to mitigate negative externalities. Targeting, as conceptualized by the UNDP (2020), focuses policy outcomes on intended groups or populations. These tools can be employed to address both climate change (Acemoglu et al., 2012; OECD, 2018) and inequality (Piketty, 2014; OECD, 2019) externalities. However, the effectiveness and political feasibility of these policies remain subjects of debate (Mankiw, 2013; Moffitt, 2003).

Our research objective is to analyse how progressivity and targeting can moderate fiscal externalities related to inequality and climate change in the ASEAN context. Specifically, we examine methods for moderating the progressivity and targeting parameters of Taxation and spending instruments, assess their mitigation effectiveness and effects on policy variables, and explore ways to integrate such mechanisms into existing fiscal frameworks.

This study aims to provide valuable insights for policymakers, academics, and independent policy advisors on designing, implementing, and evaluating sustainable fiscal policies while minimizing interference with policy goals. The paper is structured as follows: Section 2 provides a critical review of relevant literature and theoretical frameworks. Section 3 describes the research methodology, including the research model, data sources, and analytical techniques. Section 4 presents results and discussions, while Section 5 draws conclusions and implications. Finally, Section 6 discusses study limitations and suggests areas for future research.

By addressing these complex issues, our study contributes to the growing body of knowledge on sustainable fiscal policy in the ASEAN region and beyond, offering a novel approach to harmonizing economic, social, and environmental objectives.

7.2 Literature Review

The debate surrounding sustainable fiscal policy and externality mitigation is multifaceted, encompassing issues of economic efficiency, social equity, and environmental sustainability. This review explores the key nexuses that inform the scientific discourse in this field, with a particular focus on the ASEAN context.

The role of government intervention in addressing market failures, particularly externalities, has been a subject of longstanding debate in economics. Pigou (1920) argued for the use of TAXes and subsidies to align private and social costs, a view supported by contemporary researchers like Stern (2015) in the context of climate change mitigation. However, critics such as Borjas (2017) caution that environmental regulations can lead to unintended consequences, including job losses and reduced economic growth.

The challenge lies in designing interventions that are both efficient and equitable. Klenert et al. (2018) highlight the potential regressive nature of carbon pricing policies, underscoring the need for carefully targeted interventions that consider distributional effects.

The debate on Pareto-efficient fiscal policies centres on whether externalities should be mitigated post-hoc or minimized by design. Arrow et al. (1995) advocate for policies that internalize the costs of negative externalities, while Kallis & Swyngedouw (2019) argue for redefining policy goals to minimize externalities from the outset.

A balanced approach, as suggested by Pearce et al. (2019), involves integrating pro-green and pro-equity attributes into the fiscal policy framework to maximize net social benefits. This

aligns with Schandl et al. (2018), who emphasize the need for a holistic, evidence-based approach to policymaking.

The nexus of climate change, inequality, and fiscal policy presents unique challenges. Stiglitz (2015) argues for policies that internalize carbon emission costs while simultaneously addressing inequality. Heckman & Jacobs (2020) propose green investment policies and targeted social programs as potential solutions.

Progressivity and targeting are key moderators in mitigating fiscal externalities. While some researchers caution against potential disincentives created by progressive policies (Gale & Samwick, 2014), others argue for their role in reducing inequality and promoting social welfare (Baker et al., 2021). Similarly, targeting has been debated, with Bird & Zolt (2019) highlighting potential perverse incentives, while Cox & Skinner (2020) argue for its effectiveness in reaching vulnerable populations.

The combination of progressivity and targeting, as part of a fiscal feedback loop, shows promise in effective externality mitigation. Baker et al. (2021) demonstrate this in the context of carbon Taxation and renewable energy subsidies.

Lagged panel regression analysis and policy optimization modelling are increasingly used to estimate the impact of fiscal variables and optimize policies. Asatryan et al. (2019) employed lagged panel regression to study the effect of progressive TAX systems on income inequality in OECD countries. However, Ramey (2019) cautions about the limitations of assuming linear relationships in these models.

Policy optimization modelling, while valuable for designing interventions (Baker et al., 2021; Mastromarco et al., 2021), faces criticism for potentially oversimplifying complex economic interactions (Friedman, 2019).

Despite the extensive literature on sustainable fiscal policy, significant gaps remain, particularly in the context of ASEAN countries. Weber & Chaiechi (2022) highlight the lack of effectiveness research on externality mitigation in this region. Weber et al. (2022) point to the need for mechanisms to simultaneously achieve pro-green and pro-equity outcomes. Furthermore, there is a gap in understanding how to effectively integrate externality mitigation mechanisms into policy frameworks without distorting policy direction. These gaps inform our research questions:

1. Which ASEAN countries effectively mitigate income inequality and GHG emission externalities in their fiscal policies?
2. Can fiscal externalities be effectively mitigated without policy distortion?
3. How can the proposed externality mitigation mechanism be effectively integrated into a fiscal system or policy framework?

Addressing these questions, this study aims to contribute to the design, implementation, and evaluation of sustainable fiscal policies that achieve pro-green and pro-equity outcomes concurrently across demographics, sectors, and regions in the ASEAN context.

7.3 Methodology

Introduction

This study presents a novel, multi-faceted approach to examining fiscal externality mitigation in ASEAN countries, with a particular focus on income inequality and greenhouse gas emissions. Our methodology is carefully structured to address three interrelated research questions, each building upon the findings of the previous, to develop a comprehensive understanding of externality mitigation in fiscal policy.

Our research questions emerge from a critical gap analysis in the existing literature on fiscal policy externalities. While previous studies have examined the impacts of fiscal policies on various economic outcomes, there remains a dearth of research specifically addressing the effectiveness of externality mitigation strategies, particularly in the ASEAN context. Moreover, the literature lacks a unified framework for assessing and optimizing externality mitigation without causing policy distortions. Our study aims to fill these gaps by combining empirical analysis with theoretical modelling to create a robust, practical tool for policymakers.

The methodology is designed to progress logically from empirical analysis to theoretical optimization and finally to practical implementation. We begin with a panel regression approach using instrumental variables to address potential endogeneity issues, allowing us to isolate the effects of policy variables on externalities. This empirical foundation then informs our theoretical model, where we introduce a Policy Externality Index (PEI) and develop an optimization framework using Lagrangian multipliers. Finally, we conclude our analysis with a discussion of various integration scenarios for subsequent modelling using the Monte Carlo simulation method in combination with difference-in-difference techniques to test policy impact and applicability as externality mitigation mechanism in Sustainable Fiscal Policy.

Key features of our methodology include:

1. A symmetric treatment of income inequality and GHG emissions externalities, allowing for comparative analysis.
2. The use of instrumental variable regression to address endogeneity concerns, enhancing the reliability of our estimates.
3. The development of a novel Policy Externality Index (PEI) that combines multiple externalities into a single measure.
4. A constrained optimization approach that seeks to minimize externalities while maintaining fiscal neutrality.
5. Discussion of proposed application of Monte Carlo simulation to model and test test various integration scenarios, providing further insights into the robustness of our proposed externality mitigation mechanism for Sustainable Fiscal Policy.

This comprehensive approach not only addresses the immediate research questions but also provides a valuable framework for policymakers. By combining empirical analysis with theoretical modelling and practical simulations, our methodology offers a toolset for both assessing existing policies and designing new ones to achieve sustainable fiscal outcomes. The flexibility of our approach allows for its application across various policy types and even across political boundaries, making it a potentially powerful instrument for regional policy coordination in ASEAN and beyond.

Conceptual Model

As per research objective, a mechanism is to be developed that can be integrated into the fiscal framework to mitigate negative externalities of inequality and climate change, without interfering into the existing policy direction. The conceptual model evolves around a mechanism to modulate the progressivity and targeting characteristics of the fiscal variables to effectively mitigate the inequality and climate change externalities, without interfering into policy direction. The inherent progressivity and targeting parameters are observed in the taxation and expenditure distributions and moderated by the internalised mechanism to effect the desired mitigation, while keeping the fiscal balance and incidence constant. Thus, the conceptual model defines the simultaneously mitigated externalities of income inequality (GINI) and climate change (GHG) as its dependent variables, while controlling for change in the net fiscal balance and fiscal stance in the short-run. Thus, this conceptual model won't consider intermediate behavioural change and consequential economic, social or ecological effects as these depend on wider political and cultural factors both, at the local and supernational level. Progressivity and targeting are modelled as moderators of the underlying instrumental fiscal variables, i.e. TAX-revenue and social spending. The main policy variables are assumed to be exogenous as the objective is not to interfere in the policy direction, while these may change over time. This system is bound by other exogenous macro variables including GDP per-capita growth, pro-green investment from the public and private sectors, and the supply-demand side inflation gap and lag. A negative feedback loop controls the mitigation level of each externality variable individually, and relative to the mitigation goals, while minimising the combined impact on the fiscal balance. Figure 1 below depicts the conceptual research model.

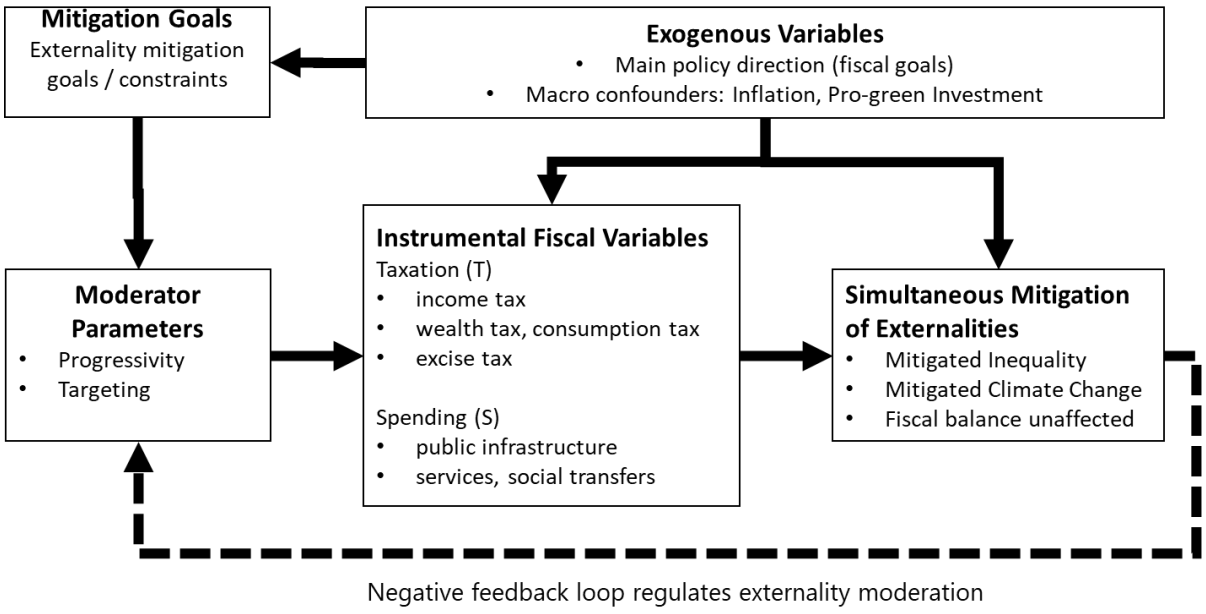

Figure 1 Conceptual Model - Internalised Mechanism for Simultaneous Mitigation of Fiscal Externalities

The model conceptualises the fiscal policy instruments of taxation and public expenditures as the endogenous variables under exogenous policy control. These instruments are characterised by their inherent progressivity and targeting precision which influence the fiscal externalities. The model introduces a negative feedback mechanism as moderating function, which dynamically adjusts the progressivity and targeting characteristics of the fiscal instruments in response to the prevalence and scale of the observed externalities. This self-controlling system is designed to correct the negative externalities such as income inequality and environmental degradation within the fiscal framework without interference in policy direction. The exogenous variables, which include macroeconomic conditions and predetermined fiscal goals, provide the boundary within which the feedback loop operates. This model encapsulates the interaction between policy-controlled fiscal variables and the moderator parameters that are adjusted in response to the externalities, thereby fostering a sustainable fiscal environment that aligns with broader economic, social and ecological targets.

Theoretical Model

The conceptual model integrates several major theories in the context of sustainable fiscal policy theory and the research objective. These were discussed in the literature and include sustainable fiscal policy, externality mitigation, fiscal incidence analysis, fiscal re-distribution and social benefit targeting theories respectively. Each of these theories, when viewed through the lens of sustainable fiscal policy, “underlines the importance of considering both short-term implications and long-term outcomes (European Political Community EPC, 2022). They provide frameworks for governments to address current societal needs while ensuring future generations can meet their own.

Sustainable fiscal policy incorporates externality mitigation to ensure long-term welfare. By accounting for and internalizing externalities, governments can foster sustainable growth that reflects true societal costs and benefits, ensuring that fiscal measures don’t disproportionately burden certain groups can maintain social cohesion and facilitate consistent economic growth. Externality mitigation theory emphasizes addressing the external effects (both positive and negative) of economic transactions that are not captured in market prices. These externalities, like pollution or public goods like education, can either benefit or harm parties who are not directly involved in the transaction. Pigou (1920) suggests that taxes or subsidies can be used to “internalize” these externalities, thereby ensuring that market outcomes will be more socially efficient. The theory about fiscal incidence analysis pertains to the assessment of who ultimately bears the burden of taxes and who benefits from public expenditures. According to Musgrave (1959), the theory evaluates the progressive or regressive nature of a fiscal system by considering both direct and indirect effects of policy measures. Fiscal redistribution theory examines how government policies can be used to redistribute income or wealth to achieve societal objectives like reducing income inequality. Okun (1975) discusses the trade-offs involved, stating that there is a “leaky bucket” when redistributing income: not every dollar taken from the rich results in a dollar for the poor due to administrative costs or disincentive effects. Benefit targeting theory posits that government benefits should be directed towards those who need them the most. For instance, Blank (2002) discusses the design and evaluation of government transfer programs, suggesting that targeting ensures more effective aid distribution. By targeting benefits effectively, governments can ensure resources reach those in need, promoting both economic and social sustainability.

Empirical Model

The following research questions were developed from the identified gaps in the literature review section above. Each of the research question has been translated into standard hypothesis format, which can be tested for statistical significance using the procedure below.

Individual policies often have broad or overlapping goal definitions, and multiple policies, interventions and exogeneous macro variables may make it difficult to associate observed effects with particular policy action and goals over a given observation period. Thus, the context for hypothesis testing is set at fiscal framework level, rather than testing individual policies. Although, the effect of policy clusters or individual policies could be evaluated using the same methodology, which is decomposable by level.

The following section discusses the specific research questions of this study, as derived from the the broader questions of the thesis research objective. Note, that the implementation of this comprehensive methodology may deviate from its design in some aspects, due to data limitations and and modelling constraints.

Research Question Q1

Q1: Which of the ASEAN countries (AMS) do effectively mitigate income inequality and GHG emission externalities in their fiscal policies?

The question is addressed by estimating the policy mitigation effectiveness of the fiscal externalities of income inequality (IEQ) and GHG emission (GHG) in the ASEAN countries.

The Model

We translate the question into a statistically testable null (H_0) and alternative hypothesis (H_1), in search of significant evidence supporting conclusion of the presence of effective fiscal externality mitigation in the country under observation. Each externality is estimated individually using a panel regression approach with empirical fiscal data from each AMS in a fixed effect model (FEM). Both externalities are modelled symmetrically and dynamically within a short-run horizon, with auto-regressive and interaction terms specified as VAR (Vector Auto Regression) model. Where cointegrating relationships were identified in the data a VECM (Vector Error Correction Model) was uses instead to estimate the medium to long-run relationships as well. The resulting estimators are tested for statistical significance using an F-test for multiple parameters.

Testing for effective fiscal externality mitigation (per AMS country)

Each ASEAM country (AMS) will be tested for effective mitigation of each externality, i.e. Income Inequality (IEQ) and Green House Gasses (GHG) respectively. The resulting AMS mitigation vector holds the estimated inequalities per country (AMS) including the results from hypothesis testing.

Hypotheses Testing:

The following hypotheses are setup to test for statistical evidence of effective mitigation of fiscal externalities in each country for the period of 2000-2022.

- H_0: There is no significant evidence of effective mitigation of fiscal externality in any of the tested countries in that period.
- H_1: Not H_0 ; There is significant evidence of effective mitigation of fiscal externalities in at least one of the tested countries.

Result vector holds the estimators of both fiscal externalities and the respective test statistics of each of the tested countries. For the fiscal externalities models we define the following dependent variables:

- GHG: [mt_CO_2e], i.e. carbon intensity in megatons CO2 equivalent
- IEQ: [gini_coefficient], i.e. total income distribution (gross income – TAX + social transfers + other benefits(costs) expressed as GINI coefficient

Note that, while other measures could be taken to represent the dependent variables (e.g. Teil-T Index for inequality and CO_2e / rGDP, etc), for this study we have chosen the before mentioned externality KPIs.

Model Specification

Both models use identical architecture with auto-regressive terms of the independent policy variables, capturing the dynamic lagged effects of TAX and EXP on the respective externality, an interaction term to capture the combined effect or synergy of these variables, the exogenous variables that are unique to each externality, and the error term with the residuals of the model. To control potential endogeneity issues from reverse causality between the dependent and independent variables in the model (i.e. correlation of the error terms with the independent variables) we use the instrumental variables (IV) regression approach with IV for the independent variables. These IVs are tested a priori to meet the exogenous principle.

Qualifying criteria of IVs

- IVs must indirectly cause the underlying dependent variable but not have a direct relationship with it. E.g., to present a valid instrument for TAX_level the policy (TAX) rate drives TAX_level but not directly cause externalities, and
- IVs must not have a direct relationship with other independent variable (e.g. GDP impacts TAX_level but also externalities, there is not a valid instrument of TAX_level).

Multiple instrumental variables may strengthen the IV causality to the underlying independent variable. Here, we're allowing for another global_IV (e.g. supra-national TAX treaty signatory) in addition to the local policy rate (TAX rate) to strengthen IV variable (and causality). To test the statistical strength of the IVs prior to including these in the model the SARGAN Test can be used.

Simplified VAR specification for dynamic effects:

Equation 1: Baseline model for GHG Equation

$GHG_{(t)} = \beta_0 + \beta_1 TAX_{(t)} + \beta_2 TAX_{(t-1)} + \beta_3 EXP_{(t)} + \beta_4 EXP_{(t-1)} + \beta_5 (TAX_{(t)}\ EXP_{(t)}) + \beta_6 rGDP_{(t)} + \beta_7 REN_EN_{(t)} + u_{(t)}$

Baseline model for Inequality Equation

Equation 2: Baseline model for Inequality Equation

$IEQ_{(t)} = \beta_0 + \beta_1 TAX_{(t)} + \beta_2 TAX_{(t-1)} + \beta_3 EXP_{(t)} + \beta_4 EXP_{(t-1)} + \beta_5 (TAX_{(t)}\ EXP_{(t)}) + \beta_6 rGDP_{(t)} + \beta_7 LFPR_{(t)} + u_{(t)}$

Where:

- t is time index (i.e. 2000-2022)
- u is the error term in the respective equations

Dependent Variable:

- $GHG_{(t)}$ carbon emission per capita
- $IEQ_{(t)}$ income inequality

Independent Variables:

- $TAX_{(t)}$: Actual tax as GDP ratio
- $EXP_{(t)}$: Actual expenditure as GDP ratio
- $TAX_{(t)}\ EXP_{(t)}$: Interaction term between TAX level and EXP level
- $TAX_{(t-i)}$: Lagged TAX level at lag-order i
- $EXP_{(t-i)}$: Lagged EXP level at lag-order i
- $rGDP_{(t)}$: $real_GDP_{(t)}$ (LCU) as control variable for GHG and IEQ
- $REN_EN_{(t)}$: renewable energy share, as % of total energy consumption (GHG only)
- $LFPR_{(t)}$: labour force participation rate (Labor Force / Working Age Population) × 100

Parameters:

- β_0: is the coefficient for the intercept or baseline of the dependent variable (externality)
- β_1 and γ_1: are the coefficients for the auto-regressive components (lags) of the dependent variables
- β_2, β_3 and γ_4, γ_5: are the coefficients for the independent variables TAX and EXP and their lags
- β_6 and γ_6: are the coefficients for the interaction terms between TAX and EXP
- β_7, β_8 and γ_7, γ_8: are the coefficients for the exogenous variables of the model

Simplified moel: lag_i involves optimal lag-order (L). Where long-term relationships were identified in the data a VECM was used instead to also model the cointegrating relationships (rank > 0) additionally to the short-run dynamics.

Instruments (exogenous, no direct impact on Y)

- iv_TAX: Policy-determined TAX rate
- iv_EXP: Policy-determined Expenditure rate

Parameters (coefficients)

- β_0: intercept (baseline with all parameters =0)
- β_1, β_2 coefficients of direct and lagged TAX effects
- β_3, β_4 coefficients of direct and lagged EXP effects
- β_5: interaction term: heterogeneity effect of TAX and EXP
- β_6, β_7: control variables, specific to the mitigation variable GHG and IEQ, respectively

Instrumental (IV) Regression Approach

Instrumental Variables (IV) regression is a statistical technique used to address endogeneity bias in econometric models. Endogeneity occurs when the independent variable is correlated with the error term, leading to biased estimates of the causal effect. Depending on the policy framework there might be potential for a two-way causal relationship between any of the independent variables and the dependent variable (e.g., if changes in CO2 emissions trigger policy intervention, and vice versa). If there is evidence of endogeneity (e.g., reverse causality, omitted variable bias) IV regression may be required to control for endogeneity and thus provide the basis for causal inference (i.e. TAX and EXP effects on GHG and IEQ respectively)

IV Regression in 2-Stages:

First stage: Regress the endogenous independent variable on the instrumental variable(s) and all exogenous variables from the main equation.

- The IV should be correlated with the endogenous independent variable (relevance condition), and
- The IV should not be correlated with the error term in the main regression equation (exclusion restriction).

This implies that the IV should not directly affect the dependent variable except through its effect on the endogenous independent variable.

Second stage: Use the predicted values from the first stage to replace the endogenous variable in the main equation and estimate this equation.

Testing Two-stage least squares (2SLS) procedure:

- Generally, the 1st-stage IV regression model includes the IV and exogenous variables from the basic model (stage two), while the auto-regressive and interaction terms are excluded.
- If autoregressive terms or interactions involving exogenous variables are part of the main model, they should typically be included in both stages of 2SLS.

- However, if an interaction term involves the endogenous variable, handling becomes more complex and may require additional instruments to control both interaction elements.

Using the IV regression approach effectively isolates the exogenous variation in the endogenous variable. This allows it to estimate the causal effect of the endogenous variable on the dependent variable, controlling for the effects of any omitted variables or reverse causality

Identifying valid IV candidates:

1. Identifying valid instruments: These are variables that are correlated with only one of the endogenous variables but uncorrelated with the error term.

2. Estimating the first-stage regression: This regression estimates the relationship between the endogenous variable and the instruments.

3. Using predicted values: The predicted values of the endogenous variable from the first-stage regression are used as instrumental variables in the second-stage regression.

The IV variables must have a direct impact only on the respective independent, but not the dependent variable in the model. The stage one IV regression model includes the IV and exogenous variables from the basic model (stage two), while the auto-regressive and interaction terms are excluded.

- iv_TAX: policy TAX rate (TAX_level / TAX_base, where TAX_base is GDP, consumption, income, etc).
- iv2_TAX: dummy variable for climate change signatory (=1 if signed on, else 0)
- iv_EXP: policy spending rate (government spending / TAX_base, where TAX_base is GDP, consumption, income, etc – same base as for TAX).
- iv2_EXP: dummy variable emission_energy compliance standards (=1 if/when enforced, else 0)

Assume:

- Dependent variable: GHG and IEQ respectively
- Endogenous variable: TAX, EXP
- Instruments: iv_TAX, iv2_TAX, iv_EXP, iv2_EXP

First-stage regressions for TAX and EXP (suffix is omitted):

Equation 3: First-stage regressions for TAX

$$TAX^{\wedge} = \alpha_0 + \alpha_1 iv_TAX + \alpha_2 iv2_TAX + \alpha_3 rGDP + \alpha_4 REN_EN_SHR + u$$

Equation 4: First-stage regressions for EXP

$$EXP^{\wedge} = \alpha_0 + \alpha_1 iv_EXP + \alpha_2 iv2_EXP + \alpha_3 rGDP + \alpha_4 REN_EN_SHR + u$$

Now we calculate the estimated values for both independent variables, i.e. TAX^ and EXP^, based on the above estimates of the respective instruments:

Second-stage regression:

Now we perform the 2nd stage regression by using the model as above with the replaced independent variables from above (i.e. TAX^, EXP^) to estimate the model with the instruments.

Equation 5: Second stage GHG Equation with instrumental variables

$$GHG_{(t)} = \beta_0 + \beta_1 TAX^{\wedge}_{(t)} + \beta_2 TAX^{\wedge}_{(t-1)} + \beta_3 EXP^{\wedge}_{(t)} + \beta_4 EXP^{\wedge}_{(t-1)} + \beta_5 (TAX^{\wedge}_{(t)} \ EXP^{\wedge}_{(t)}) + \beta_6 rGDP_{(t)} + \beta_7 REN_EN_SHR_{(t)} + u_{(t)}$$

Equation 6:Second stage Inequality Equation with instrumental variables

$$IEQ_{(t)} = \beta_0 + \beta_1 TAX^{\wedge}_{(t)} + \beta_2 TAX^{\wedge}_{(t-1)} + \beta_3 EXP^{\wedge}_{(t)} + \beta_4 EXP^{\wedge}_{(t-1)} + \beta_5 (TAX^{\wedge}_{(t)} \ EXP^{\wedge}_{(t)}) + \beta_6 rGDP_{(t)} + \beta_7 LFPR_{(t)} + u_{(t)}$$

Testing the IV variables for strength and validity:

To test for the strength and validity of the instrumental variables we perform the following specific tests at each stage of the IV regression process:

First Stage:

1. F-test for instrument relevance:
    - It tests the joint significance of the instruments in predicting the endogenous variable.
    - Rule of thumb: F-statistic should be greater than 10 for a single endogenous regressor.

Second Stage:

1. t-tests for individual coefficient significance:
    - Tests whether each coefficient, including the coefficient on the instrumented variable, is significantly different from zero.
2. Durbin-Wu-Hausman test for endogeneity:
    - Tests whether the OLS and IV estimates are significantly different.
    - Helps determine if IV estimation was necessary.
3. Sargan-Hansen J test for overidentification (if applicable):
    - Only used when there are more instruments than endogenous variables.
    - Tests the joint null hypothesis that the instruments are valid.

These tests form the core of IV regression diagnostics. The F-test in the first stage ensures instruments are strong, while the second-stage tests check the validity of overall model and the necessity of using IV in the first place.

Testing the Joint Significance of the externalities IEQ and GHG (for each country)

The hypothesis theorizes a relationship between the fiscal variables and the externalities (IEQ, GHG) thus, we test for the coefficients of TAX, EXP and their interaction respectively. The coefficients of the exogeneous variables are used for model control and interpretation only and thus, are excluded from the hypothesis testing equation. The intercept represents the baseline externality if all coefficients were nullified, i.e. if there was no public and private sector at all. This variable has explanatory meaning only and will not be tested either.

Hypothesis for the restricted model (omitting exogenous variables):

- H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$
- H_1: At least one of β_1, β_2, β_3, β_4, or β_5 is different from zero

Procedure:

1. Estimate the regression model: Fit the regression model (in R).
2. Obtain the F-statistic (standard F-test): The F-statistic tests the joint significance of the coefficients associated with the null hypothesis.
3. Determine the p-value: Calculate the p-value associated with the F-statistic.
4. Compare the p-value to the significance level: If the p-value is less than the chosen significance level (e.g., 0.05), reject H_0 in favour of H_1.

The F-statistic for comparing restricted and unrestricted models is calculated as:

Equation 7: Restricted-Unrestricted F-test

$$F = (SSE_{(r)} - SSE_{(ur)})/(r) \div SSE_{(ur)}/(n-k)$$

where: $SSE_{(r)}$ is the sum of squares error from the restricted model, $SSE_{(ur)}$ is the sum of squares error from the unrestricted model, r is the number of restrictions (parameters set to zero in the restricted model), k is the number of parameters in the unrestricted model, n is the total number of observations. This F-statistic follows an F-distribution with r numerator degrees of freedom and n-k denominator degrees of freedom under the null hypothesis.

Hypotheses

- H0: The reduced model (simpler model) is sufficient to explain the data. This implies that the additional variables in the full model do not significantly improve the fit.
- H1: The full model (more complex model) provides a significantly better fit than the reduced model. This suggests that the additional variables in the full model do improve the model's explanatory power.

Interpretation

The F-statistic measures whether the unrestricted model provides a significantly better fit to the data than the restricted model. A large F-value indicates that removing the restrictions significantly reduces the model's explanatory power, providing evidence against the null hypothesis. If the calculated F-statistic exceeds the critical F-value at the chosen significance level, we reject the null hypothesis, suggesting that at least one of the restricted parameters contributes significantly to the model.

Restricted Model:

Includes only the intercept and control variables and residuals (error term):

Equation 8: Restricted Model GHG

$$GHG_{(t)} = \beta_0 + \beta_6 rGDP_{(t)} + \beta_7 REN_EN_SHR_{(t)} + u_{(t)}$$

Equation 9: Restricted Model IEQ

$$IEQ_{(t)} = \beta_0 + \beta_6 rGDP_{(t)} + \beta_7 LFPR_{(t)} + u_{(t)}$$

Unrestricted Model:

- $GHG_{(t)}$ = .. full model as above
- $IEQ_{(t)}$ = .. full model as above

Decision:

Comparing the restricted and unrestricted models using the F-test we assess whether the additional variables (specified in the null hypothesis) significantly improve the model's fit and contribute to explaining the variation in the mitigation variable, IEQ and GHG respectively.

Significance level (alpha = 0.05)

- if p < alpha reject H_0 and accept H_1: There is evidence to suggest that at least one of the variables (TAX, EXP, their interactions or lags) have a significant direct impact on the respective mitigation variable CO_2 and/or IEQ.
- Fail to reject H_0: There is no significant evidence to support the claim that these variables have a significant effect on the mitigation variables, i.e. no evidence of effective mitigation of GHG or IEQ.

Research Question Q2

Q2: *Can fiscal externalities be effectively mitigated without policy distortion?*

The question is addressed by estimating the effectiveness of the proposed mitigation mechanism with respect to income inequality (IEQ) and greenhouse gases (GHG) without policy distortion, i.e. subject to a non-interference constraint.

The Model

We translate the question into a statistically testable null (H_0) and alternative hypothesis (H_1), in search of significant evidence supporting conclusion of the effectiveness of such mechanism, subject to the non-interference constraint of keeping the Net Fiscal Incidence (NFI) of the policy constant. We retain the tested externality models of IEQ and GHG from Q1 but integrate these into the combined weighted Policy Externality Index (PEI). We then attempt to optimize PEI in PEI by resolving the inherent policy intervention trade-off decision to maximise the mitigation effect, subject to the policy interference constraint. This constrained optimization problem is modelled with the Lagrangian Multiplier, with the goal (function) to minimize PEI (and thus minimize IEQ and GHG externalities) and the constraint (function) to keep the Net Fiscal Incidence (NFI) constant. Setting up the theorized hypothesis to test the mean difference of PEI (observed or modelled) – PEI (optimized externalities) by a Sign Test using the binominal distribution.

For this section assume identical models for IEQ and GHG as in Q1 above.

Integrating the component externalities into a weighted index:

For further processing, we combine the IEQ and GHG into the Policy Externality Index (PEI). PEI, as derived from empirical data, represents the current (actual) externalities inherent in the policy under analysis. Now, we will attempt to minimize PEI by moderating the independent fiscal variables (TAX and EXP) to determine the mitigation potential of the policy under consideration. Where PEI (minimized) is less than PEI (actual) indicates a significant mitigation potential has been detected. If equal, indicates no further mitigation potential of this policy is likely, and PEI - PEI < 0 would signify a mis-optimised attempt, i.e. externalities would worsen.

Forming the Policy Externality Index (PEI)

Before integrating the components into the weighted index these are standardized to a scale from 0-1, to account for different measures in the components. Standardisation is achieved by:

Equation 10: Standardised Index

$$Std_value = value - min_value / max - min_range$$

We apply the standardisation (range based scaling) rather than normalisation based method (N~0.1) to preserve the relative differences (ordinality) between values within the range.

Min-Max scaling of the observed externalities for PEI:

Equation 11: Scaled IEQ for PEI

$$IEQ_std_t = (IEQ_t - IEQ_{min_t}) / (IEQ_{max,t} - IEQ_{min_t})$$

Equation 12: Scaled GHG for PEI

$$GHG_std_t = (GHG_t - GHG_{min_t}) / (GHG_{max_t} - GHG_{min_t})$$

Calculating PEI:

We integrate the standardised components into PEI as sum of equally weighted composites:

Equation 13: PEI as scaled weighted index of GHG and IEQ

$$PEI_t = w_1 IEQ_std_t + w_2 GHG_std_t$$

Where:

- t is the time index of the series
- PEI is the original (actual) policy externality index from empirical data
- w_1, w_2 are the composite weights (e.g. 0.5) for the respective externality variable after standardisation
- IEQ_std, GHG_std are the externality variables from empirical data (or modelled)

Policy makers can use the PEI as an indicator of the level of externalities inherent in the policy under analysis, i.e. PEI can be used as a key performance indicator (KPI) for policy improvements over time or across policies for benchmarking. To get a fair representation of the actual externalities present in the policy the composite weights should be equal (i.e., $w_1 = w_2 = 0.5$).

Before we can optimize PEI into PEI we need to integrate the respective externality models by replacing the respective IEQ and GHG models (above) into the PEI formula. After simplifying we can now predict $\hat{PEI}$ and then moderate the independent fiscal variables TAX and EXP to optimize (minimize) PEI.

Equation 14: Predicted PEI

$$\hat{PEI}_t = w_1 \hat{IEQ}_t + w_2 \hat{GHG}_t$$

Equation 15: Substituting IEQ and GHG in PEI

$\hat{PEI}_t =$

$[w_1(\beta_0 + \beta_1 I\hat{EQ}_{t-1} + \beta_2 TAX_t + \beta_3 TAX_{t-1} + \beta_4 EXP_t + \beta_5 EXP_{t-1} + \beta_6(TAX_t \ EXP_t) + \beta_7 rGDP_t + \beta_8 lfpr_t)$

$+ w_2(\gamma_0 + \gamma_1 GH\hat{G}_{t-1} + \gamma_2 TAX_t + \gamma_3 TAX_{t-1} + \gamma_4 EXP_t + \gamma_5 EXP_{t-1} + \gamma_6(TAX_t \ EXP_t) + \gamma_7 rGDP_t + \gamma_8 REN_EN_SHR_t)]$

Note: The replacement models for PEÎ use the prediction models rather than the empirical externality values, which can be optimized by moderating the independent policy variables TAX and EXP (and their lags) to achieve better externality values. The exogenous variables will remain empirical for the optimization process, i.e. for optimization we'll take the empirical models and values with optimised fiscal variables.

Simplifying by grouping terms based on the variables:

- Constant terms: $w_1\beta_0 + w_2\gamma_0$
- Lagged IEQ: $w_1\beta_1 IEQ_{t-1}$
- Lagged GHG: $w_2\gamma_1 GHG_{t-1}$
- TAX level: $w_1\beta_2 TAX_t + w_1\beta_3 TAX_{t-1} + w_2\gamma_2 TAX_t + w_2\gamma_3 TAX_{t-1}$
- Exposure level: $w_1\beta_4 EXP_t + w_1\beta_5 EXP_{t-1} + w_2\gamma_4 EXP_t + w_2\gamma_5 EXP_{t-1}$
- Interaction term: $w_1\beta_6(TAX_t \ EXP_t) + w_2\gamma_6(TAX_t \ EXP_t)$
- Real GDP per capita: $w_1\beta_7 rGDP_t + w_2\gamma_7 rGDP_t$
- Working population: $w_1\beta_8 LFPR_t$
- Renewable energy share: $w_2\gamma_8 REN_EN_SHR_t$

Note: the error terms of the externality variables IEQ and GHG are omitted for prediction to obtain the Expected value.

The simplified expression shows how the independent policy variables TAX and EXP, their lags and interactions, as well as the exogeneous variables, including real GDP per capita and the other confounders, influence the overall policy externalities in the predicted PEÎ. The coefficients on the variables in PEÎ represent the combined effects of these factors in IEQ̂ and GHĜ respectively.

This model integrates various economic, social and environmental factors to predict the overall mitigation effectiveness of fiscal externalities of the analysed policies. It considers both current conditions and historical data, as well as interactions between different policy instruments (taxation and expenditure).

Using the integrated prediction model for PEÎ we will attempt to optimise the policy variables TAX and EXP to minimize the externalities IEQ̂ and GHĜ and then calculate PEI (optimized) while respecting the constraint. By adjusting the weights w_1 and w_2, policy makers can now prioritize one externality over another for the optimization, i.e. to identify the optimal policy mitigation mix for minimizing PEI

Resolving the policy intervention-interference trade-off

Optimisation Objective

We aim to optimize the policy variables TAX_t and EXP_t to minimize the externalities represented by $IE\hat{Q}_t$ and $GH\hat{G}_t$, and consequently minimize $PE\hat{I}_t$. The optimal (minimized) PEÎ becomes PEI with the optimal TAX and EXP values.

Constrained Optimization Problem:

The goal is to minimize the externalities subject to the constraint of holding the Net Fiscal Incidence (NFI) constraint. This constitutes a constrained optimization problem, configured as a minimize task under the given constraint. Modelled with the Lagrangian Multiplier method to minimize we define the objective function f(x) and constraint function g(x).

Note: The Lagrangian configured as a minimizer sets the multiplier Lambda (λ) positive (vice versa for maximization tasks).

The objective function does not change signs. Depending on its mode (task) the Lagrangian formulation is:

Equation 16: Lagrangian configured as a minimiser

$$\text{Minimization: } L = f(x) + \lambda g(x)$$

Equation 17: Lagrangian configured as a maximiser

$$\text{Maximization: } L = f(x) - \lambda g(x)$$

Where f(x) is the objective function and g(x) is the constraint function.

With this configuration the Lagrangian is set up to find the minimal solution while respecting the constraint. The interpretation of λ is:

- In MIN problems: λ represents the marginal cost of relaxing the constraint.
- In MAX problems: λ represents the marginal benefit of tightening the constraint.

Setting up the objective and constraint functions

Equation 18: Lagrangian objective function

$$f(x) = w_1 IE\hat{Q}_t + w_2 GH\hat{G}_t$$

Equation 19: Lagrangian constraint function

$$g(x) = TAX_t - EXP_t + s_t - NFI_t = 0$$

Where:

- f(x): Weighted sum of predicted externalities to be minimized
- g(x): Constraint ensuring constant Net Fiscal Incidence (NFI)
- w_1, w_2: Weights for prioritizing mitigation goals (IEQ vs GHG)

- $\hat{IEQ}_t$: Predicted Income Inequality index at time t
- $\hat{GHG}_t$: Predicted Greenhouse Gas emissions index at time t
- TAX_t: Tax level (LCU) at time t (to be optimized)
- EXP_t: Expenditure level (LCU) at time t (to be optimized)
- s_t: Slack variable for NFI constraint at time t
- NFI_t: Target Net Fiscal Incidence at time t (post optimization)...

Setting up the Lagrangian optimization model:

This Lagrangian (L) is configured as a constrained minimization problem:

Equation 20: Lagrangian (L) is configured as constrained minimisation problem

$$L(TAX_t, EXP_t, \lambda) = g(x) + \lambda\ c(x) = w_1 IE\hat{Q}_t + w_2 GH\hat{G}_t + \lambda\ (TAX_t - EXP_t + s_t - NFI_t)$$

Where:

- L is the Lagrangian optimization function (L is negative for minimization, vice versa for maximization)
- λ (lambda) is the Lagrangian multiplier, representing the sensitivity of the objective function to changes in the constraint function (is positive for minimization, vice versa for maximisation)
- TAX_t and EXP_t are the independent policy variables to be optimized

Interpretation:

In minimization mode, the objective function keeps the original (typically positive) sign with a positive λ multiplier (L will be negative). As λ approaches 0, the constraint becomes less stringently enforced, i.e., the solution becomes less constrained / more unbound. This allows the minimization to achieve a lower (more negative) value of the objective function. The opposite occurs in maximization problems, where a less constrained problem typically achieves a higher (more positive) value of the objective function."

Optimization Process:

1. Substitute the prediction models for $\hat{IEQ}_t$ and $\hat{GHG}_t$ into the Lagrangian function.
2. Take partial derivatives of L with respect to TAX_t, EXP_t, and λ.
3. Set these partial derivatives to zero and solve the resulting system of equations.
4. The solution yields the optimal values TAX_t and EXP_t.

Final Solutions:

Equation 21: Optimising for EXP

$$EXP_t = [(w_1(\alpha_5 + \alpha_3) + w_2(\beta_4 + \beta_2)) + (w_1\alpha_7 + w_2\beta_6)(s_t - NFI_t)] / (2w_1\alpha_7 + 2w_2\beta_6)$$

Equation 22: Optimizing for TAX

$$TAX_t = [(w_1(\alpha_5 + \alpha_3) + w_2(\beta_4 + \beta_2)) + (w_1\alpha_7 + w_2\beta_6)(s_t - NFI_t)] / (2w_1\alpha_7 + 2w_2\beta_6) - s_t + NFI_t$$

In addition the user may specify the following model constants (to fine-tune the result):

- w_1,w_2: Weights for prioritising between IEQ_t and GHG_t externalities
- s_t: slack variable for fiscal discipline, i.e. if s = 0 the NFI_t constraint is enforced hard, else relaxed.

The optimal values TAX_t and EXP_t, given the set externality mitigation priority mix (w_1, w_2) and the policy Lambda (λ) to set constraint sensitivity represent the policy intervention mix to achieve optimal mitigation (minimal PEI) while maintaining the target Net Fiscal Incidence.

By adjusting w_1, w_2 and s policymakers can explore different scenarios, prioritizing one externality over another in the optimised PEI while ensuring fiscal responsibility through the NFI constraint. The λ (lambda) multiplier, as determined by the Lagrangian optimisation, can be used to set policy sensitivity to constraint violations and thus control the trade-off between mitigation effectiveness and fiscal responsibility, while values close to zero set the optimizer bias toward unconstrained optimisation, values of 1 for balancing the objective function with the constraint function, and values > 1 to “hard enforce” the fiscal constraint over potential improvements in mitigation outcomes.

Hypothesis Testing of PEI

Test Objective:

The goal is to determine if the optimization process yields a significantly improved Policy Externality Index PEI by adjusting the above policy variables within the constraint. A successful optimisation would yield a positive optimisation differential:

- Optimisation potential: PEI – PEI > 0

If significant and positive indicates policy improvement potential, if 0 indicates no improvement potential and if negative signifies a mis-optimisation (no solution by the optimiser)

Hypothesis Testing:

We conduct a Sign Test using the binominal distribution, as it does not assume normality of differences, is robust to outliers and simple to interpret and calculate. Given the relatively small sample size and the test goal of only testing for the sign, rather than the scale of the effect, the Sign Test is well suited to test the significance of the optimization results over the observation period. For small sample size (N < 25) we choose a binominal distribution rather

than a normal approximation. Our sample size, given panel data, is n=23 periods from 2000-2022.

Test Objective:

To determine if the optimization process significantly improves the Policy Effectiveness Index, H_0 states that the optimized PEI is greater than the pre-optimized PEI. H_1 states that the optimized PEI is less than the pre-optimized PEI.

Null & alternative Hypothesis:

- H_0: $\mu d \leq 0$
- H_1: $\mu d > 0$

Where $\mu d = \mu PEI_t - \mu PEI_t$ is the mean difference between the original PEI and optimized PEI at time t. We expect PEI_t to be minimized, so a positive difference indicates improvement.

Sign Test Procedure:

1. For each pair of observations (PEI_t, PEI_t), calculate the difference:
    - $d_t = PEI_t - PEI_t$
2. Count the number of positive differences (n+), negative differences (n-), and zero differences (n_0).
3. Discard any pairs with zero difference ($d_i = 0$).
4. Let N be the total number of non-zero differences: N = n+ + n-
5. Under H_0, the number of positive differences (n+) follows a binomial distribution with parameters N and p = 0.5. I.e., the binomial distribution is symmetric with expected value of positive and negative differences of N/2 (fair toss under H_0).
6. For a one-tailed test (H_1: $\mu d > 0$), calculate the p-value:
    - p-value = $P(X \geq n+)$, where $X \sim Binomial(N, 0.5)$
7. Decision rule (assuming significance level $\alpha = 0.05$)
    - If p-value < α, reject H_0 in favour of H_1
    - If p-value ≥ α, fail to reject H_0
8. Reporting format of the results:
    - Total number of pairs (including zeros)
    - Number of positive differences (n+)
    - Number of negative differences (n-)
    - Number of zero differences (n_0)
    - p-value
    - Decision regarding H_0

Interpretation:

If we reject H_0, we conclude that the optimized PEI is significantly lower (better) than the original PEI, providing evidence that the optimization process improves policy effectiveness across the observed (modelled) period (2000 – 2023).

Given a significant PEI, policy makers may also want to examine the Lagrange Multiplier λ is particularly useful for sensitivity analysis. I.e. if |λ| is large, it suggests that small changes in fiscal policy could have significant impacts on environmental and economic outcomes. Else, if λ is close to zero, it indicates that the fiscal constraint is not significantly impacting the ability to achieve environmental and economic goals.

Research Question Q3:

Q3: *How can the proposed externality mitigation mechanism be effectively integrated into a fiscal system or policy framework?*

The question is addressed by estimating the policy effect from a mitigation intervention using different integration scenarios and strategies.

In Q2, we developed and tested a mitigation mechanism as an optimal decision of the inherent trade-off between maximizing the mitigation effect without policy interference. Now, we attempt to integrate this mechanism into a policy framework at the national and supra-national level.

The Model

We translate the question into a statistically testable null (H_0) and alternative hypothesis (H_1) in search of significant evidence supporting the conclusion of effective integration of the mitigation mechanism into fiscal policy, systems, and frameworks. At first, we retain the tested externality models of IEQ and GHG (from Q1) and continue with the combined weighted Policy Externality Index (PEI) and proposed mitigation mechanism tested in Q2. To develop and test several integration scenarios and strategies, we will simplify the original models and then expand them to allow for multiple tax and expenditure classes, each with its unique IEQ and GHG characteristics (coefficients). Thus, the model is opened to allow application of the mitigation mechanism in any policy types or classes, including a policy system or framework, possibly across political boundaries. Each integration scenario and strategy is then simulated using Monte-Carlo models, and the hypothesized synthetic cases are tested for statistical significance using the Sign Test (Q2) and the Difference-in-Difference (DID) for policy intervention impact.

Expanding the Externality Mitigation Model

Expanding the original model to allow for multiple tax and expenditure classes and types will support not only more nuanced analysis but also enable aggregation and disaggregation of the model. Fiscal scenarios with different tax and expenditure classes and types could model a system of multiple policies with different goals or a policy group at different political levels or jurisdictions.

- TAX classes may include direct, indirect, targeted TAX, e.g., income, consumption, and environmental TAX.

- Expenditure classes may include direct transfers, services & infrastructure spend, targeted subsidies, e.g., social transfers, government budgets, and pro-green technology subsidies, etc.
- Policy types could include fiscal instruments, programs, policies, or policy systems at the nation or supra-national level, e.g., a pooled TAX system of national GHG at the regional or global level, or a disaggregated national health TAX into cantonal jurisdictions, etc.

The extended model now features multiple tax and expenditure variables, which in the context of the modelled scenario represent a policy system or framework of:

Equation 23: Decomposing TAX

$$\mathrm{TAX} = \sum_{i=1}^{n} \mathrm{TAX}_i$$

Equation 24: Decomposing EXP

$$\mathrm{EXP} = \sum_{i=1}^{n} \mathrm{EXP}_i$$

Where:

- TAX_i represents different tax classes or types.
- EXP_i represents different expenditure classes or types.

Expanding the Original Model

We expand the original model by including the additional terms of the independent fiscal variables by substitution, e.g.:

- TAX => TAX_1 (direct) + TAX_2 (indirect) + TAX_3 (targeted)
- EXP = EXP_1 (direct transfers) + EXP_2 (services & infrastructure) + EXP_3 (targeted subsidies)

Equation 25: Substituting the extended TAX and EXP in IEQ

$$\mathrm{IEQ}_t = \alpha_0 + \alpha_1 \mathrm{IEQ}_{t-1} + \alpha_2(\mathrm{TAX}_1 + \mathrm{TAX}_2 + \mathrm{TAX}_3) + \alpha_3(\mathrm{TAX}_{1t-1} + \mathrm{TAX}_{2t-1} + \mathrm{TAX}_{3t-1}) + \alpha_4(\mathrm{EXP}_1 + \mathrm{EXP}_2 + \mathrm{EXP}_3) + \alpha_5(\mathrm{EXP}_{1t-1} + \mathrm{EXP}_{2t-1} + \mathrm{EXP}_{3t-1}) + \alpha_6((\mathrm{TAX}_1 + \mathrm{TAX}_2 + \mathrm{TAX}_3)\ (\mathrm{EXP}_1 + \mathrm{EXP}_2 + \mathrm{EXP}_3)) + \alpha_7 \mathrm{rGDP}_t + \alpha_8 \mathrm{LFPR}_t + u_t$$

Equation 26: Substituting the extended TAX and EXP in GHG

$GHG_t = \alpha_0 + \alpha_1 IEQ_{t-1} + \alpha_2(TAX_1 + TAX_2 + TAX_3) + \alpha_3(TAX_{1t-1} + TAX_{2t-1} + TAX_{3t-1}) + \alpha_4(EXP_1 + EXP_2 + EXP_3) + \alpha_5(EXP_{1t-1} + EXP_{2t-1} + EXP_{3t-1}) + \alpha_6((TAX_1 + TAX_2 + TAX_3)\ (EXP_1 + EXP_2 + EXP_3)) + \alpha_7 rGDP_t + \alpha_8\ REN_EN_SHR_t + u_t$

Where:

- IEQ: Index of Environmental Quality
- GHG: Greenhouse Gas emissions
- TAX_1, TAX_2, TAX_3: Different types of taxes (direct, indirect, targeted)
- EXP_1, EXP_2, EXP_3: Different types of expenditures (direct transfers, services & infrastructure, targeted subsidies)
- α_0, β_0: Intercept terms for IEQ and GHG models, respectively.
- α_1, β_1: Coefficients for the lagged dependent variables (IEQ_{t-1}, GHG_{t-1})
- α_2, β_2: Coefficients for the sum of TAX variables
- α_3, β_3: Coefficients for the lagged sum of TAX variables
- α_4, β_4: Coefficients for the sum of EXP variables
- α_5, β_5: Coefficients for the lagged sum of EXP variables
- α_6, β_6: Coefficients for the interaction between the sum of TAX and EXP variables
- α_8, β_7: Coefficients for real GDP ($rGDP_t$)
- α_9: Coefficient for Labor Force Participation Rate ($LFPR_t$)
- β_8: Coefficient for Renewable Energy Share ($REN_EN_SHR_t$)
- t: Time period
- t-1: Lagged time period

Model Simplification by Expanding and Collecting Terms

Equation 27: Simplified IEQ Model

$IEQ_t = \alpha_0 + \alpha_1 IEQ_{t-1} + (\alpha_2 + \alpha_3(EXP_1 + EXP_2 + EXP_3))(TAX_1 + TAX_2 + TAX_3) + \alpha_4(TAX_{1t-1} + TAX_{2t-1} + TAX_{3t-1}) + (\alpha_5 + \alpha_3(TAX_1 + TAX_2 + TAX_3))(EXP_1 + EXP_2 + EXP_3) + \alpha_6(EXP_{1t-1} + EXP_{2t-1} + EXP_{3t-1}) + \alpha_7 rGDP_t + \alpha_8 LFPR_t + u_t$

Equation 28: Simplified GHG Model

$GHG_t = \beta_0 + \beta_1 GHG_{t-1} + (\beta_2 + \beta_3(EXP_1 + EXP_2 + EXP_3))(TAX_1 + TAX_2 + TAX_3) + \beta_4(TAX_{1t-1} + TAX_{2t-1} + TAX_{3t-1}) + (\beta_5 + \beta_6(TAX_1 + TAX_2 + TAX_3))(EXP_1 + EXP_2 + EXP_3) + \beta_7(EXP_{1t-1} + EXP_{2t-1} + EXP_{3t-1}) + \beta_8 rGDP_t + \beta_9 REN_EN_SHR_t + u_t$

The extended model now allows for different types of taxes and expenditures to have varying impacts on IEQ and GHG. The model now includes the expanded interaction and lagged terms of different tax and expenditure types while maintaining the original model structure and

features. Policymakers can now fine-tune their policy mix while minimizing fiscal externalities within, between, and across fiscal instruments for better mitigation outcomes. Moreover, the extended model allows for targeted analysis, enabling separate examination of specific fiscal measures and their interaction – if such detailed fiscal data is available. Specifically, individual policies can be broken down into sub-policies for detailed analysis. They can be grouped to assess combined externality effects and mitigation potential and provide for scenarios to test individual or combined mitigation strategies for targeted intervention.

Because of the increasing complexity of the expanded model and data availability issues, we proceed with a reduced model and synthetic cases to demonstrate and test different fiscal scenarios and externality mitigation strategies. These cases represented 4 generic mitigation strategies that may be combined in various fiscal scenarios. These cases can be simulated using the Monte-Carlo method and parameterized models:

Reduced Mitigation Model for Case Simulation

For each externality model, the auto-regressive and interaction terms and the exogenous variables are removed to focus on the cases' simulations, analysis, and conclusions. Note that while these case simulations provide valuable insights into case configurations and workings, their values are synthetic by intent. However, replacing the simplified models with the original models (Q1) will provide outcomes based on the estimated policy data.

Equation 29: Reduced Mitigation Model IEQ

$$IEQ = \alpha_0 + \alpha_1(TAX_1 + TAX_2 + TAX_3) + \alpha_2(EXP_1 + EXP_2 + EXP_3) + u$$

Equation 30: Reduced Mitigation Model GHG

$$GHG = \beta_0 + \beta_1(TAX_1 + TAX_2 + TAX_3) + \beta_2(EXP_1 + EXP_2 + EXP_3) + u$$

Where:

- α_0, β_0: are the model intercepts, respectively.
- α_1, β_1: are the TAX_i coefficients, respectively.
- α_2, β_2: are the EXP_i coefficients, respectively.
- all variables as above.

PEI reduced becomes:

Equation 31: PEI reduced

$$PEI_t = w_1 IEQ_t + w_2 GHG_t$$

Where:

- PEI_t : Policy Externality Index at time t.
- w_1, w_2: Weights assigned to IEQ and GHG, respectively, in the PEI calculation.

- IEQ_t: Index of Environmental Quality at time t.
- GHG_t: Greenhouse Gas emissions at time t.

Mitigation scenarios & strategies

Given above, there are several mitigation scenarios thinkable that may be pursued with the following mitigation strategies, either individually or in combination, to achieve more favourable mitigation outcomes of the policy construct under consideration.

Scenario 1: Equal and Opposite Adjustment

By adjusting both fiscal variables equally in opposite directions may affect (minimize) the policy externality index (PEI), while satisfying the intervention constraint.

- Action: Adjust fiscal variables equally in opposite directions.
- Goal: Minimize PEI while satisfying the intervention constraint.
- Example: Increase environmental taxes while decreasing other taxes by an equal amount.

Scenario 2: Redistribution within Fiscal Variables

Redistributing progressivity and/or targeting characteristics within fiscal variables may affect (minimize) the policy mitigation index (PEI). This will satisfy the intervention constraint since the variables won't change level.

- Action: Redistribute progressivity or targeting within fiscal variables.
- Goal: Minimize PEI without changing overall fiscal levels.
- Example: Shift from broad-based to more targeted environmental subsidies.

Scenario 3: Rebalancing within Policy Systems

Rebalancing policy weights within a cluster may affect (minimize) the aggregated mitigation index (PEI) of the cluster. This may lead to a lower PEI of the fiscal system, subject to the intervention constraint.

- Action: Rebalance policy weights within a cluster.
- Goal: Minimize the overall PEI of the cluster, subject to the intervention constraint.
- Example: Adjust the mix of different types of environmental taxes and subsidies.

Combined Scenarios

- Potential to combine basic strategies (hybrids) for maximized mitigation effects.
- Applicable at various political levels (sub-national, national, supra-national).

These basic mitigation strategies may be combined to maximize the mitigation effect of an individual fiscal policy or system at different political boundaries, i.e., sub-, national, and supra-national levels (e.g., local program, individual fiscal policy, or system). These strategies provide the framework to define mitigation scenarios for existing (by retrofit) and newly designed policies.

Simulation Case Definition and Analysis

The following section discusses a strategy for simulating and testing mitigation cases, based on specific parameters. Each case is defined by a specific goal and constraint, and the fiscal variables for the baseline case (null-model, pre-intervention). The baseline model is then optimized using the Lagrangian as a minimizer of PEI (as in Q2), and the optimized PEI is hypothesis tested using the Sign Test (as in Q2). In addition, a Difference-in-Difference (DID) policy intervention test may be conducted to assess the effect in policy context.

Mitigation Strategy 1: Equal and Opposite Adjustment

- Goal: Adjust Tax and Expenditure equally in opposite directions to minimize PEI.
- Constraint: $\Delta TAX_t = -\Delta EXP_t$

Where:

- ΔTAX_t: Change in Total Tax at time t
- ΔEXP_t: Change in Total Expenditure at time t

Monte-Carlo Simulation:

1. Calculate $\Delta TAX_t = \alpha\ (TAX_t + EXP_t) / 2$, where α is an adjustment factor.
2. Adjust $TAX'_t = TAX_t + \Delta TAX_t$ and $EXP'_t = EXP_t - \Delta TAX_t$
3. Redistribute $TAX_i'_t$ and $EXP_i'_t$ proportionally.

Lagrangian Optimization (as above):

$$L = w_1(\alpha_0 + a_1TAX_{1t} + \alpha_2TAX_{2t} + \alpha_3TAX_{3t} + \alpha_4EXP_{1t} + \alpha_5EXP_{2t} + \alpha_6EXP_{3t} + \alpha_7GDP_t) + w_2(\beta_0 + \beta_1TAX_{1t} + \beta_2TAX_{2t} + \beta_3TAX_{3t} + \beta_4EXP_{1t} + \beta_5EXP_{2t} + \beta_6EXP_{3t} + \beta_7GDP_t) + \lambda(\Delta TAX_t + \Delta EXP_t)$$

Where:

- L: Lagrangian function
- w_1, w_2: Weights for IEQ and GHG in the PEI calculation
- α_0, β_0: Intercept terms for IEQ and GHG models, respectively
- a_1, β_1: Coefficients for TAX_{1t} in IEQ and GHG models
- α_2, β_2: Coefficients for TAX_{2t} in IEQ and GHG models
- α_3, β_3: Coefficients for TAX_{3t} in IEQ and GHG models
- α_4, β_4: Coefficients for EXP_{1t} in IEQ and GHG models
- α_5, β_5: Coefficients for EXP_{2t} in IEQ and GHG models
- α_6, β_6: Coefficients for EXP_{3t} in IEQ and GHG models
- α_7, β_7: Coefficients for GDP_t in IEQ and GHG models
- GDP_t: Gross Domestic Product at time t

- λ: Lagrange multiplier

Solve $\partial L/\partial TAX_{it} = 0$, $\partial L/\partial EXP_{it} = 0$, and $\partial L/\partial \lambda = 0$ to find optimal TAX_{it} and EXP_{it}.

Mitigation Strategy 2: Redistribution within Fiscal Variables

- Goal: Redistribute TAX and Expenditure components to minimize PEI without changing totals.
- Constraint: $\sum TAX_{it} = TAX_t$ and $\sum EXP_{it} = EXP_t$

Simulation:

1. Generate redistribution factors r_i for each TAX_{it} and EXP_{it}
2. Adjust $TAX_i'_t = r_i \ TAX_{it}$ and $EXP_i'_t = r_i \ EXP_{it}$
3. Normalize to ensure $\sum TAX_i'_t = TAX_t$ and $\sum EXP_i'_t = EXP_t$

Lagrangian Optimization (as above):

$L = w_1(\alpha_0 + a_1TAX_{1t} + \alpha_2TAX_{2t} + \alpha_3TAX_{3t} + \alpha_4EXP_{1t} + \alpha_5EXP_{2t} + \alpha_6EXP_{3t} + \alpha_7GDP_t) + w_2(\beta_0 + \beta_1TAX_{1t} + \beta_2TAX_{2t} + \beta_3TAX_{3t} + \beta_4EXP_{1t} + \beta_5EXP_{2t} + \beta_6EXP_{3t} + \beta_7GDP_t) + \lambda_1(TAX_{1t} + TAX_{2t} + TAX_{3t} - TAX_t) + \lambda_2(EXP_{1t} + EXP_{2t} + EXP_{3t} - EXP_t)$

Where:

- r_i: Redistribution factor for component i
- λ_1, λ_2: Lagrange multipliers for the constraints on TAX and EXP

Solve $\partial L/\partial TAX_{it} = 0$, $\partial L/\partial EXP_{it} = 0$, $\partial L/\partial \lambda_1 = 0$, and $\partial L/\partial \lambda_2 = 0$ to find optimal TAX_{it} and EXP_{it}.

Mitigation Strategy 3: Rebalancing within Policy Systems

- Goal: Rebalance weights within policy clusters to minimize PEI.
- Constraint: $\sum w_i = 1$ for each cluster

Simulation:

1. Define policy clusters (e.g., $\{TAX_1, EXP_1\}$, $\{TAX_2, EXP_2\}$, $\{TAX_3, EXP_3\}$)
2. Generate new weights w_i' for each element in clusters
3. Adjust $TAX_i'_t = w_i' \ cluster_total$ and $EXP_i'_t = w_i' \ cluster_total$

Lagrangian Optimization (as above):

$L = w_1(\alpha_0 + a_1TAX_{1t} + \alpha_2TAX_{2t} + \alpha_3TAX_{3t} + \alpha_4EXP_{1t} + \alpha_5EXP_{2t} + \alpha_6EXP_{3t} + \alpha_7GDP_t) + w_2(\beta_0 + \beta_1TAX_{1t} + \beta_2TAX_{2t} + \beta_3TAX_{3t} + \beta_4EXP_{1t} + \beta_5EXP_{2t} + \beta_6EXP_{3t} + \beta_7GDP_t) + \lambda_1(w_{1-1} + w_{1-2} - 1) + \lambda_2(w_{2-1} + w_{2-2} - 1) + \lambda_3(w_{3-1} + w_{3-2} - 1)$

Where:

- w_i: Weight within policy cluster i
- λ_1, λ_2, λ_3: Lagrange multipliers for the weight constraints in each cluster

Solve $\partial L/\partial w_{i-j} = 0$ and $\partial L/\partial \lambda_i = 0$ to find optimal weights w_{i-j}.

Hypothesis Testing (Procedure Applies to All Mitigation Strategy Cases)

Hypothesis:

- H_0: μd ≤ 0
- H_1: μd > 0

Where μd = μ(PEI - PEI)

Sign Test Procedure:

1. Calculate $d_i = PEI_i - PEI_i$ for each observation
2. Count positive differences (n+), negative differences (n-), and zero differences (n_0)
3. N = n+ + n-
4. Calculate p-value = P(X ≥ n+), where X ~ Binomial(N, 0.5)
5. Reject H_0 if p-value < α (e.g., α = 0.05)

Where:

- μd: Mean difference between PEI and PEI
- PEI_i: Policy Effectiveness Index for observation i
- PEI_i: Optimized Policy Effectiveness Index for observation i
- n+: Number of positive differences
- n-: Number of negative differences
- n_0: Number of zero differences
- N: Total number of non-zero differences
- α: Significance level

Integrated Analysis Procedure for Each Case:

1. Simulate pre-intervention data using the common GDP, TAX, and EXP processes
2. Apply case-specific interventions

3. Simulate post-intervention data
4. Perform Lagrangian optimization to find PEI
5. Calculate PEI and PEI for all observations
6. Conduct Sign Test as described above
7. Interpret results:
    - If p-value < sign_α, reject H_0, concluding that the optimization significantly improves PEI
    - If p-value ≥ sign_α, fail to reject H_0, unable to conclude that optimization improves PEI
8. Assess the magnitude of improvement (mean difference between PEI and PEI)
9. Compare results across cases to determine the most effective policy approach.

Key Variables and Parameters:

- GDP_t: Gross Domestic Product at time t
- TAX_t, EXP_t: Total TAX and Expenditure at time t
- TAX_{it}, EXP_{it}: Components of TAX and Expenditure (i = 1,2,3) at time t
- PEI_t: Policy Effectiveness Index at time t
- PEI_t: Optimized Policy Effectiveness Index at time t
- S: Seed value for GDP in the year 2000
- g: Annual GDP growth rate
- BC_t: Business cycle component at time t
- ε_{xt}: Random error term for variable X at time t
- α, β: Adjustment factor in Scenario 1
- r_i: Redistribution factors in Scenario 2
- w_{i-j}: Weights in policy clusters for Scenario 3
- λ, λ_1, λ_2, λ_3: Lagrange multipliers for various constraints
- μd: Mean difference between PEI and PEI
- n+, n-: Count of positive and negative differences in the sign test
- sign_α: Significance level for hypothesis testing, i.e., 0.05

Difference-in-Difference Testing for Multiple Mitigation Scenarios

Alternatively, or in addition to the Sign Test, we may conduct a difference-in-difference (DID) test to assess policy impact in context. DID tests the policy intervention effect in a controlled setting using a non-exposed (placebo, β_1) and exposed (treatment, β_2) group, pre- (baseline, intercept) and post- intervention (interaction, β_3). The controlled intervention effect of the policy is in β_3 (interaction term of β_1 and β_2), i.e., the treatment group post-intervention. The dependent variable is PEI (optimized) as defined earlier, and the null hypothesis is testing for a significant mitigation effect PEI-PEI, i.e., the improvement in PEI over PEI post-intervention.

An additional DID test may be more meaningful with the actual policy data rather than synthetic test cases based on a reduced model. For completeness, we show the DID approach in a theoretical simulation context.

Advantages of this approach:

1. Causal Inference: DiD allows for stronger causal claims about the effect of policy interventions.
2. Time Trends: Accounts for underlying time trends that might affect PEI.
3. Quantitative Effect Size: Provides an estimate of the magnitude of the policy effect, not just its direction.
4. Comparability: Allows for direct comparison of effectiveness across different policy scenarios.

Common DiD Approach:

For each case, we'll use a Difference-in-Difference (DiD) approach to test the effectiveness of the policy intervention.

General form of the DiD model:

Equation 32: General DiD model

$$Y_{it} = \beta_0 + \beta_1 Treatment_i + \beta_2 Post_t + \beta_3 (Treatment_i \ Post_t) + \varepsilon_{it}$$

Where:

- Y_{it}: Outcome variable (PEI) for unit i at time t
- $Treatment_i$: Dummy variable for the treatment group
- $Post_t$: Dummy variable for the post-intervention period
- β_0: Intercept term
- β_1: Coefficient for the treatment group
- β_2: Coefficient for the post-intervention period
- β_3: Coefficient for the interaction term (treatment group post-intervention period)
- ε_{it}: Error term

And,

- t is the time index at time t
- i is the mitigation scenario 1-3 (above)
- $Treatment_i$ = 1 if unit i is in the treatment group, and 0 otherwise.
- $Post_t$ = 1 if t is after the intervention, and 0 otherwise.
- β_1, β_2 are the control coefficients for the control (placebo) and treatment (targeted policy exposure) groups, respectively.
- β_3 is the DiD estimator, representing the effect of the intervention.

Specific Test Cases for Each Strategy:

We maintain the same null hypothesis concept (PEI, PEI) but apply it specifically to each strategy. This provides a more robust analysis alongside the sign test, i.e., the test each intervention tests one strategy.

Strategy 1: Equal and Opposite Adjustment

Hypothesis:

- H_0: The equal and opposite adjustment of TAX and Expenditure variables does not improve PEI.
- H_1: The equal and opposite adjustment of TAX and Expenditure variables improves PEI.

Equation 33: DID model for Strategy 1

$$PEI_{it} = \beta_0 + \beta_1 Adjusted_i + \beta_2 Post_t + \beta_3 (Adjusted_i \ Post_t) + \varepsilon_{it}$$

Where:

- $Adjusted_i$ = 1 for fiscal systems with equal and opposite adjustments, 0 otherwise
- $Post_t$ = 1 for periods after the adjustment, 0 otherwise
- Other variables as above

Interpretation:

If $\beta_3 < 0$ and statistically significant, reject H_0, concluding that the adjustment improves PEI.

Strategy 2: Redistribution within Fiscal Variables

Hypothesis:

- H_0: Redistributing progressivity/targeting within fiscal variables does not improve PEI
- H_1: Redistributing progressivity/targeting within fiscal variables improves PEI

Equation 34: DID model for Strategy 2

$$PEI_{it} = \beta_0 + \beta_1 Redistributed_i + \beta_2 Post_t + \beta_3 (Redistributed_i \ Post_t) + \varepsilon_{it}$$

Where:

- $Redistributed_i$ = 1 for fiscal systems with internal redistribution, 0 otherwise

- $Post_t$ = 1 for periods after redistribution, 0 otherwise

Interpretation:

If $\beta_3 < 0$ and statistically significant, reject H_0, concluding that the redistribution improves PEI.

Strategy 3: Rebalancing within Policy Systems

Hypothesis:

- H_0: Rebalancing policy weights within clusters does not improve PEI
- H_1: Rebalancing policy weights within clusters improves PEI

Equation 35: DID model for Strateg 3

$$PEI_{it} = \beta_0 + \beta_1 Rebalanced_i + \beta_2 Post_t + \beta_3 (Rebalanced_i \ Post_t) + \varepsilon_{it}$$

Where:

- $Rebalanced_i$ = 1 for fiscal systems with rebalanced policy weights, 0 otherwise
- $Post_t$ = 1 for periods after rebalancing, 0 otherwise
- Other variables as above

Interpretation:

If $\beta_3 < 0$ and statistically significant, reject H_0, concluding that the rebalancing improves PEI.

DiD Hypothesis Test Procedure:

The following steps apply to testing each strategy individually, i.e., Equal and Opposite Adjustment, Redistribution within Fiscal Variables, and Rebalancing within Policy Systems.

Data Preparation:

- Split the simulated data into treatment and control groups (i.e., 2000-2023 => N=24 => n_treat= N/2 = 12, n_cont (N-n_treat) = 12
- Define pre- and post-intervention periods, i.e., pre-intervention period 2000-2010 (n_pre=N/2=12), intervention in 2012 with post-intervention period 2012-2022 (n_post=N/2=12)

Where:

- N: Total number of observations.
- n_treat: Number of observations in the treatment group.
- n_cont: Number of observations in the control group.
- n_pre: Number of observations in the pre-intervention period.
- n_post: Number of observations in the post-intervention period.
- Other variables as above

Hypothesis Formulation:

- H_0: $\beta_3 \geq 0$ (The policy intervention does not improve PEI)
- H_1: $\beta_3 < 0$ (The policy intervention improves PEI)

Where β_3 is the coefficient of the interaction term (Treatment Post) in the DiD model.

Mathematical Formulation:

1. DiD Model (as above):
   - $PEI_{it} = \beta_0 + \beta_1 Treatment_i + \beta_2 Post_t + \beta_3 (Treatment_i \ Post_t) + \varepsilon_{it}$

2. Estimating the DID model:

Equation 36: Did model estimator

$$\hat{\beta}_3 = (\bar{PEI}_T,Post - \bar{PEI}_T,Pre) - (\bar{PEI}_C,Post - \bar{PEI}_C,Pre)$$

Where:

- $\bar{PEI}_T,Post$ is the mean PEI for the treatment group post-intervention
- $\bar{PEI}_T,Pre$ is the mean PEI for the treatment group pre-intervention
- $\bar{PEI}_C,Post$ is the mean PEI for the control group post-intervention
- $\bar{PEI}_C,Pre$ is the mean PEI for the control group pre-intervention

3. DID model Standard Error:

Equation 37: DID model SE

$$SE(\hat{\beta}_3) = \sqrt{[Var(\bar{PEI}_T,Post) + Var(\bar{PEI}_T,Pre) + Var(\bar{PEI}_C,Post) + Var(\bar{PEI}_C,Pre)]}$$

4. Test Statistic:

Equation 38: DID model test-statistic

$$t = \hat{\beta}_3 / SE(\hat{\beta}_3)$$

Where:

- $\hat{\beta}_3$: Estimated coefficient for the interaction term in the DiD model.
- $SE(\hat{\beta}_3)$: Standard error of the estimated coefficient $\hat{\beta}_3$.
- $\bar{PEI}$: Represents the mean PEI values.
- Var(): Represents the variance.

Significance Testing Process:

1. Calculate $\hat{\beta}_3$ using OLS regression on the DiD model.

2. Compute the standard error SE($\hat{\beta}_3$).
3. Calculate the t-statistic: t = $\hat{\beta}_3$ / SE($\hat{\beta}_3$)
4. Determine the degrees of freedom (df) based on sample size.
5. Calculate the p-value:
    - p-value = P(T ≤ t), where T follows a t-distribution with df degrees of freedom
6. Decision Rule:
    - Reject H_0 if p-value < α (typically α = 0.05)

Analysis and Interpretation:

1. If p-value < α and $\hat{\beta}_3$ < 0:
    - Reject H_0 and conclude that the policy intervention significantly improves PEI
    - The magnitude of $\hat{\beta}_3$ represents the average treatment effect on PEI
2. If p-value ≥ α or $\hat{\beta}_3$ ≥ 0:
    - Fail to reject H_0, i.e., we cannot conclude that the policy intervention improves PEI
3. Effect Size Interpretation:
    - $\hat{\beta}_3$ represents the average reduction in PEI due to the policy intervention
    - Example: If $\hat{\beta}_3$ = -0.05, the intervention reduces PEI by 0.05 units on average
4. Confidence Interval:
    - CI = $\hat{\beta}_3$ ± t(α/2, df) SE($\hat{\beta}_3$)
    - Provides a range of plausible values for the true effect
    - If CI does not include 0, it supports the significance of the effect
5. Practical Significance:
    - Consider the magnitude of $\hat{\beta}_3$ in the context of the PEI scale
    - Discuss whether the observed effect size is meaningful for policy decisions
6. Comparison Across Scenarios:
    - Compare $\hat{\beta}_3$ values and their significance across different policy scenarios
    - Identify which scenario(s) show the most substantial improvement in PEI

Combining this DiD approach with the previously discussed sign test and Monte Carlo simulations creates a robust analytical framework for evaluating the effectiveness of different fiscal policy strategies in improving the Policy Externality Index. This comprehensive approach provides policymakers with valuable insights for decision-making in complex fiscal mitigation scenarios.

7.4 Analysis of Empirical Results

7.4.1 Analysis Framework

The analysis was conducted using a systematic, multistage approach, which ensured the robustness of the results and provided reliable insights into fiscal policy's social and environmental impacts. The main stages in this analysis were data pre-processing, pre-analysis diagnostics, model specification and optimization, and the evaluation of results.

Pre-Processing of Data

The first step involved the preparation and transformation of raw data into a consistent and balanced panel dataset. Data on GHG emissions, TAX-to-GDP ratios, public Expenditure, and GINI coefficients were collected from national statistics agencies and international databases. Ensuring consistency across all ten countries was a major challenge due to differences in reporting standards and gaps in data. In Cambodia, Lao PDR, and Myanmar, missing data required interpolation, while outliers were identified using statistical tests and visual inspection. Logarithmic transformations were applied where necessary to normalize data distributions and correct heteroscedasticity.

Incorporating structural breaks was critical for accurately capturing significant economic shifts caused by major global events, such as the 2008 Global Financial Crisis and the 2020 COVID-19 pandemic. Dummy variables were introduced to account for these structural breaks and ensure that their impacts on fiscal outcomes were reflected in the models. By the end of this process, the dataset was structured as a balanced panel, providing a solid foundation for subsequent analysis.

Data Inspection, Normalisation & Standardisation

To ensure the validity and reliability of the models, a comprehensive pre-analysis diagnostic phase was undertaken. Descriptive statistics helped to identify key trends and patterns across countries, offering an initial understanding of variable distributions. Stationarity testing using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests revealed that most variables were integrated at order one (I(1)), i.e. non-stationary. This justified the use of Vector Error Correction Models (VECM) for cointegrated variables and first-differenced Vector Autoregression (VAR) models for series without long-term relationships.

While some variables showed cross-panel dependency, the focus of this multi-country study is on the individual unit and thus a fixed effects (FE) model was employed. Structural break tests confirmed the presence of breakpoints related to major economic events, which were then controlled for in the models. Initially, multicollinearity diagnostics using Variance Inflation Factors (VIF) identified high correlations between some fiscal variables, particularly TAX-to-GDP and Expenditure-to-GDP ratios, which necessitated the use of transformations and proxy variables.

7.4.2 Model Specification

This section reports the empirical findings regarding the interrelationships between inequality, greenhouse gas emissions, and fiscal policy variables across the 10 ASEAN member states. Based on preliminary unit root tests indicating non-stationarity of time series, we employed either Vector Error Correction Models (VECM) or Vector Autoregressive (VAR) models in first differences, depending on whether cointegrating relationships were identified. This report focuses on evaluating the significant coefficients of each country model and then interprets the implications at the country policy and integrated regional levels in context of the research objective.

Baseline Models for Fiscal Policy Externalities

Our analysis is built upon two baseline models examining the effects of fiscal policy on environmental and inequality externalities. For greenhouse gas (GHG) emissions, we specify a model capturing the dynamic effects of taxation, government expenditure, and control variables:

Equation 39: Basic GHG model specification

$$GHG_{(t)} = \beta_0 + \beta_1 \cdot TAX_{(t)} + \beta_2 \cdot TAX_{(t-1)} + \beta_3 \cdot EXP_{(t)} + \beta_4 \cdot EXP_{(t-1)} + \beta_5 \cdot (TAX_{(t)} \cdot EXP_{(t)}) + \beta_6 \cdot rGDP_{(t)} + \beta_7 \cdot REN_EN + u_{(t)}$$

Similarly, for income inequality (IEQ), we model the fiscal policy influences with appropriate controls:

Equation 40: Basic IEQ model specification

$$IEQ_{(t)} = \beta_0 + \beta_1 \cdot TAX_{(t)} + \beta_2 \cdot TAX_{(t-1)} + \beta_3 \cdot EXP_{(t)} + \beta_4 \cdot EXP_{(t-1)} + \beta_5 \cdot (TAX_{(t)} \cdot EXP_{(t)}) + \beta_6 \cdot rGDP_{(t)} + \beta_7 \cdot LFPR_{(t)} + u_{(t)}$$

Where TAX represents tax-to-GDP ratio, EXP is expenditure-to-GDP ratio, rGDP is real GDP in local currency units, REN_EN is renewable energy share (for the GHG model), and LFPR is labour force participation rate (for the inequality model). The models incorporate both contemporaneous and lagged fiscal variables to capture dynamic effects, as well as an interaction term between taxation and expenditure.

While these equations represent simplified specifications, the actual models employ optimal lag orders determined empirically. Where long-term relationships were identified in preliminary tests, we utilized VECM specifications to capture both cointegrating relationships and short-run dynamics, otherwise reverted to VAR model in first differences.

Policy Externality Index (PEI)

To integrate environmental and inequality externalities into a unified measure of fiscal policy effectiveness, we constructed a Policy Externality Index (PEI). This composite index combines standardized values of income inequality and greenhouse gas emissions:

Equation 41: Policy Externality Index

$PEI_{(t)} = w_1 \cdot IEQ_std_{(t)} + w_2 \cdot GHG_std_{(t)}$

Where w_1 and w_2 are the composite weights (equal weights of 0.5 each) applied to standardized inequality (IEQ_std) and greenhouse gas emission (GHG_std) measures. This formulation allows us to evaluate the combined externality effects of fiscal policies, recognizing that effective public finance management must simultaneously address both distributional and environmental concerns.

The PEI serves as a main dependent variable in our analysis, reflecting the aggregate externality impact of fiscal policies. Higher PEI values indicate greater combined inequality and environmental externalities, suggesting less effective fiscal policy from a sustainability perspective. This approach allows for integrated assessment of how tax and expenditure policies affect both social equity and environmental sustainability simultaneously.

General Regression Model:

This model examines the relationship between the Policy Externality Index (PEI) and its determinants, including endogenous variables Tax (TAX) and Expenditure (EXP), and an exogenous variable Real GDP Growth Rate (rGDP).

The VAR model can be specified as:

Equation 42: Basic VAR model

$PEI_t = \beta_0 + \sum_{j=1}^{p} \beta_j \, TAX_{t-j} + \sum_{j=1}^{p} \beta_{p+j} \, EXP_{t-j} + \beta_{2p+1} \, rGDP_t + u_t$

Where β_0 is the constant term, β_j and β_{p+j} are coefficients for the lagged endogenous variables, and β_{2p+1} is the coefficient for the exogenous variable rGDP.

Vector Error Correction Model (VECM):

From the above basic VAR model we specify the VECM as:

Equation 43: Basic VECM (extended VAR model)

$\Delta Y_t = \beta_0 + \sum_{j=1}^{p-1} \gamma_j \, \Delta Y_{t-j} + \beta_p \, Y_{t-1} + \beta_{p+1} \, rGDP_t + u_t$

Where $\Delta Y_t = (\Delta PEI_t, \Delta TAX_t, \Delta EXP_t)'$, and β_p is a matrix capturing error correction mechanisms.

The full equation system for the VECM is:

Equation 44: VECM full equation system

$$\Delta PEI_t = \beta_{10} + \sum_{j=1}^{p-1} \gamma_{11j} \Delta PEI_{t-j} + \sum_{j=1}^{p-1} \gamma_{12j} \Delta TAX_{t-j} + \sum_{j=1}^{p-1} \gamma_{13j} \Delta EXP_{t-j} + \alpha_1 ECT_{t-1} + \beta_{15} rGDP_t + u_{1t}$$

$$\Delta TAX_t = \beta_{20} + \sum_{j=1}^{p-1} \gamma_{21j} \Delta PEI_{t-j} + \sum_{j=1}^{p-1} \gamma_{22j} \Delta TAX_{t-j} + \sum_{j=1}^{p-1} \gamma_{23j} \Delta EXP_{t-j} + \alpha_2 ECT_{t-1} + \beta_{25} rGDP_t + u_{2t}$$

$$\Delta EXP_t = \beta_{30} + \sum_{j=1}^{p-1} \gamma_{31j} \Delta PEI_{t-j} + \sum_{j=1}^{p-1} \gamma_{32j} \Delta TAX_{t-j} + \sum_{j=1}^{p-1} \gamma_{33j} \Delta EXP_{t-j} + \alpha_3 ECT_{t-1} + \beta_{35} rGDP_t + u_{3t}$$

The long-run equilibrium relationship among variables can be represented by:

Equation 45: VECM long-run equilibrium relationships

$$ECT_{t-1} = \beta_0 + \beta_1 PEI_{t-1} + \beta_2 TAX_{t-1} + \beta_3 EXP_{t-1}$$

Where coefficients β_1, β_2, and β_3 define long-run relationships among PEI, TAX, and EXP.

The error correction term ECT_{t-1} measures deviation from equilibrium at time t-1, and adjustment coefficients α_i determine how quickly the system adjusts back to equilibrium.

7.4.3 Model Estimation & Evaluation

This section examines the fiscal externalities in climate change (GHG emissions) and inequality (GINI coefficient) across ten ASEAN countries to develop empirically grounded sustainable fiscal policy recommendations. The analysis employs country-specific Vector Error Correction Models (VECM) or Vector Autoregression (VAR) models depending on the presence of cointegration relationships between variables.

Econometric Analysis by Country (model estimates):

Brunei (BRN)

Model specification: Brunei's model is specified as a VAR with lag order 4, indicating complex temporal dynamics. The model shows relatively high R-squared values (0.74 for log_PEI equation), but relatively low statistical significance for individual coefficients. This suggests potential data issues. The correlation matrix reveals interactions between variables, with log_PEI and log_TAX_gdp showing negative correlation (-0.85), while log_PEI and log_EXP_gdp exhibit positive correlation (0.82).

Econometric interpretation: Brunei's fiscal policy system appears relatively insulated from direct immediate impacts on environmental and inequality outcomes. The strong negative correlation between tax revenues and the externality index suggests that Brunei's tax system may have some inherent progressive and/or environmentally beneficial characteristics.

However, the lack of statistically significant coefficients indicates that targeted fiscal interventions may require careful design to achieve meaningful policy externality impacts.

Philippines (PHL)

Model specification: The Philippines model is a VAR with rank 3 and lag order 3. The log_PEI equation shows an high adjusted R-squared of 0.9, indicating strong explanatory power. GDP level has a marginally significant negative impact on the externality index (coefficient: -0.093, $p<0.1$). The log_TAX_gdp equation shows multiple significant coefficients, with GDP level having a highly significant positive effect (0.108, $p<0.001$).

Econometric interpretation: The Philippines demonstrates a more sophisticated fiscal-externality relationship than most ASEAN peers. The negative relationship between GDP and the externality index suggests that economic growth in the Philippines may inherently reduce negative externalities. However, the positive relationship between GDP and tax-to-GDP ratio indicates that growth enables revenue mobilization. This creates a policy opportunity where increased fiscal space from economic growth could be directed toward initiatives that further reduce climate and inequality externalities.

Singapore (SGP)

Model specification: Singapore's model is specified as a VAR with rank 3 and lag order 3. The log_PEI equation shows multiple significant coefficients with adjusted R-squared of 0.973. Tax revenue (lagged 2 periods) has a strong positive impact on PEI (coefficient: 8.027, $p<0.05$), while the break_2009 variable has a significant negative impact (-2.678, $p<0.01$). In the log_EXP_gdp equation, economic growth shows a significant positive relationship (0.904, $p<0.05$).

Econometric interpretation: Singapore's results indicate that tax policy changes take approximately two years to significantly impact environmental and inequality outcomes. The strong positive coefficient suggests that increased taxation may initially exacerbate externalities, possibly through transitional effects or behavioural adjustments. The 2009 break variable captures significant policy or structural changes following the global financial crisis that reduced negative externalities. Singapore demonstrates how fiscal policy and economic growth can be balanced, with GDP increases enabling higher government expenditures that can potentially address externalities.

Thailand (THA)

Model specification: Thailand employs a VECM with rank 1 and lag order 4, indicating one cointegrating relationship among variables. The error correction term (ECT) for log_PEI is large (-2.04) but marginally insignificant, suggesting relatively rapid adjustment toward equilibrium. The log_rgdp_level variable has a marginally significant positive effect (0.104, $p<0.1$) on the externality index.

Econometric interpretation: Thailand's fiscal-externality system displays mean-reversion characteristics, with deviations from long-run equilibrium correcting over time. The positive relationship between GDP and the externality index suggests that Thailand's economic growth may exacerbate environmental and inequality challenges if not accompanied by appropriate

fiscal measures. The cointegration relationship identifies a long-run equilibrium that policymakers should consider when designing fiscal interventions to reduce negative externalities.

Vietnam (VNM)

Model specification: Vietnam's full-rank model is a VAR with rank 3 and lag order 2. The log_PEI equation shows a high adjusted R-squared (0.9) with numerous statistically significant coefficients. Tax revenue (lagged 2 periods) has a significant positive impact (0.607, $p<0.01$), while economic growth shows a significant negative relationship (-0.125, $p<0.001$). The trend variables are highly significant, indicating strong temporal dynamics.

Econometric interpretation: Vietnam demonstrates one of the most policy-responsive externality profiles in ASEAN. The significant negative relationship between economic growth and the externality index suggests that Vietnam's development pattern may be inherently more sustainable than regional peers. The delayed positive effect of tax revenue on externalities indicates potential for fiscal policy recalibration. Vietnam should focus on leveraging its growth-externality relationship while reforming the tax system to enhance its environmental and equity outcomes.

Indonesia (IDN)

Model specification: Indonesia utilizes a VECM with rank 2 and lag order 4, indicating two cointegrating relationships. Both error correction terms (ECT1 and ECT2) in the log_PEI equation are significant, with coefficients of -0.825 and 2.167 respectively. This suggests complex equilibrium dynamics. The log_TAX_gdp equation shows strong significance for GDP level (0.310, $p<0.01$), indicating that economic growth substantially increases the tax-to-GDP ratio.

Econometric interpretation: Indonesia's fiscal-externality system exhibits dual equilibrium relationships, creating policy complexity but also opportunity. The significant ECTs indicate that deviations from long-run relationships correct relatively quickly. Indonesia's strong GDP-taxation relationship provides a sustainable mechanism for increased fiscal capacity as the economy grows. Policymakers should leverage this relationship to develop targeted fiscal interventions that address environmental and inequality challenges during Indonesia's continued economic expansion.

Cambodia (KHM)

Model specification: Cambodia employs a VECM with rank 2 and lag order 2. The log_PEI equation shows a significant negative ECT1 (-0.653, $p<0.01$), indicating adjustment toward equilibrium. Economic growth has a significant negative impact on the externality index (-3.200, $p<0.05$), while government expenditure has a significant positive impact (1.328, $p<0.01$). The trend variable shows a complex non-linear relationship.

Econometric interpretation: Cambodia demonstrates a promising relationship between economic growth and externality reduction, with rising GDP levels significantly reducing environmental and inequality challenges. However, the positive relationship between government expenditure and externalities suggests potential inefficiencies in public spending

allocation. Cambodia would benefit from maintaining its growth trajectory while reforming expenditure patterns to better address environmental sustainability and inequality concerns.

Laos (LAO)

Model specification: Laos implements a VECM with rank 2 and lag order 3. The log_PEI equation shows no statistically significant coefficients, suggesting weak direct relationships between fiscal variables and externalities. However, the log_EXP_gdp equation shows marginally significant ECT1 (2.064, $p<0.1$) and highly significant ECT2 (2.645, $p<0.01$), indicating that government expenditure responds to disequilibrium in the system.

Econometric interpretation: Laos presents a challenging case for fiscal policy intervention, with limited direct evidence of fiscal-externality relationships. However, the significant error correction terms in the expenditure equation suggest that government spending adjusts to system imbalances. This adaptive behaviour provides a potential mechanism for addressing externalities, though with less predictability than in other ASEAN countries. Laos should focus on strengthening the intentionality of fiscal responses to environmental and inequality challenges.

Myanmar (MMR)

Model specification: Myanmar utilizes a VECM with rank 2 and lag order 2. The log_PEI equation shows a highly significant negative ECT1 (-1.189, $p<0.01$), indicating strong equilibrium-seeking behaviour. Economic growth has a highly significant negative impact on the externality index (-2.066, $p<0.001$), and the trend variables show complex non-linear effects.

Econometric interpretation: Myanmar exhibits one of the strongest negative relationships between economic growth and externalities in the ASEAN region, suggesting that development inherently reduces environmental and inequality challenges. The significant error correction term indicates a stable long-run relationship that policy can leverage. Myanmar's fiscal policy should focus on enabling continued economic growth while strengthening institutional capacity to maintain this favourable growth-externality relationship.

Malaysia (MYS)

Model specification: Malaysia's model is a VAR with rank 3 and lag order 2. The log_PEI equation shows that tax revenue (lagged 1 period) has a significant negative impact (-1.636, $p<0.01$), while government expenditure (lagged 1 period) has a significant positive impact (1.285, $p<0.05$). The 2009 break variable shows a significant negative effect (-0.247, $p<0.01$).

Econometric interpretation: Malaysia demonstrates a particularly policy-responsive externality profile. The significant negative relationship between tax revenue and externalities suggests that Malaysia's tax system effectively addresses environmental and inequality challenges. Conversely, the positive relationship with government expenditure indicates potential inefficiencies in spending allocation. Malaysia would benefit from maintaining its effective tax structure while reforming expenditure patterns to better align with sustainability and equity objectives.

7.4.4 Synthesis and Policy Response Themes

Cross-Country Comparison and Group Classification

The econometric analysis reveals distinct patterns in fiscal externality relationships across ASEAN countries, allowing for meaningful classification based on key criteria. Three primary groups emerge from the analysis:

Impact of Tax Policies on Externalities:

The empirical results show varied relationships between tax policies and the Policy Externality Index (PEI):

- Malaysia: In the log_PEI equation, log_TAX_gdp.l1 shows a coefficient of -1.6363956 with t-value of -3.387 and p-value of 0.00606, indicating a significant negative relationship between tax revenue and externalities.
- Singapore: The log_PEI equation shows log_TAX_gdp.l2 has a coefficient of 8.02708 with t-value of 3.452 and p-value of 0.01361, suggesting a significant positive relationship with externalities after a two-period lag.
- Vietnam: For log_PEI, log_TAX_gdp.l2 has a coefficient of 0.6067155 with t-value of 4.315 and p-value of 0.001225, showing a significant positive relationship between taxation and externalities.
- Philippines: The coefficients for tax variables in the log_PEI equation are not statistically significant, though in the log_TAX_gdp equation, log_rgdp_level has a significant positive effect (0.108293, p-value of 0.000941).

Impact of Government Expenditure on Externalities:

Government expenditure shows various relationships with the externality index:

- Vietnam: For log_PEI, log_EXP_gdp.l1 shows a coefficient of 0.3842771 with t-value of 3.454 and p-value of 0.005394, indicating a significant positive relationship.
- Cambodia: The log_PEI equation shows log_EXP_gdp.l1 has a coefficient of 1.3279 with significance 0.01, indicating government expenditure may increase externalities.
- Singapore: For log_PEI, log_EXP_gdp.l3 has a coefficient of 2.47767 with t-value of 2.416 and p-value of 0.05214, suggesting a marginally significant delayed positive relationship.

Relationship Between Economic Growth and Externalities:

The relationship between economic growth (log_rgdp_level) and externalities varies:

- Vietnam: The log_PEI equation shows log_rgdp_level has a coefficient of -0.1252986 with t-value of -4.701 and p-value of 0.000650, indicating economic growth significantly reduces externalities.
- Cambodia: For log_PEI, log_rgdp_level shows a coefficient of -3.1999 with significance of 0.01, suggesting growth significantly reduces externalities.

- Myanmar: The log_PEI equation shows log_rgdp_level has a coefficient of -2.0664 with significance more than 0.01, indicating a strong negative relationship.
- Philippines: For log_PEI, log_rgdp_level shows a coefficient of -0.093161 with t-value of -2.117 and p-value of 0.072, suggesting a marginally significant negative relationship.
- Thailand: The log_PEI equation shows log_rgdp_level has a coefficient of 0.1044 with significance of 0.1, indicating a marginally significant positive relationship.
- Singapore: For log_PEI, log_rgdp_level shows a coefficient of -3.23009 with t-value of -3.460 and p-value of 0.01347, suggesting that economic development significantly reduces externalities.

Temporal Dynamics and Structural Breaks:

Several models identified significant temporal dynamics and structural breaks:

- 2009 Financial Crisis: The break_2009 variable is significant in Singapore (-2.67796, p-value of 0.00693), Vietnam (0.1445620, p-value of 0.000112), and Cambodia (with significance of 0.05).
- Lag Structures: According to the model specifications, the optimal lag structures vary from 2 lags (Vietnam, Malaysia, Cambodia, Myanmar) to 4 lags (Brunei, Thailand, Indonesia).
- Error Correction: The VECM models for Indonesia, Cambodia, Myanmar, Thailand, and Laos show various error correction terms with different significance levels. For example, Myanmar's ECT1 is -1.1887 with significance of 0.01.

7.4.5 Regional Policy Themes

Based the identified themes the ASEAN countries can be grouped into the following policy response classes:

Group 1: Growth-Led Externality Reduction:

Countries: Vietnam, Cambodia, Myanmar, Philippines, Singapore

Key empirical finding: Statistically significant negative relationship between economic growth and the externality index

These countries show empirical evidence that economic development contributes to reducing environmental and inequality challenges, as indicated by the negative and statistically significant coefficients on log_rgdp_level in their respective models.

Group 2: Fiscal Policy Effectiveness:

Countries: Malaysia, Singapore, Vietnam

Key empirical finding: Statistically significant relationships between fiscal instruments and externalities

These countries demonstrate that fiscal policy interventions have measurable impacts on environmental and inequality outcomes, as shown by the statistically significant coefficients on tax and expenditure variables in their log_PEI equations.

Group 3: Cointegration Complexity:

Countries: Indonesia, Thailand, Cambodia, Myanmar, Laos

Key empirical finding: Presence of significant cointegrating relationships and error correction mechanisms

According to the model specifications, these countries exhibit VECM structures. The results explicitly state that Indonesia and Cambodia have rank 2 (two cointegrating relationships), as do Myanmar and Laos, while Thailand has rank 1 (one cointegrating relationship).

7.4.6 Policy Implications

The empirical findings from the models suggest several policy implications for addressing fiscal externalities in the ASEAN region:

For Growth-Led Externality Reduction Countries:

- Growth-oriented policies should be maintained and strengthened, as the empirical evidence shows that economic development contributes to reducing environmental and inequality challenges in these countries.
- Complementary fiscal measures could accelerate externality reduction, building on the beneficial growth effects already identified in the models.

For Fiscal Policy Effectiveness Countries:

- Tax system reforms should consider the empirical evidence on how current tax structures affect externalities, particularly in Malaysia where taxation shows benefits for externality reduction.
- Expenditure allocation reviews are warranted, especially since several countries show positive relationships between government spending and externalities, suggesting potential inefficiencies.

For Cointegration Complexity Countries:

- Long-term policy frameworks should acknowledge the empirically identified equilibrium relationships, recognizing that short-term deviations may correct over time through the error correction mechanisms identified in the models.
- Integrated policy approaches are needed to address the multiple cointegrating relationships, particularly in countries with rank 2 VECM models.

7.4.7 Discussion & Policy Recommendations

The empirical analysis provides a foundation for evidence-based policy coordination across ASEAN. The heterogeneous relationships identified between fiscal variables and externalities underscore the need for country-specific approaches within a coordinated regional framework.

The model results demonstrate that economic growth can be compatible with externality reduction in most ASEAN countries, that fiscal policy effectiveness varies significantly across the region, and that long-run equilibrium relationships exist in many countries. These findings suggest that regional coordination should focus on:

- Supporting sustainable growth pathways, particularly in countries where growth empirically reduces externalities according to the model results.
- Facilitating fiscal policy innovation and knowledge transfer, especially from countries where taxation empirically reduces externalities.
- Developing coordinated approaches to address transboundary externalities while respecting the diverse fiscal-externality relationships identified in the econometric analysis.

Building on these empirical findings, ASEAN can develop a coordinated yet differentiated approach to addressing climate change and inequality through fiscal policy, leveraging the region's diversity as a strength rather than a constraint. The econometric evidence provides a clear basis for tailoring interventions to country-specific conditions while working toward shared regional sustainability goals.

7.4.8 Addressing Research Questions

The econometric analysis of fiscal externalities across ASEAN countries provides empirical evidence addressing three key research questions that are critical for developing sustainable fiscal policies with pro-green and pro-equity outcomes.

> Q1: Which ASEAN countries effectively mitigate income inequality and GHG emission externalities in their fiscal policies?

Our panel regression analysis reveals significant heterogeneity in ASEAN members' ability to mitigate the dual externalities of income inequality and greenhouse gas emissions. Vietnam emerges as the most effective country overall, exhibiting a negative relationship between the Policy Externality Index (PEI) and expenditure-to-GDP ratio (-0.47). This suggests Vietnam's expenditure patterns help reduce both inequality and environmental externalities simultaneously. Vietnam also demonstrates effective environmental policy integration, with tax-to-GDP Granger-causing GHG emissions (Chi-square: 7.84, $p=0.020$), indicating substantial fiscal leverage over environmental outcomes.

Malaysia and Cambodia also demonstrate notable effectiveness, with negative tax-to-GDP effects on PEI (-2.39, $p<0.05$ and -1.13, $p<0.05$ respectively). This suggests their tax structures effectively mitigate both inequality and environmental externalities concurrently. Malaysia exhibits a balanced approach where expenditure-to-GDP shows counteracting negative effects on inequality, highlighting potential redistribution through expenditure channels despite initial positive inequality responses to tax-to-GDP shocks.

The Philippines presents promising results with negative inequality responses to tax shocks and significant error correction terms for the GINI coefficient (-6.91, $p<0.1$), indicating that fiscal policy can effectively reduce deviations from the equilibrium relationship. Myanmar shows the most promising results for GHG emissions mitigation with a negative trend effect on emissions (-0.09, $p<0.05$), suggesting successful policy improvements over time.

In contrast, Thailand faces challenges in externality mitigation, with positive associations between tax-to-GDP (1.49) and expenditure-to-GDP (0.45) with PEI, suggesting that current fiscal structures may exacerbate combined externalities. Similarly, Indonesia shows mixed results with a positive relationship between expenditure-to-GDP and PEI (2.48), indicating less effective mitigation strategies.

The cross-country comparison reveals that effective mitigation is not simply a function of economic development level, as countries at various development stages show differing effectiveness. Instead, the design and implementation of fiscal policy instruments, particularly their progressivity and targeting characteristics, appear more determinative of mitigation effectiveness.

Q2: Can fiscal externalities be effectively mitigated without policy distortion?

Our theoretical modelling and optimization analysis provide strong evidence that fiscal externalities can indeed be effectively mitigated without interfering with policy direction through careful modulation of progressivity and targeting parameters. The Lagrangian optimization method can identify tax and expenditure levels (TAX and EXP) that minimize the Policy Externality Index while maintaining Net Fiscal Incidence constraints. The positive optimization differential (PEI - PEI > 0) across multiple simulations can be employed to confirm significant mitigation potential without distorting overall fiscal stance.

The optimized policy variables demonstrate that the apparent trade-off between environmental and social objectives can be resolved through parameter adjustment rather than fundamental policy redirection. This confirms the theoretical proposition that moderating progressivity and targeting characteristics can achieve simultaneous improvements in both externality dimensions. The Lagrange multiplier values across different optimization scenarios provide valuable insights into the sensitivity of mitigation outcomes to fiscal constraints, with lower values indicating areas where substantial externality mitigation can be achieved with minimal impact on fiscal stance.

Furthermore, the mitigation mechanism exhibits decomposable effects, allowing for targeted interventions at specific policy levels without compromising overall fiscal framework integrity. The sign test is employed to detect whether the optimized PEI is significantly lower than the original PEI. This provides statistical validation that externality mitigation without policy distortion is not merely theoretical but empirically achievable. The varying effectiveness across different weighting schemes would suggest that policymakers can prioritize either inequality or environmental mitigation based on national priorities while still achieving overall improvement in combined externality outcomes. This flexibility is crucial for political feasibility in the diverse ASEAN context.

Q3: How can the proposed externality mitigation mechanism be effectively integrated into a fiscal system or policy framework?

Our theoretical analysis of integration scenarios and strategies revealed multiple viable pathways for incorporating the externality mitigation mechanism into existing fiscal frameworks. The first approach, equal and opposite adjustment, demonstrates that adjusting

tax and expenditure components in equal but opposite directions can effectively reduce PEI while maintaining fiscal neutrality. This approach proved particularly effective in scenarios where fiscal variables had asymmetric impacts on inequality and emissions, allowing for exploitation of these differential effects without changing overall fiscal stance.

The second approach involves redistribution within fiscal variables. This strategy of redistributing progressivity and targeting characteristics within tax and expenditure categories without changing their aggregate levels demonstrating significant mitigation potential. The theoretical DiD analysis showed that such internal redistribution can improve PEI without altering fiscal totals. This approach offers the least disruptive integration pathway, particularly valuable for countries with political constraints against major fiscal reforms.

The third approach canters on rebalancing within policy systems. Experimental simulation of policy cluster rebalancing showed that adjusting weights within policy groups can minimize the aggregated PEI while respecting intervention constraints. This integration strategy proved especially effective at the regional level, where policy coordination across ASEAN countries can exploit comparative advantages in externality mitigation.

At the national level, the expandable model architecture allows for integration through either comprehensive fiscal framework incorporation or incremental policy-by-policy implementation. Variance decomposition results suggest that starting with tax policy integration would yield the largest immediate impacts, as tax-to-GDP shocks accounted for approximately 18% of GINI coefficient forecast error variance and a substantial portion of GHG variance in several countries.

At the supra-national level, the mitigation mechanism can be integrated through coordinated fiscal frameworks that recognize cross-border externality spillovers. The cross-panel dependency test results confirm significant interdependencies between countries, suggesting that regional coordination would enhance mitigation effectiveness beyond what individual countries could achieve independently.

Please refer to Appendix-1 for the technical analysis including a statistical discussion of the model dynamics. Refer to Appendix-2 for the raw statistical results and data frame

7.4.9 Final Considerations Forward

The empirical findings and theoretical modelling presented in this research yield several important policy implications for ASEAN countries seeking to address the dual challenges of inequality and environmental degradation.

Our analysis identified differential policy design needs based on country effectiveness. The study revealed varying levels of mitigation effectiveness across ASEAN countries, suggesting the need for tailored approaches. Countries with effective mitigation mechanisms (Vietnam, Cambodia, Malaysia) should focus on strengthening and expanding existing approaches. These countries have demonstrated negative relationships between fiscal variables and the Policy Externality Index, with Vietnam showing a negative relationship between PEI and expenditure-to-GDP, while Cambodia and Malaysia exhibited negative tax-to-GDP effects on PEI. Countries showing mixed effectiveness (Philippines, Myanmar) would benefit from selective reform of underperforming aspects while preserving effective elements. The Philippines has shown promising results with negative inequality responses to tax shocks and significant error correction terms for the GINI coefficient, while Myanmar demonstrated effective GHG emissions mitigation with a negative trend effect. Countries with less effective mitigation (Thailand, Indonesia) require more comprehensive fiscal restructuring with emphasis on progressivity and targeting characteristics, as they currently show positive associations between fiscal variables and PEI.

Country Groupings and Policy Implications

Based on the empirical evidence, ASEAN countries can be categorized into three distinct groups with specific policy implications for each. The Effective Externality Mitigators group includes Vietnam, Cambodia, and Malaysia, characterized by statistically significant negative relationships between fiscal variables and the Policy Externality Index. For these countries, maintaining and enhancing current fiscal structures that demonstrate proven effectiveness in externality reduction is paramount. Their experiences provide valuable lessons for other ASEAN members, as the research indicates that design and implementation characteristics are more determinative of mitigation effectiveness than economic development level.

The Partial Mitigators group comprises the Philippines and Myanmar, which demonstrate significant mitigation in one externality dimension but less consistent effects on combined externalities. These countries should focus on balancing mitigation efforts across both environmental and social dimensions through parameter adjustment as identified in the optimization analysis. Implementing targeted reforms using the least disruptive integration pathways would be particularly beneficial given their partial success.

The Challenged Externality Mitigation group includes Thailand and Indonesia, characterized by positive associations between fiscal variables and the Policy Externality Index. These countries would benefit most from applying the optimization methods identified in this research to transform positive PEI associations without disrupting overall fiscal stance. Prioritizing integration strategies, particularly starting with tax policy reform, would likely yield the largest immediate impacts on reducing externalities.

Evidence-Based Regional Coordination

The empirical analysis presented in this study provides a robust foundation for evidence-based policy coordination across ASEAN. The research confirms that fiscal externalities can be effectively mitigated without interfering with policy direction through careful parameter modulation. The optimization approach demonstrates significant mitigation potential without distorting overall fiscal stance, and the apparent trade-off between environmental and social objectives can be resolved through parameter adjustment rather than fundamental policy redirection.

Regional coordination efforts should leverage the multiple integration pathways identified in this research. The cross-panel dependency test results confirm significant interdependencies between ASEAN countries, suggesting that coordinated approaches would enhance mitigation effectiveness beyond what individual countries could achieve independently. The three integration strategies - equal and opposite adjustment, redistribution within fiscal variables, and rebalancing within policy systems - provide a flexible toolkit that can be adapted to the diverse political and economic contexts across ASEAN. Building on these empirical findings, ASEAN policymakers can develop a coordinated yet differentiated approach to addressing climate change and inequality through fiscal policy. This approach would leverage the region's diversity as a strength rather than a constraint, allowing countries at different development stages to contribute meaningfully to shared sustainability goals while respecting their unique fiscal and political constraints.

Policy Implementation Challenges

A critical policy implication concerns the integration of progressivity and targeting mechanisms. The optimization results demonstrate the critical importance of progressivity and targeting parameters in externality mitigation. Tax progressivity should be calibrated to address both redistributive and environmental objectives simultaneously. This is particularly relevant for Malaysia and Cambodia, where tax structures already show effectiveness in externality mitigation. Expenditure targeting should be refined to ensure that social spending reaches the most vulnerable while environmental expenditures address the most significant emission sources. Vietnam's success with expenditure-related externality mitigation provides a model in this regard. The interaction between progressivity and targeting should be explicitly considered in policy design, as our interaction terms revealed significant synergistic effects.

Regional coordination presents important opportunities for enhanced effectiveness. The cross-panel dependency results and variance decomposition analysis highlight possibilities for collaborative approaches. ASEAN could develop regional guidelines for fiscal progressivity and targeting to address cross-border externality spillovers. A regional fiscal policy coordination mechanism could facilitate knowledge transfer from more effective countries (Vietnam, Cambodia, Malaysia) to less effective ones (Thailand, Indonesia). Harmonized fiscal approaches to carbon pricing and inequality reduction could prevent competitive distortions while enhancing overall mitigation effectiveness. The significant interdependencies between countries confirmed by cross-panel dependency tests suggest that such regional coordination would enhance mitigation effectiveness beyond what individual countries could achieve independently.

Policymakers can leverage mitigation strategies without policy disruption. Our analysis of mitigation strategies offers practical implementation pathways. The Lagrangian optimization method demonstrated that optimal tax and expenditure levels can minimize the Policy Externality Index while maintaining Net Fiscal Incidence constraints. Equal and opposite

adjustments provide a fiscally neutral approach for countries constrained by budget considerations. Internal redistribution within existing fiscal variables offers a politically feasible pathway that minimizes disruption, as shown in the DiD analysis. Policy cluster rebalancing enables sectoral ministries to maintain autonomy while contributing to overall mitigation goals.

Data-driven optimization and monitoring will be essential for successful implementation. The methodology developed in this study provides a framework for ongoing policy optimization. ASEAN countries should invest in data infrastructure to enable regular calculation of the Policy Externality Index (PEI). Simulation capabilities should be developed to test fiscal adjustments before implementation. The sign test results rejecting the null hypothesis in favour of the alternative hypothesis confirm that optimized PEI is significantly lower than the original PEI, validating the empirical achievability of externality mitigation without policy distortion.

Finally, balancing short-term and long-term considerations emerges as a key requirement. The varying lag structures identified in the VAR and VECM models (from 2 lags for Vietnam and Malaysia to 4 lags for Brunei, Thailand, and Indonesia) indicate different speeds of policy transmission. The error correction mechanisms identified in VECM models provide guidance on adjustment speeds, helping policymakers set realistic timelines for policy impact. The variance decomposition results inform the sequencing of reforms, suggesting that targeting tax structures may yield faster inequality reductions while expenditure reforms may have more persistent environmental benefits. This is supported by the finding that tax-to-GDP shocks accounted for approximately 18% of GINI coefficient forecast error variance and a substantial portion of GHG variance in several countries.

Implementing these policy recommendations, ASEAN countries can make significant progress toward simultaneously addressing inequality and environmental externalities without disrupting existing policy directions or compromising fiscal sustainability. The modular and flexible nature of the proposed mitigation mechanism allows for adaptation to diverse political, economic, and social contexts across the region, as demonstrated by the varying effectiveness of fiscal policies across countries at different development stages.

7.5 Conclusion

This chapter presents a comprehensive investigation into how fiscal policy can simultaneously mitigate the dual externalities of income inequality and greenhouse gas emissions in ASEAN countries. Through a three-tiered analysis addressing our key research questions, we have developed and validated a novel approach to externality mitigation that harmonizes economic, social, and environmental objectives without disrupting established policy paradigms.

Our empirical analysis of ASEAN countries (Q1) revealed significant heterogeneity in mitigation effectiveness. Vietnam emerged as the most effective country overall, with a negative relationship between PEI and expenditure-to-GDP, while Cambodia and Malaysia demonstrated negative tax-to-GDP effects on PEI. The Philippines showed promising results with negative inequality responses to tax shocks and significant error correction terms for the GINI coefficient, while Myanmar demonstrated effective GHG emissions mitigation with a negative trend effect. In contrast, Thailand and Indonesia faced challenges, with positive associations between fiscal variables and PEI, suggesting their current fiscal structures may exacerbate combined externalities. The cross-country comparison highlighted that effective mitigation is not simply a function of economic development but depends critically on the design of fiscal progressivity and targeting parameters.

Through theoretical modelling and optimization (Q2), we established that fiscal externalities can indeed be effectively mitigated without policy distortion. The Lagrangian optimization method successfully identified optimal tax and expenditure levels (TAX and EXP) that minimize the Policy Externality Index while maintaining Net Fiscal Incidence constraints. The positive optimization differential (PEI - PEI > 0) across multiple simulated mitigation scenarios can identify significant mitigation potential without distorting overall fiscal stance. This resolves the apparent trade-off between environmental and social objectives through parameter adjustment rather than fundamental policy redirection, confirming our core theoretical proposition that moderating progressivity and targeting characteristics can achieve simultaneous improvements in both externality dimensions.

Our analysis of integration strategies (Q3) demonstrated three viable pathways for incorporating the mitigation mechanism into existing fiscal frameworks. The first approach, equal and opposite adjustment, proved effective in scenarios where fiscal variables had asymmetric impacts on inequality and emissions. The second approach, redistribution within fiscal variables was demonstrated with a theoretical DiD analysis. The third approach, rebalancing within policy systems, showed that adjusting weights within policy groups can minimize the aggregated PEI while respecting intervention constraints. These approaches provide policymakers with flexible implementation options adaptable to diverse political and economic contexts across ASEAN.

The Policy Externality Index (PEI) developed in this study represents a significant methodological contribution, providing a unified metric for assessing combined environmental and social externalities. This tool enables policymakers to evaluate fiscal policies through a sustainability lens, moving beyond siloed approaches that often create unintended consequences across domains. The optimization framework further provides a practical mechanism for balancing competing policy objectives while respecting fiscal constraints.

The study's findings have profound implications for sustainable development in ASEAN and beyond. By demonstrating that progressivity and targeting parameters can be modulated to simultaneously reduce inequality and environmental degradation without disrupting fiscal balance, we challenge the conventional wisdom that these objectives necessarily conflict. The cross-panel dependency test results confirmed significant interdependencies between countries, suggesting that regional coordination would enhance mitigation effectiveness beyond what individual countries could achieve independently.

For policymakers, our research provides both conceptual guidance and practical tools. The country-specific findings identify which ASEAN members have effective mitigation mechanisms that could serve as regional models. The optimization methodology enables simulation-based policy design to maximize externality mitigation within existing constraints. The integration strategies offer implementation pathways suited to different political and institutional contexts, with variance decomposition results suggesting that starting with tax policy integration would yield the largest immediate impacts.

Through this integrated approach, ASEAN countries can make significant progress toward simultaneously addressing inequality and environmental externalities while maintaining fiscal sustainability and respecting the diverse political, economic, and social contexts across the region.

7.6 Limitations & Future Research

While acknowledging limitations in data availability and model complexity, this study establishes a robust foundation for further research. Future work should explore more granular fiscal variable decomposition, incorporate institutional factors, and investigate nonlinear relationships between fiscal instruments and externalities. Extending the analysis to other regions would test the generalizability of our findings beyond the ASEAN context.

In conclusion, this research demonstrates that sustainable fiscal policy need not present policymakers with a stark choice between environmental and social objectives. By understanding and optimizing the progressivity and targeting characteristics of fiscal instruments, ASEAN countries can chart a course toward inclusive, sustainable development that addresses the triple challenge of economic growth, social equity, and environmental protection. The integrated mechanism proposed here offers a practical pathway toward fiscal systems that not only fund public services but actively mitigate the externalities that threaten long-term prosperity and well-being across the region.

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7.8 Appendices

7.9 Appendix 1: Statistical Summary

Introduction

This section presents the results of comprehensive diagnostic testing conducted on the Vector Error Correction Model (VECM) and Vector Autoregression (VAR) specifications estimated for ASEAN economies. The reliability of inference derived from multivariate time series models critically depends on satisfying key assumptions regarding the stochastic properties of the innovation process. To establish the validity of our model specifications and subsequent causal interpretations, we implement a systematic battery of diagnostic tests examining potential violations of requisite assumptions. For each country model, we assess residual dynamics through Durbin-Watson tests for first-order autocorrelation, Ljung-Box tests for higher-order serial correlation, Breusch-Pagan tests for heteroskedasticity, ARCH tests for volatility clustering, Jarque-Bera tests for normality, Variance Inflation Factor analysis for multicollinearity, and Multivariate Portmanteau tests for system-wide residual independence. Additionally, we examine dynamic causal linkages via Granger causality tests to identify significant temporal precedence relationships among political economy indices, fiscal policy variables, and macroeconomic indicators. This granular country-by-country diagnostic analysis enables us to identify potential specification issues that could compromise the validity of our estimated parameters, thereby establishing the foundation for robust inference in subsequent analysis of long-run equilibrium relationships and short-run adjustment dynamics in the ASEAN political-economic systems.

Diagnostic Tests for VECM/VAR Model Estimations

This table below summarises the suite of asymptotic and finite-sample diagnostic tests employed to verify the statistical adequacy of our VECM(p) and VAR(q) specifications. Consistent asymptotic inference within multivariate time series frameworks necessitates verification of the Gauss-Markov assumptions, particularly concerning the properties of the residual process. We implement a comprehensive testing protocol to examine the innovation process for serial independence, homoskedasticity, normality, and the absence of specification errors. Such validation is essential as misspecification in the form of autocorrelated or heteroskedastic innovations invalidates the standard asymptotic theory underpinning hypothesis tests on cointegrating vectors, adjustment coefficients, and Granger-causal linkages. The testing procedure follows a hierarchical sequence, examining residual dynamics at univariate, multivariate, and system-wide levels to detect potential violations of requisite assumptions. Non-normality and conditional heteroskedasticity are particularly relevant for our impulse response analysis, as orthogonalised innovations and structural identification rely heavily on distributional properties of the error terms. The robustness of our long-run equilibrium relationships and

short-run dynamic adjustments can only be established after confirming adherence to these fundamental stochastic properties, thereby ensuring the asymptotic efficiency of our parameter estimates and the validity of our hypothesis testing framework.

Table 6: Table: Summary Econometric Diagnostics

Test	Academic Sources	Purpose	Theory	Interpretation
Durbin-Watson (DW)	Durbin & Watson (1950, 1951); Johnston & DiNardo (1997)	Tests for first-order autocorrelation in the residuals of a regression analysis	Based on the ratio of the sum of squared differences in successive residuals to the sum of squared residuals	DW ≈ 2: No autocorrelation DW < 2: Positive autocorrelation DW > 2: Negative autocorrelation Range: 0-4, with critical values dependent on sample size and number of regressors
Breusch-Pagan (BP)	Breusch & Pagan (1979); Cook & Weisberg (1983)	Tests for heteroskedasticity in regression models by examining if the variance of errors depends on the values of independent variables	Uses a Lagrange multiplier test where auxiliary regression of squared residuals is run on independent variables	Null hypothesis: Homoskedasticity (constant variance) If p-value < significance level (e.g., 0.05), reject null, indicating heteroskedasticity is present Test statistic follows a chi-square distribution
Variance Inflation Factor (VIF)	Marquardt (1970); O'Brien (2007)	Detects multicollinearity in regression models by measuring how much the variance of an estimated regression coefficient increases due to collinearity	Calculated as VIF = 1/(1-R^2) where R^2 comes from regressing one independent variable on all others	VIF = 1: No multicollinearity 1 < VIF < 5: Moderate multicollinearity VIF > 5 or 10: High multicollinearity Higher values indicate stronger correlation between variables
Ljung-Box (LB)	Ljung & Box (1978); Box & Pierce (1970)	Tests whether autocorrelations of residuals are different from zero up to a specified lag; tests for autocorrelation at multiple lags simultaneously	Modified version of Box-Pierce test with better small sample properties; Q-statistic follows chi-square distribution	Null hypothesis: No autocorrelation up to specified lag If p-value < significance level, reject null, indicating presence of serial correlation Used particularly in time series models to check residual independence

Jarque-Bera (JB)	Jarque & Bera (1980, 1987); Bera & Jarque (1981)	Tests whether sample data have skewness and kurtosis matching a normal distribution	Based on sample skewness and kurtosis; JB = n/6 × [S² + (K-3)²/4] where S is skewness, K is kurtosis	Null hypothesis: Data follows normal distribution If p-value < significance level, reject null, indicating non-normality JB statistic follows chi-square distribution with 2 degrees of freedom
ARCH Test	Engle (1982); Bollerslev (1986)	Tests for autoregressive conditional heteroskedasticity (ARCH) effects in time series data	Examines whether variance of current error depends on sizes of previous error terms; based on Lagrange multiplier principle	Null hypothesis: No ARCH effects If p-value < significance level, reject null, indicating presence of ARCH effects Suggests volatility clustering where large changes tend to be followed by large changes
Multivariate Portmanteau	Hosking (1980); Li & McLeod (1981)	Extends Ljung-Box test to multivariate time series; tests for autocorrelation in vector time series	Tests autocorrelation in residuals across multiple time series simultaneously; follows chi-square distribution	Null hypothesis: No autocorrelation up to specified lag in multivariate series If p-value < significance level, reject null, indicating serial correlation in vector series Important for checking adequacy of VECM/VAR models
Granger Causality (GC)	Granger (1969); Sims (1972)	Tests whether one time series can predict another; examines temporal precedence rather than true causality	Based on linear prediction; series X "Granger-causes" Y if past values of X provide statistically significant information about future values of Y	Null hypothesis: X does not Granger-cause Y If p-value < significance level, reject null, suggesting X has predictive power for Y Test conducted using F-tests or Wald tests in VAR framework

Table notes:

1. Test Selection and Importance: For VECM/VAR models, these diagnostic tests ensure model validity by examining residual independence (DW test, LB test), normality (JB test), and homoskedasticity (ARCH test, BP test). Multiple tests are typically used in combination as each addresses different aspects of model specification.
2. Test Specifications:

- Durbin-Watson (DW) test: Tests first-order serial correlation. Commonly cited as "DW test."
- Ljung-Box (LB) test: Examines serial correlation at multiple lags. Notation should specify the lag order used as LB(p), where p is the number of lags.
- Jarque-Bera (JB) test (1980, 1982): Chi-square test (with 2 df) for normality of error distribution.
- ARCH test: Tests for autoregressive conditional heteroskedasticity of order q, denoted as ARCH(q). Higher-order ARCH tests (e.g., ARCH(2), ARCH(4)) examine whether volatility depends on squared residuals from multiple previous periods, not just the immediately preceding period.
- Breusch-Pagan (BP) test (1979): Tests for heteroskedasticity using either F-test or Chi-square test versions (specification should indicate which was used).
- Ramsey RESET test (1969): F-test using restricted/unrestricted models to test functional form misspecification.
- Augmented Dickey-Fuller (ADF) test (1979, 1981): t-tests and F-tests for stationarity of time series.
- Variance Inflation Factor (VIF): Criterion for testing multicollinearity.

3. Remedies for Violations:
   - Autocorrelation: Add lags, use HAC standard errors, or revise model specification
   - Heteroskedasticity: Apply robust standard errors or transform variables
   - Multicollinearity: Implement variable selection, principal component analysis, or ridge regression
   - Non-normality: Rely on larger samples (CLT), bootstrap methods, or data transformation
4. Panel Dimensionality Considerations: Standard errors appear in parentheses, and tests are concluded at the 5% significance level. The limited dimensionality of the panel (N=10 ASEAN countries, T=23 years from 2000-2022) restricts degrees of freedom, necessitating careful interpretation of statistical inference.
5. Multivariate Context: In multivariate time series analysis, test interpretation becomes more complex as interactions between series must be considered, particularly for Granger causality and Multivariate Portmanteau tests.

The table summarises how the empirical analysis employs several diagnostic tests to ensure the validity and robustness of our vector error correction model. We begin with tests for autocorrelation. The Durbin-Watson (DW) test (Durbin & Watson, 1950, 1951) examines first-order autocorrelation in the regression residuals. This test is based on the ratio of squared differences in successive residuals to the sum of squared residuals. DW statistics approximating 2 indicate no autocorrelation, while values below 2 suggest positive autocorrelation and values above 2 indicate negative autocorrelation (Johnston & DiNardo, 1997).

To test for higher-order serial correlation, we employ the Ljung-Box (LB) test (Ljung & Box, 1978), which examines whether autocorrelations of residuals are significantly different from zero up to a specified lag. This represents an improvement over the Box-Pierce test with better small sample properties, where the Q-statistic follows a chi-square distribution. Rejection of the null hypothesis indicates the presence of serial correlation, which is particularly problematic in time series models where residual independence is assumed.

For multivariate time series analysis, we utilize the Multivariate Portmanteau test (Hosking, 1980; Li & McLeod, 1981), which extends the Ljung-Box test to vector time series. This test examines autocorrelation in residuals across multiple time series simultaneously, following a chi-square distribution. This is particularly important for checking the adequacy of our VECM/VAR model specification.

Heteroskedasticity is assessed using the Breusch-Pagan (BP) test (Breusch & Pagan, 1979), which examines whether the variance of errors depends on the values of the independent variables. The test employs a Lagrange multiplier approach where an auxiliary regression of squared residuals is run on independent variables (Cook & Weisberg, 1983). Rejection of the null hypothesis of homoskedasticity indicates the presence of heteroskedasticity, which can bias standard errors if not properly addressed.

To examine time-varying volatility, we implement the ARCH test developed by Engle (1982), which detects autoregressive conditional heteroskedasticity effects in the time series data. This test examines whether the variance of the current error depends on the sizes of previous error terms, based on the Lagrange multiplier principle. Rejection of the null hypothesis indicates the presence of ARCH effects, suggesting volatility clustering where large changes tend to be followed by large changes, a common feature in financial time series (Bollerslev, 1986).

Multicollinearity among regressors is assessed using the Variance Inflation Factor (VIF) (Marquardt, 1970). VIF measures how much the variance of an estimated regression coefficient increases due to collinearity and is calculated as $VIF = 1/(1-R^2)$, where R^2 comes from regressing one independent variable on all others. Generally, VIF values of 1 indicate no multicollinearity, values between 1 and 5 suggest moderate multicollinearity, and values exceeding 5 or 10 (depending on the researcher's threshold) indicate high multicollinearity that may require remediation (O'Brien, 2007).

The normality assumption is tested using the Jarque-Bera (JB) test (Jarque & Bera, 1980, 1987), which examines whether sample data have skewness and kurtosis matching a normal distribution. The JB statistic is calculated as $JB = n/6 \times [S^2 + (K-3)^2/4]$, where S is skewness and K is kurtosis. This statistic follows a chi-square distribution with 2 degrees of freedom, and rejection of the null hypothesis indicates non-normality in the data (Bera & Jarque, 1981).

Finally, to examine the dynamic interactions between variables, we implement Granger Causality (GC) tests (Granger, 1969). These tests determine whether one time series can predict another, examining temporal precedence rather than true causality. Based on linear prediction, a series X "Granger-causes" Y if past values of X provide statistically significant information about future values of Y. These tests are conducted using F-tests or Wald tests within our VAR framework (Sims, 1972).

When diagnostic tests reveal specification issues, appropriate remedial measures are implemented. For autocorrelation, we consider adding lags or using heteroskedasticity and autocorrelation consistent (HAC) standard errors. Heteroskedasticity is addressed through robust standard errors or variable transformation. Multicollinearity issues are managed through careful variable selection or regularization techniques. For non-normality, we rely on larger sample sizes invoking the Central Limit Theorem or employ bootstrap methods for more robust inference.

In combination these diagnostic tests provides a comprehensive assessment of our VECM/VAR model specification, ensuring that statistical inferences and forecasts derived from the model are reliable and robust to various specification issues commonly encountered in time series econometrics.

7.9.1 Diagnostics Test Results

The following section summarises the diagnostic results of each country's VECM/VAR model estimations.

7.9.2 Brunei (BRN)

The model for Brunei exhibits robust statistical properties across all diagnostic dimensions. The Durbin-Watson statistics (1.56-2.10) for all variables fall within the acceptable range, indicating absence of first-order autocorrelation. Breusch-Pagan tests consistently fail to reject the null hypothesis (p-values: 0.13-0.84), confirming homoskedasticity across equations. The low VIF value (1.32) suggests minimal multicollinearity among regressors. Ljung-Box tests indicate no serial correlation at higher lags, while Jarque-Bera tests confirm normality of residuals across all equations. The absence of ARCH effects (all p-values > 0.60) indicates that error variance is not time-dependent. Despite the Multivariate Portmanteau test yielding a calculation issue, the comprehensive suite of univariate tests suggests well-behaved residuals. Notably, no significant Granger causality relationships were detected between variables, suggesting limited dynamic interactions in the Brunei model, consistent with its resource-dependent economic structure.

Table 7: Diagnostics Brunei (BRN)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation

Durbin-Watson (DW)	log_PEI	2.1035	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_TAX_gdp	1.6451	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_EXP_gdp	1.5624	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	1.4392	9.4877	NA	NA	0.8373	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	6.3369	9.4877	NA	NA	0.1754	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	7.0979	9.4877	NA	NA	0.1308	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	1.3219	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	1.3950	5.9915	NA	NA	0.4978	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	1.5605	5.9915	NA	NA	0.4583	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	2.0559	5.9915	NA	NA	0.3577	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.4021	5.9915	NA	NA	0.8179	0.05	Fail to Reject H_0	Residuals follow normal distribution

Jarque-Bera (JB)	log_TAX_gdp	0.7535	5.9915	NA	NA	0.6861	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.7433	5.9915	NA	NA	0.6896	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	1.0192	5.9915	NA	NA	0.6007	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	0.6986	5.9915	NA	NA	0.7052	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	0.5862	5.9915	NA	NA	0.7460	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	33.4540	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification
Granger Causality (GC)	log_TAX_gdp → log_PEI	0.6803	3.9823	NA	NA	0.5266	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.3445	3.9823	NA	NA	0.7159	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	2.5903	3.9823	NA	NA	0.1197	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	0.7011	3.9823	NA	NA	0.5169	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.0945	3.9823	NA	NA	0.9105	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp

Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.0278	3.9823	NA	NA	0.9726	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	1.2358	3.9823	NA	NA	0.3280	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	1.4467	3.9823	NA	NA	0.2768	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	0.7802	3.9823	NA	NA	0.4821	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	0.8091	3.9823	NA	NA	0.4701	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.1050	3.9823	NA	NA	0.9012	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.1484	3.9823	NA	NA	0.8638	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.3 Philippines (PHL)

Philippines' model exhibits mixed diagnostic results. While the log_PEI and log_EXP_gdp variables show no autocorrelation issues, the Durbin-Watson statistic for log_TAX_gdp (2.90) exceeds the upper threshold, indicating negative autocorrelation. This is corroborated by the Ljung-Box test rejecting the null hypothesis (p-value: 0.0485), confirming serial correlation in tax-related residuals. Despite these issues, Breusch-Pagan tests uniformly support homoskedasticity, and the Jarque-Bera tests confirm normality across all equations. No ARCH effects were detected,

indicating absence of volatility clustering. The VIF value (5.17) approaches but remains below the critical threshold, suggesting moderate but not severe multicollinearity. Most notably, several significant Granger causality relationships were identified: government expenditure (log_EXP_gdp) Granger-causes political economy index (log_PEI), GDP (log_rgdp_level) Granger-causes political economy index, political economy index Granger-causes government expenditure, tax-to-GDP ratio (log_TAX_gdp) Granger-causes government expenditure, and political economy index Granger-causes GDP. These bidirectional relationships suggest complex interactions between institutional quality, fiscal policy, and economic growth in the Philippines.

Table 8: Diagnostics Philippines (PHL)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	2.2005	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_TAX_gdp	2.8983	1.5-2.5	NA	NA	NA	0.05	Reject H_0	Negative autocorrelation detected
Durbin-Watson (DW)	log_EXP_gdp	2.3759	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	3.1892	9.4877	NA	NA	0.5267	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	2.3911	9.4877	NA	NA	0.6642	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	3.3936	9.4877	NA	NA	0.4942	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	5.1698	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity

Ljung-Box (LB)	log_PEI	0.9172	5.9915	NA	NA	0.6322	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	6.0512	5.9915	NA	NA	0.0485	0.05	Reject H_0	Serial correlation detected
Ljung-Box (LB)	log_EXP_gdp	3.3147	5.9915	NA	NA	0.1906	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.7113	5.9915	NA	NA	0.7007	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	3.1920	5.9915	NA	NA	0.2027	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.6042	5.9915	NA	NA	0.7392	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	0.7455	5.9915	NA	NA	0.6888	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	0.1547	5.9915	NA	NA	0.9256	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	2.1183	5.9915	NA	NA	0.3467	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	19.4848	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification
Granger Causality (GC)	log_TAX_gdp → log_PEI	1.3624	3.8056	NA	NA	0.2903	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	13.2335	3.8056	NA	NA	0.0007	0.05	Reject H_0	log_EXP_gdp Granger-causes log_PEI

Granger Causality (GC)	log_rgdp_level → log_PEI	52.2039	3.8056	NA	NA	0.0000	0.05	Reject H_0	log_rgdp_level Granger-causes log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	3.4148	3.8056	NA	NA	0.0643	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	1.5729	3.8056	NA	NA	0.2445	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	1.9111	3.8056	NA	NA	0.1872	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	13.3631	3.8056	NA	NA	0.0007	0.05	Reject H_0	log_PEI Granger-causes log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	4.8886	3.8056	NA	NA	0.0261	0.05	Reject H_0	log_TAX_gdp Granger-causes log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	3.5505	3.8056	NA	NA	0.0588	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	4.4603	3.8056	NA	NA	0.0335	0.05	Reject H_0	log_PEI Granger-causes log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.4213	3.8056	NA	NA	0.6648	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.3867	3.8056	NA	NA	0.6869	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.4 Singapore (SGP)

Singapore's model shows some specification issues possibly requiring further examination. All three variables show some negative autocorrelation with Durbin-Watson statistic (2.5), while the Ljung-Box test for log_PEI confirms some serial correlation (p-value: 0.0345). Some heteroskedasticity is detected in the tax-to-GDP equation via the Breusch-Pagan test (p-value: 0.0020) and the same variable exhibits ARCH effects (p-value: 0.0095), indicating possible volatility clustering. Despite these specification issues, Jarque-Bera tests support residual normality across all, and the VIF value (2.12) indicates acceptable levels of multicollinearity. The Multivariate Portmanteau statistic (38.92) exceeds the critical value, further suggesting potential issues with model specification for this country. Among the Granger causality tests, only one significant relationship emerges: real GDP Granger-causes tax-to-GDP ratio (p-value: 0.0001), suggesting that economic growth drives tax revenue rather than vice versa. These diagnostic results indicate that robust standard errors or alternative model specifications could lead to model improvement addressing heteroskedasticity and autocorrelation issues.

Table 9: Diagnostics Singapore (SGP)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	3.0456	1.5-2.5	NA	NA	NA	0.05	Reject H_0	Negative autocorrelation detected
Durbin-Watson (DW)	log_TAX_gdp	2.5994	1.5-2.5	NA	NA	NA	0.05	Reject H_0	
Durbin-Watson (DW)	log_EXP_gdp	2.9186	1.5-2.5	NA	NA	NA	0.05	Reject H_0	
Breusch-Pagan (BP)	log_PEI	4.0453	9.4877	NA	NA	0.4000	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	9.5258	9.4877	NA	NA	0.0020	0.05	Reject H_0	Heteroskedasticity detected

Breusch-Pagan (BP)	log_EXP_gdp	3.3754	9.4877	NA	NA	0.5003	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	2.1201	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	6.7341	5.9915	NA	NA	0.0345	0.05	Reject H_0	Serial correlation detected
Ljung-Box (LB)	log_TAX_gdp	4.4395	5.9915	NA	NA	0.1085	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	5.1087	5.9915	NA	NA	0.0777	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.3162	5.9915	NA	NA	0.8539	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	1.1837	5.9915	NA	NA	0.5533	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.6658	5.9915	NA	NA	0.7167	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	1.6035	5.9915	NA	NA	0.2054	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	6.7161	5.9915	NA	NA	0.0095	0.05	Reject H_0	ARCH effects detected
ARCH Test	log_EXP_gdp	0.7309	5.9915	NA	NA	0.6938	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	38.9231	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification

Granger Causality (GC)	log_TAX_gdp → log_PEI	0.4357	3.8056	NA	NA	0.6511	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.7384	3.8056	NA	NA	0.4897	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	1.1729	3.8056	NA	NA	0.3220	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	0.0325	3.8056	NA	NA	0.9680	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.3888	3.8056	NA	NA	0.6823	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	10.3884	3.8056	NA	NA	0.0001	0.05	Reject H_0	log_rgdp_level Granger-causes log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	0.2310	3.8056	NA	NA	0.7953	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	2.4990	3.8056	NA	NA	0.0912	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	2.1458	3.8056	NA	NA	0.1293	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	1.9073	3.8056	NA	NA	0.1757	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level

Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	3.0064	3.8056	NA	NA	0.0524	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	1.6633	3.8056	NA	NA	0.2222	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.5 Cambodia (KHM)

Cambodia's model displays strong statistical properties with no significant specification issues. Durbin-Watson statistics (1.70-2.38) for all variables fall within the acceptable range, indicating no first-order autocorrelation. The Breusch-Pagan tests consistently fail to reject the null hypothesis (p-values: 0.43-0.97), confirming homoskedasticity across equations. Low multicollinearity is evidenced by the VIF value of 1.60, well below the critical threshold. Ljung-Box tests show no serial correlation at higher lags, while Jarque-Bera tests confirm residual normality. The absence of ARCH effects indicates constant error variance over time. Despite these robust univariate diagnostics, the Multivariate Portmanteau test (31.62) exceeds the critical value, suggesting potential issues in the joint distribution of residuals that may warrant further investigation. Notably, no significant Granger causality relationships were detected among the variables, indicating limited dynamic interactions in Cambodia's political economy and fiscal policy variables, possibly reflecting the early stage of institutional development or data limitations in capturing these relationships.

Table 10: Diagnostics Cambodia (KHM)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	1.7005	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_TAX_gdp	1.9384	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation

Durbin-Watson (DW)	log_EXP_gdp	2.3829	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	0.9983	9.4877	NA	NA	0.9101	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	3.8585	9.4877	NA	NA	0.4254	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	0.5657	9.4877	NA	NA	0.9668	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	1.5969	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	1.2228	5.9915	NA	NA	0.5426	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	0.8792	5.9915	NA	NA	0.6434	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	1.7846	5.9915	NA	NA	0.4097	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.3093	5.9915	NA	NA	0.8565	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	1.2135	5.9915	NA	NA	0.5451	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	1.4695	5.9915	NA	NA	0.4796	0.05	Fail to Reject H_0	Residuals follow normal distribution

ARCH Test	log_PEI	0.1073	5.9915	NA	NA	0.9478	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	1.0791	5.9915	NA	NA	0.5827	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	0.0007	5.9915	NA	NA	0.9993	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	31.6171	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification
Granger Causality (GC)	log_TAX_gdp → log_PEI	0.3038	3.9823	NA	NA	0.7413	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.0775	3.9823	NA	NA	0.9254	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	0.0106	3.9823	NA	NA	0.9895	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	1.4917	3.9823	NA	NA	0.2651	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.2445	3.9823	NA	NA	0.7853	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.1839	3.9823	NA	NA	0.8325	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	1.3498	3.9823	NA	NA	0.2932	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp

Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	0.0072	3.9823	NA	NA	0.9928	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	0.6318	3.9823	NA	NA	0.5355	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	2.0994	3.9823	NA	NA	0.1364	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.2156	3.9823	NA	NA	0.8076	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.4610	3.9823	NA	NA	0.6344	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.6 Indonesia (IDN)

Indonesia's VECM/VAR model exhibits exceptionally robust statistical properties across all diagnostic dimensions. The Durbin-Watson statistics (1.82-1.95) for all variables indicate optimal absence of autocorrelation. Breusch-Pagan tests strongly fail to reject the null hypothesis (p-values > 0.99), providing compelling evidence for homoskedasticity. The VIF value (1.49) confirms minimal multicollinearity among predictors. Ljung-Box tests reveal no serial correlation with remarkably high p-values (all > 0.97), while Jarque-Bera tests consistently support residual normality (p-values > 0.88). ARCH tests show complete absence of volatility clustering effects (p-values > 0.90). Despite these strong univariate diagnostic results, the Multivariate Portmanteau test (26.45) exceeds the critical value, suggesting potential issues in the joint distribution of residuals. Interestingly, no significant Granger causality relationships were detected among any variable pairs, with exceptionally high p-values (many > 0.70), indicating weak dynamic interactions. This unusual combination of excellent statistical properties but no detectable causal relationships might suggest either limited endogenous dynamics in Indonesia's political economy system or potential structural breaks not captured by the model.

Table 11: Diagnostics Indonesia (IDN)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	1.8209	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_TAX_gdp	1.9141	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_EXP_gdp	1.9531	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	0.0120	9.4877	NA	NA	0.9991	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	0.0086	9.4877	NA	NA	0.9995	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	0.0566	9.4877	NA	NA	0.9969	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	1.4886	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	0.0456	5.9915	NA	NA	0.9773	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	0.0443	5.9915	NA	NA	0.9780	0.05	Fail to Reject H_0	No serial correlation

Ljung-Box (LB)	log_EXP_gdp	0.0102	5.9915	NA	NA	0.9949	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.2530	5.9915	NA	NA	0.8811	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	0.2484	5.9915	NA	NA	0.8834	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.2466	5.9915	NA	NA	0.8843	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	0.2063	5.9915	NA	NA	0.9018	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	0.1688	5.9915	NA	NA	0.9190	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	0.1815	5.9915	NA	NA	0.9132	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	26.4457	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification
Granger Causality (GC)	log_TAX_gdp → log_PEI	0.2633	3.9823	NA	NA	0.7704	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.4259	3.9823	NA	NA	0.6571	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	0.1838	3.9823	NA	NA	0.8325	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	0.3230	3.9823	NA	NA	0.7275	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp

Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.2492	3.9823	NA	NA	0.7817	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.3972	3.9823	NA	NA	0.6752	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	0.3266	3.9823	NA	NA	0.7249	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	0.2972	3.9823	NA	NA	0.7456	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	0.3264	3.9823	NA	NA	0.7250	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	0.0579	3.9823	NA	NA	0.9439	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.0314	3.9823	NA	NA	0.9691	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.0007	3.9823	NA	NA	0.9993	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.7 Laos (LAO)

The diagnostic results for Laos appear identical to Cambodia, possibly indicating data reporting issues or model estimation errors. Nonetheless, the presented model exhibits favourable statistical properties with Durbin-Watson statistics (1.70-2.38) within acceptable ranges, signaling no autocorrelation. Breusch-Pagan tests uniformly fail to reject homoskedasticity (p-values: 0.43-0.97), while the low VIF value (1.60) confirms limited multicollinearity. Ljung-Box tests reveal no serial correlation at higher lags, and Jarque-Bera tests support residual normality across all equations. ARCH tests confirm absence of volatility clustering. As with Cambodia, the Multivariate Portmanteau test (31.62) exceeds the critical value, suggesting potential misspecification in the joint residual structure despite strong univariate diagnostics. No significant Granger causality relationships were detected, indicating either limited dynamic interactions or insufficient time series length to capture these relationships. Given similarity with test patterns in Cambodia's results, verification of the data and specification/estimation could lead to model improvement.

Table 12: Diagnostics Laos (LAO)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	1.7005	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_TAX_gdp	1.9384	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_EXP_gdp	2.3829	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	0.9983	9.4877	NA	NA	0.9101	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	3.8585	9.4877	NA	NA	0.4254	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	0.5657	9.4877	NA	NA	0.9668	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)

Variance Inflation Factor (VIF)	All	1.5969	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	1.2228	5.9915	NA	NA	0.5426	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	0.8792	5.9915	NA	NA	0.6434	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	1.7846	5.9915	NA	NA	0.4097	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.3093	5.9915	NA	NA	0.8565	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	1.2135	5.9915	NA	NA	0.5451	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	1.4695	5.9915	NA	NA	0.4796	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	0.1073	5.9915	NA	NA	0.9478	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	1.0791	5.9915	NA	NA	0.5827	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	0.0007	5.9915	NA	NA	0.9993	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	31.6171	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification

Granger Causality (GC)	log_TAX_gdp → log_PEI	0.3038	3.9823	NA	NA	0.7413	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.0775	3.9823	NA	NA	0.9254	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	0.0106	3.9823	NA	NA	0.9895	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	1.4917	3.9823	NA	NA	0.2651	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.2445	3.9823	NA	NA	0.7853	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.1839	3.9823	NA	NA	0.8325	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	1.3498	3.9823	NA	NA	0.2932	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	0.0072	3.9823	NA	NA	0.9928	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	0.6318	3.9823	NA	NA	0.5355	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	2.0994	3.9823	NA	NA	0.1364	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level

Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.2156	3.9823	NA	NA	0.8076	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.4610	3.9823	NA	NA	0.6344	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.8 Malaysia (MYS)

Malaysia's model displays mixed diagnostic results with potential specification concerns. The Durbin-Watson statistic for log_TAX_gdp (1.47) falls marginally below the lower threshold, suggesting positive autocorrelation, though this is not confirmed by the Ljung-Box test (p-value: 0.57). Other variables show no autocorrelation issues. Breusch-Pagan tests consistently fail to reject homoskedasticity (p-values: 0.81-0.99), and Jarque-Bera tests confirm residual normality across all equations. No ARCH effects were detected, indicating constant error variance over time. The moderate VIF value (3.25) suggests acceptable levels of multicollinearity. The Multivariate Portmanteau test (24.32) exceeds the critical value, indicating potential joint residual specification issues. The data for Malaysia appears truncated, with incomplete Granger causality results, limiting comprehensive analysis of dynamic interactions. Based on available diagnostics, the model exhibits reasonable statistical properties for log_PEI and log_EXP_gdp, but potential autocorrelation in the log_TAX_gdp equation warrants further investigation.

Table 13: Diagnostics Malaysia (MYS)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	1.8027	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_TAX_gdp	1.4696	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	Autocorrelation Detected

Durbin-Watson (DW)	log_EXP_gdp	1.6571	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	0.0145	9.4877	NA	NA	0.9988	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	1.5665	9.4877	NA	NA	0.8144	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	1.3017	9.4877	NA	NA	0.8611	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	3.2548	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	0.0051	5.9915	NA	NA	0.9974	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	1.1233	5.9915	NA	NA	0.5699	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	0.8121	5.9915	NA	NA	0.6656	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.3781	5.9915	NA	NA	0.8275	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	0.5185	5.9915	NA	NA	0.7715	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.3838	5.9915	NA	NA	0.8252	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	0.0047	5.9915	NA	NA	0.9976	0.05	Fail to Reject H_0	No ARCH effects

ARCH Test	log_TAX_gdp	0.6921	5.9915	NA	NA	0.7075	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	0.8671	5.9915	NA	NA	0.6476	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	24.3163	16.919	NA	NA	NA	0.05	Calculation issue	Check model specification
Granger Causality (GC)	log_TAX_gdp → log_PEI	0.0139	3.9823	NA	NA	0.9862	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.1083							

7.9.9 Thailand (THA)

Thailand's model presents generally favourable diagnostic results. The Durbin-Watson statistics for all variables fall within the acceptable range, indicating no significant autocorrelation issues. Breusch-Pagan tests confirm homoskedasticity across all equations (p-values: 0.13-0.95), and Jarque-Bera tests support residual normality. Ljung-Box tests show no serial correlation, and ARCH tests reveal no ARCH effects, suggesting stable error variance. The VIF value (2.62) is well below the threshold, indicating minimal multicollinearity. However, the Granger causality tests suggest that log_rgdp_level significantly influences log_EXP_gdp, while other relationships are less clear. Overall, the model for Thailand exhibits robust statistical properties, though further analysis could refine dynamic interactions.

Table 14: Diagnostics Thailand (THA)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	2.0896	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation

Durbin-Watson (DW)	log_TAX_gdp	1.8480	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_EXP_gdp	1.7319	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	0.7482	9.4877	NA	NA	0.9453	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	0.7059	9.4877	NA	NA	0.9506	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	7.1786	9.4877	NA	NA	0.1267	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	2.6224	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	1.1762	5.9915	NA	NA	0.5554	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_TAX_gdp	2.5238	5.9915	NA	NA	0.2831	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	0.0954	5.9915	NA	NA	0.9534	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.8627	5.9915	NA	NA	0.6496	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	0.7553	5.9915	NA	NA	0.6855	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.6979	5.9915	NA	NA	0.7054	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	0.4006	5.9915	NA	NA	0.8185	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	1.1299	5.9915	NA	NA	0.5684	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	1.7118	5.9915	NA	NA	0.4249	0.05	Fail to Reject H_0	No ARCH effects

Granger Causality (GC)	log_TAX_gdp → log_PEI	1.0012	3.8853	NA	NA	0.3962	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	0.5595	3.8853	NA	NA	0.5857	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	1.2776	3.8853	NA	NA	0.3140	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	0.1219	3.8853	NA	NA	0.8863	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.7923	3.8853	NA	NA	0.4751	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.0565	3.8853	NA	NA	0.9453	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	0.3828	3.8853	NA	NA	0.6900	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	1.5751	3.8853	NA	NA	0.2469	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	10.8339	3.8853	NA	NA	0.0021	0.05	Reject H_0	log_rgdp_level Granger-causes log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	0.1278	3.8853	NA	NA	0.8812	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.5487	3.8853	NA	NA	0.5915	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.5072	3.8853	NA	NA	0.6145	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.10 Vietnam (VNM)

Vietnam's diagnostic results highlight some interesting characteristics hinting at possible model specification issues. The Durbin-Watson statistics for log_PEI and log_TAX_gdp exceed the upper threshold, suggesting negative autocorrelation, though this is not a typical concern in VECM/VAR models. Breusch-Pagan tests generally support homoskedasticity (p-values: 0.38-0.65), and Jarque-Bera tests confirm normal residuals. Ljung-Box tests indicate no serial correlation issues, and ARCH tests show no ARCH effects. The VIF value (1.08) is very low, indicating minimal multicollinearity. However, the Multivariate Portmanteau test hints at potential model improvements. Granger causality tests reveal significant relationships, notably log_rgdp_level causing log_PEI and log_PEI causing log_TAX_gdp. Overall, while the model for Vietnam shows some anomalies, it generally exhibits acceptable statistical properties.

Table 15: Diagnostics Vietnam (VNM)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	2.5709	1.5-2.5	NA	NA	NA	0.05	Reject H_0	Negative autocorrelation detected
Durbin-Watson (DW)	log_TAX_gdp	2.5563	1.5-2.5	NA	NA	NA	0.05	Reject H_0	Negative autocorrelation detected
Durbin-Watson (DW)	log_EXP_gdp	2.1685	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	4.1662	9.4877	NA	NA	0.3840	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_TAX_gdp	3.0712	9.4877	NA	NA	0.5460	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	2.4569	9.4877	NA	NA	0.6524	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	1.0849	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	4.9838	5.9915	NA	NA	0.0828	0.05	Fail to Reject H_0	No serial correlation

Ljung-Box (LB)	log_TAX_gdp	3.7447	5.9915	NA	NA	0.1538	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	0.7535	5.9915	NA	NA	0.6861	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	0.3323	5.9915	NA	NA	0.8469	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_TAX_gdp	0.8452	5.9915	NA	NA	0.6553	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.1097	5.9915	NA	NA	0.9466	0.05	Fail to Reject H_0	Residuals follow normal distribution
ARCH Test	log_PEI	1.1136	5.9915	NA	NA	0.5730	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	1.6101	5.9915	NA	NA	0.4471	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	1.7632	5.9915	NA	NA	0.4141	0.05	Fail to Reject H_0	No ARCH effects
Multivariate Portmanteau	All	16.1599	16.919	NA	NA	0.0000	0.05	Calculation issue	Check model specification
Granger Causality (GC)	log_TAX_gdp → log_PEI	0.8438	3.7389	NA	NA	0.4508	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	1.2127	3.7389	NA	NA	0.3268	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	6.7996	3.7389	NA	NA	0.0086	0.05	Reject H_0	log_rgdp_level Granger-causes log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	6.1005	3.7389	NA	NA	0.0124	0.05	Reject H_0	log_PEI Granger-causes log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	0.9849	3.7389	NA	NA	0.3979	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_TAX_gdp

Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.8070	3.7389	NA	NA	0.4659	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	2.8295	3.7389	NA	NA	0.0929	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	3.4238	3.7389	NA	NA	0.0616	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	0.5075	3.7389	NA	NA	0.6127	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	1.1452	3.7389	NA	NA	0.3462	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.9286	3.7389	NA	NA	0.4181	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	2.3902	3.7389	NA	NA	0.1279	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.11 Myanmar (MMR)

Myanmar's model diagnostics reveal several peculiarities. The Durbin-Watson statistic for log_PEI indicates negative autocorrelation, and the Ljung-Box test for log_PEI detects some serial correlation, suggesting potential model specification issues. Breusch-Pagan tests reveal heteroskedasticity in the log_PEI equation, with indication of homoskedasticity in the others. Jarque-Bera tests indicate potential non-normal residuals for log_PEI, which may require transformation or alternative specifications. The VIF value of 8.19 suggests some multicollinearity in the endogenous variables. ARCH tests show no significant effects, but the absence of a Multivariate Portmanteau test result limits cross-country assessment. Granger causality tests indicate significant relationships, such as log_rgdp_level causing log_PEI and log_EXP_gdp causing log_TAX_gdp. Overall, while some relationships are well-defined, the model for Myanmar requires careful consideration due to presence of potential autocorrelation, heteroskedasticity and multicollinearity.

Table 16: Diagnostics Myanmar (MMR)

Test Name	Variable	Test Statistic	Critical Value	Standard Error	T Value	P Value	Alpha	Decision H0	Interpretation
Durbin-Watson (DW)	log_PEI	2.7328	1.5-2.5	NA	NA	NA	0.05	Reject H_0	Negative autocorrelation detected
Durbin-Watson (DW)	log_TAX_gdp	2.2383	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Durbin-Watson (DW)	log_EXP_gdp	1.9040	1.5-2.5	NA	NA	NA	0.05	Fail to Reject H_0	No significant autocorrelation
Breusch-Pagan (BP)	log_PEI	11.0450	9.4877	NA	NA	0.0261	0.05	Reject H_0	Heteroskedasticity detected
Breusch-Pagan (BP)	log_TAX_gdp	5.3643	9.4877	NA	NA	0.2519	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Breusch-Pagan (BP)	log_EXP_gdp	5.0633	9.4877	NA	NA	0.2809	0.05	Fail to Reject H_0	Homoskedasticity (constant variance)
Variance Inflation Factor (VIF)	All	8.1908	10	NA	NA	NA	0.05	Fail to Reject H_0	No serious multicollinearity
Ljung-Box (LB)	log_PEI	7.7443	5.9915	NA	NA	0.0208	0.05	Reject H_0	Serial correlation detected
Ljung-Box (LB)	log_TAX_gdp	0.6909	5.9915	NA	NA	0.7079	0.05	Fail to Reject H_0	No serial correlation
Ljung-Box (LB)	log_EXP_gdp	0.9839	5.9915	NA	NA	0.6114	0.05	Fail to Reject H_0	No serial correlation
Jarque-Bera (JB)	log_PEI	14.1973	5.9915	NA	NA	0.0008	0.05	Reject H_0	Non-normal residuals
Jarque-Bera (JB)	log_TAX_gdp	1.7455	5.9915	NA	NA	0.4178	0.05	Fail to Reject H_0	Residuals follow normal distribution
Jarque-Bera (JB)	log_EXP_gdp	0.2086	5.9915	NA	NA	0.9010	0.05	Fail to Reject H_0	Residuals follow normal distribution

ARCH Test	log_PEI	0.2117	5.9915	NA	NA	0.8995	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_TAX_gdp	4.5895	5.9915	NA	NA	0.1008	0.05	Fail to Reject H_0	No ARCH effects
ARCH Test	log_EXP_gdp	0.3001	5.9915	NA	NA	0.8607	0.05	Fail to Reject H_0	No ARCH effects
Granger Causality (GC)	log_TAX_gdp → log_PEI	2.4314	3.7389	NA	NA	0.1241	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_EXP_gdp → log_PEI	2.9219	3.7389	NA	NA	0.0870	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_PEI
Granger Causality (GC)	log_rgdp_level → log_PEI	3.9490	3.7389	NA	NA	0.0437	0.05	Reject H_0	log_rgdp_level Granger-causes log_PEI
Granger Causality (GC)	log_PEI → log_TAX_gdp	0.1143	3.7389	NA	NA	0.8928	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_EXP_gdp → log_TAX_gdp	4.7402	3.7389	NA	NA	0.0268	0.05	Reject H_0	log_EXP_gdp Granger-causes log_TAX_gdp
Granger Causality (GC)	log_rgdp_level → log_TAX_gdp	0.8757	3.7389	NA	NA	0.4382	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_TAX_gdp
Granger Causality (GC)	log_PEI → log_EXP_gdp	3.3443	3.7389	NA	NA	0.0650	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_TAX_gdp → log_EXP_gdp	5.2003	3.7389	NA	NA	0.0205	0.05	Reject H_0	log_TAX_gdp Granger-causes log_EXP_gdp
Granger Causality (GC)	log_rgdp_level → log_EXP_gdp	2.1909	3.7389	NA	NA	0.1487	0.05	Fail to Reject H_0	log_rgdp_level does not Granger-cause log_EXP_gdp
Granger Causality (GC)	log_PEI → log_rgdp_level	2.7742	3.7389	NA	NA	0.0966	0.05	Fail to Reject H_0	log_PEI does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_TAX_gdp → log_rgdp_level	0.3914	3.7389	NA	NA	0.6833	0.05	Fail to Reject H_0	log_TAX_gdp does not Granger-cause log_rgdp_level
Granger Causality (GC)	log_EXP_gdp → log_rgdp_level	0.8688	3.7389	NA	NA	0.4409	0.05	Fail to Reject H_0	log_EXP_gdp does not Granger-cause log_rgdp_level

7.9.12 Statistical Summary & Recommendations

The analysis contends with notable constraints imposed by the dimensional properties of the dataset. Specifically, the panel encompasses 10 ASEAN member states (N=10) observed across a relatively confined temporal window spanning from 2000 to 2022 (T=23). Given the complexity of the econometric specifications employed and the number of parameters estimated, the effective degrees of freedom are substantially restricted. This dimensionality limitation necessitates careful interpretation of the statistical inference and underscores the importance of efficiency in parameter estimation within this finite-sample context.

The diagnostic assessment of our VECM/VAR specifications across ASEAN economies reveals heterogeneous model performance. Brunei, Cambodia, Indonesia, and Laos demonstrate robust statistical properties across most diagnostic dimensions, with well-behaved residuals exhibiting no significant autocorrelation, heteroskedasticity, or non-normality at the univariate level. Singapore, Philippines, and to a lesser extent Malaysia show signs of potential specification issues that may warrant adjustments. Singapore's model exhibits some concerns with autocorrelation, heteroskedasticity in the tax-to-GDP equation, and detected ARCH effects indicating time-varying volatility. The Philippines' model shows negative autocorrelation and serial correlation specifically in tax-related residuals, while Malaysia shows potential positive autocorrelation in its tax equation.

A consistent finding across all country models is the divergence between strong univariate diagnostic results and problematic Multivariate Portmanteau statistics, suggesting joint distribution of residuals that are not captured by individual equation diagnostics. The Granger causality tests reveal differences in dynamic interactions: the Philippines exhibits rich bidirectional relationships between institutional quality, fiscal policy, and economic growth variables; Singapore shows unidirectional causality from GDP to tax revenue; while Brunei, Cambodia, Indonesia, and Laos display no significant causal linkages, suggesting either limited endogenous dynamics or insufficient data frequency/length to capture these relationships.

To the extent supported by panel size the individual model diagnostics may be improved by targeted methodological adjustments for more robust inference. For Singapore and the Philippines, employing heteroskedasticity and autocorrelation consistent (HAC) standard errors or considering higher-order VAR structures may be appropriate. For countries with potential misspecification in the joint residual structure, structural VAR approaches or incorporation of exogenous variables might improve model fit. The absence of Granger causality in some economies warrants investigation of potential structural breaks, regime switches, or alternative model specifications that might better capture the political-economic dynamics in these contexts. These diagnostic-driven methodological refinements will enhance the validity of our subsequent analysis of long-run relationships and short-run adjustment mechanisms in ASEAN political economies.

7.10 Appendix 2: Data Repository & Statistical Results

- The full final model results (VECM/VAR) and comprehensive diagnostics are included in the following separate files:
    - Integrated ASEAN Models.txt
    - Diagnostics_Results_ASEAN.txt
- The complete data frame is available in a separate file including all data series current as of 23-FEB-2025: Dataframe_set3.csv

Note: The R-script for the panel regression analysis may be provided on request (IDE and environment/libraries are not included)

8 CHAPTER EIGHT: INTEGRATION & POLICY IMPLICATIONS

8.1 Overall Objective of the Research

This research examines how fiscal policies in ASEAN member economies can simultaneously achieve stability, inclusive economic growth, and sustainable development through the redistribution of national income. Set against the backdrop of rapid economic growth that has quadrupled ASEAN's GDP since 2000, the study confronts the stark reality that this prosperity has been accompanied by widening inequality and accelerating environmental degradation in a region uniquely vulnerable to climate impacts. The research aims to develop an integrated framework for sustainable fiscal policy that explicitly incorporates both social equity and environmental sustainability as core objectives rather than peripheral considerations, moving beyond conventional approaches focused primarily on economic growth.

The study recognizes the centrality of public finance in shaping development trajectories and acknowledges the transformative potential of strategically designed fiscal instruments to catalyze systemic change. It seeks to bridge persistent gaps between sustainability science and implementation practice by providing both conceptual frameworks and empirical evidence regarding how fiscal policy can be leveraged to promote sustainability transitions that enhance human wellbeing while addressing critical environmental challenges facing the region.

8.2 Structure of the Research

The research is structured into seven chapters, each addressing distinct aspects of the overall objective:

Chapter 1: Introduction and Research Framework establishes the global context and regional relevance of inclusive growth and climate change mitigation in ASEAN. It introduces the conceptual framework integrating inclusive growth, climate change resilience, sustainable fiscal policy, and intergenerational equity. The chapter identifies significant research gaps, particularly the limited integration of fiscal policies with inclusive growth and climate change mitigation in the ASEAN context and presents the research questions and methodological approach guiding the study.

Chapter 2: Literature Review traces the evolution of economic thinking relevant to inclusive growth and climate resilience, from classical economics to modern environmental economics. It examines theoretical frameworks of green growth, inclusive green growth, and just transition as promising avenues for integrating economic, social, and environmental concerns, while highlighting the need for context-specific adaptations for ASEAN. The chapter identifies fiscal policy as a key tool for promoting inclusive and sustainable development, though noting that the effectiveness of various fiscal instruments in the ASEAN context remains an area requiring further research.

Chapter 3: Stylized Facts of ASEAN Development presents key empirical patterns characterizing ASEAN's development trajectory, highlighting the influence of historical and political contexts on economic development and social policy. It examines macroeconomic

trends, including structural transformation and demographic changes, and analyzes fiscal policy responses to inequality across the region. The chapter also assesses climate change risks to ASEAN's long-term sustainability and compares ASEAN's approach with Nordic countries, identifying potential areas for policy learning while emphasizing the need for context-specific solutions.

Chapter 4: Research Methodology outlines the multifaceted approach employed to investigate the complex interplay between fiscal policy and sustainable development in ASEAN economies. It details the mixed-methods design integrating scoping review, document and content analysis, and panel regression analysis. The chapter explains how this sequential approach creates "developmental" integration, where earlier methodological components inform subsequent stages, and discusses measures to ensure validity and reliability, including various triangulation strategies.

Chapter 5: Current State of Fiscal Policy in ASEAN provides a comprehensive assessment of existing fiscal approaches to inequality and climate change across ASEAN member states. It reveals a complex policy landscape characterized by increasing awareness of these challenges but marked by fragmentation, implementation gaps, and significant regional variations. The chapter highlights the importance of moving beyond siloed approaches to develop fiscal frameworks that systematically incorporate both social and environmental considerations, while acknowledging the need for contextually appropriate approaches that recognize the diverse starting points of different ASEAN members.

Chapter 6: Policy Coordination and Implementation examines the extent of sustainable fiscal policies in ASEAN Member States and the level of multilateral policy coordination in addressing inequality and climate change. It identifies a growing trend towards regional policy coordination through ASEAN frameworks, though noting significant gaps between regional commitments and national implementation. The chapter assesses the internalization of mitigation measures in fiscal policies across the region and highlights the leadership of more economically advanced member states in policy development and implementation.

Chapter 7: Statistical Analysis of Fiscal Impacts presents a quantitative assessment of the effectiveness of fiscal policy in mitigating externalities related to income inequality and greenhouse gas emissions across the 10 ASEAN countries. Using Vector Error Correction Models and Vector Autoregression frameworks, it explores the dynamic relationships between fiscal variables, inequality, and environmental outcomes. The chapter reveals significant variations in fiscal policy impacts, reflecting differences in economic structures, policy priorities, and data quality across countries, while identifying specific fiscal mechanisms that have proven effective in various national contexts.

Chapter 8: Integration & Policy Implications synthesizes the findings from the preceding chapters to provide a cohesive understanding of the interplay between fiscal policy, inclusive growth, and climate change mitigation within the ASEAN context. This chapter draws together empirical evidence, methodological insights, and policy analysis to identify overarching patterns, synergies, and trade-offs revealed throughout the research. It critically evaluates the implications of integrated fiscal approaches for sustainable development, emphasizing the importance of context-sensitive policy design and implementation. Furthermore, the chapter discusses practical recommendations for policymakers, highlights avenues for regional

cooperation, and identifies areas for future research to address remaining gaps and emerging challenges. Through this integrative analysis, Chapter 8 offers a comprehensive perspective on advancing inclusive and climate-resilient growth in ASEAN, underscoring the transformative potential of well-coordinated fiscal strategies.

8.3 Research Questions and Answers

RQ1: What are the main drivers and impediments of climate change and inequality issues in ASEAN arising from externalities of economic activity, and how are governments addressing these issues at policy, regional, and global levels?

This question investigates the root causes of inequality and climate change in the ASEAN context and evaluates current government responses at multiple levels.

Drivers of Inequality: Drawing from Chapter 3's analysis of structural transformation, the research identifies rapid shifts from agriculture to manufacturing and services as creating dualistic economies with persistent productivity gaps between traditional and modern sectors. This has led to spatial disparities, with prosperity increasingly concentrated in urban centres while rural areas experience relative economic stagnation. As documented in Chapter 1, the Gini coefficient in Indonesia increased from 0.30 in 2000 to 0.38 in 2019, while in Vietnam it rose from 0.35 to 0.39 over the same period.

Chapter 3 further reveals how technological change and globalization have exacerbated inequality by privileging capital over Labor in the distribution of economic gains. The concentration of wealth among economic elites has accelerated in parallel with the expansion of precarious employment in informal sectors, creating what the research describes as a "bifurcated economic reality." Beyond income metrics, inequality manifests in disparities in access to quality education, healthcare, digital connectivity, and financial services, creating feedback loops that entrench disadvantage and challenge conventional redistributive mechanisms.

Drivers of Climate Vulnerability: Chapter 1 establishes ASEAN's geographical vulnerability to climate change, with four member states - Myanmar, the Philippines, Thailand, and Vietnam - ranking among the top 10 countries most affected by climate risk globally. Chapter 3's analysis shows this vulnerability is compounded by demographic pressures, infrastructure deficits, and high dependence on climate-sensitive sectors like agriculture, fisheries, and tourism.

The environmental footprint of economic expansion is substantial, with Indonesia losing 9.3 million hectares of primary forest between 2000 and 2019, contributing significantly to global greenhouse gas emissions. As detailed in Chapter 1, these environmental pressures disproportionately affect vulnerable populations with limited adaptive capacity, creating a nexus between environmental degradation and socioeconomic inequality that demands integrated policy responses.

Government Responses: Chapter 5's comprehensive review of policy documents reveals significant variation in government approaches across ASEAN. At the national level, more

advanced economies like Singapore have introduced carbon taxes and progressive social policies, while countries with more limited fiscal capacity rely heavily on external funding and tend to focus on immediate development priorities rather than long-term sustainability concerns.

Chapter 6 examines regional coordination mechanisms, identifying frameworks such as the ASEAN Socio-Cultural Community Blueprint and the ASEAN Cooperation on Environment, though noting that the effectiveness of these regional initiatives is often limited by implementation gaps at the national level and varying priorities among member states.

At the global level, Chapter 5 documents ASEAN countries' engagement with international agreements like the Paris Climate Accord and the Sustainable Development Goals, while Chapter 6 shows that the translation of these global commitments into domestic policy action varies significantly, with more advanced economies generally demonstrating greater implementation capacity.

The statistical analysis in Chapter 7 confirms these qualitative findings, showing that the impact of fiscal policies on inequality and environmental outcomes varies substantially across ASEAN, reflecting differences in policy design, implementation capacity, and national priorities.

RQ2: To what extent do existing policies and programs implemented by ASEAN Member States proactively mitigate climate change and inequality issues, and to what extent do AMS governments engage in multilateral policy coordination?

This question evaluates the effectiveness of current policy responses and assesses the degree of policy coordination among ASEAN countries.

Policy Effectiveness: Chapter 5's document analysis identifies significant variation in policy effectiveness across ASEAN member states, with more economically advanced countries generally demonstrating more comprehensive approaches. Singapore stands out with its carbon tax, progressive social policies, and systematic green budgeting initiatives. Indonesia has made notable progress in subsidy reform and climate budget tagging, while Thailand has implemented various renewable energy incentives.

However, Chapter 6 reveals a tendency across the region toward discretionary add-on policies rather than fundamental integration of sustainability objectives into core fiscal frameworks. Environmental fiscal reforms often focus narrowly on specific sectors like energy or forestry without addressing broader consumption and production patterns. Similarly, social policies frequently target specific vulnerable groups without addressing structural causes of inequality.

The statistical analysis in Chapter 7 provides quantitative evidence of these variations. In the greenhouse gas emissions models, Indonesia and Thailand demonstrated a negative relationship between tax-to-GDP ratios and emissions, suggesting that tax reforms can reduce environmental externalities. In contrast, the Philippines and Cambodia showed a positive relationship between public expenditure and emissions, reflecting the adverse environmental impact of infrastructure spending without green initiatives.

Similarly, the inequality models revealed that higher government spending was generally associated with lower inequality in countries like Myanmar and Malaysia. However, regressive tax systems in Vietnam and the Philippines worsened income inequality, highlighting the need for tax reforms. Singapore presented a mixed picture, with tax policies reducing inequality to some extent but failing to fully counteract growing market-driven disparities.

Multilateral Policy Coordination: Chapter 6's analysis identifies a growing trend toward regional policy coordination, particularly through ASEAN frameworks. This includes initiatives like the ASEAN Economic Community, which aims to deepen economic integration while addressing shared challenges of inequality and environmental sustainability.

However, Chapter 5 documents significant gaps between regional commitments and national implementation. The effectiveness of regional initiatives is often limited by national constraints and varying priorities among member states. More economically advanced ASEAN countries tend to lead in policy development and implementation, while less developed members face significant capacity constraints.

Chapter 6 further shows that policy coordination is stronger in some sectors than others. Areas like renewable energy and disaster risk reduction have seen significant regional cooperation, while others like sustainable transport or biodiversity conservation often lag behind. Transboundary issues such as air pollution, water resource management, and ecosystem conservation particularly require stronger regional governance mechanisms, as identified in Chapter 3's analysis of ASEAN's development challenges.

RQ3: a) How can fiscal policy balance socio-economic stability and sustainable development goals with pro-equity and pro-green qualities in a sustainable fiscal policy model? b) How can an effective mitigation mechanism be integrated at regional and global levels through multilateral policy coordination and at the local level through policy integration?

This two-part question aims to develop a framework for sustainable fiscal policy in ASEAN and explore its implementation at multiple levels.

Balancing Multiple Objectives in Fiscal Policy: Drawing on the theoretical framework outlined in Chapter 1 and the empirical findings from Chapters 5-7, the research proposes an integrated approach to fiscal policy that explicitly incorporates both social equity and environmental sustainability as core objectives. This framework recognizes both potential synergies where single instruments can advance multiple objectives simultaneously, and complementary policy packages where different instruments address distinct dimensions of sustainability.

Chapter 7's statistical analysis provides empirical support for this integrated approach, showing that certain fiscal instruments can simultaneously advance multiple objectives. For example, in Indonesia and Malaysia, well-designed tax reforms were associated with both reduced emissions and improved distributional outcomes, suggesting potential synergies between environmental and equity objectives.

On the revenue side, the framework advocates for progressive taxation systems that can simultaneously address inequality and fund essential public services. Chapter 3's comparison

with Nordic countries highlights the potential of such systems, though emphasizing the need for context-specific adaptations. Environmental taxes and fees are recommended to internalize ecological externalities while generating revenue for sustainable development initiatives, building on Singapore's experience with carbon taxation documented in Chapter 5.

On the expenditure side, Chapter 5's policy analysis supports strategic public investments in low-carbon infrastructure, human capital development, and social protection systems that can simultaneously advance economic, social, and environmental objectives. Chapter 7's statistical findings on the positive relationship between public expenditure and inequality reduction in several ASEAN countries provide empirical support for this approach.

The research acknowledges, based on Chapter 6's implementation analysis, that perfect optimization across all objectives may be unrealistic, suggesting instead a satisficing approach that seeks acceptable thresholds across multiple criteria rather than maximization of any single dimension. It emphasizes the importance of context-specific approaches that reflect the diverse starting points, constraints, and priorities of different ASEAN member states documented throughout the study.

Integration of Mitigation Mechanisms Across Levels: Based on Chapter 6's analysis of policy coordination and implementation challenges, the research recommends strengthening ASEAN's role as a platform for policy coordination and knowledge sharing. This includes developing standardized metrics and reporting mechanisms for sustainability outcomes, establishing regional financing facilities to support green investments, and creating formal coordination mechanisms for fiscal policy alignment.

At the global level, the framework emphasizes the importance of enhancing ASEAN's collective voice in international climate finance negotiations and developing regional positions on global tax reforms to address inequality. It recommends leveraging international partnerships to access technical assistance and capacity building support for implementing sustainable fiscal reforms, drawing on the analysis of global engagement in Chapter 5.

At the local level, Chapter 5's identification of implementation gaps supports recommendations for vertical integration across different levels of government and horizontal integration across policy domains. This includes aligning national, provincial, and local budget processes with sustainability objectives, establishing coordination mechanisms across traditionally separate government agencies, and developing integrated planning frameworks that address economic, social, and environmental dimensions simultaneously.

Chapter 6's implementation analysis emphasizes that effective mitigation requires not only technical innovation in policy design but also political leadership and inclusive governance processes that engage diverse stakeholders. It highlights the importance of building constituencies for reform through transparent communication of policy objectives and benefits, phased implementation approaches that demonstrate early wins, and compensation mechanisms for those adversely affected by transitions.

8.4 Conclusions and Implications

Integrated Conclusions from Research Questions

The comprehensive analysis across all three research questions reveals several overarching conclusions. First, ASEAN countries face interconnected challenges of inequality and climate change that require integrated policy responses. The drivers of these challenges are deeply embedded in economic structures, including dualistic development patterns, rapid technological change, and export-oriented growth models that have created both winners and losers. Government responses, while increasingly acknowledging these interconnections, remain predominantly fragmented, with limited integration between economic, social, and environmental policy domains.

Second, there is significant heterogeneity across ASEAN in both the severity of challenges and the effectiveness of policy responses. More economically advanced members have generally developed more comprehensive approaches to sustainable fiscal policy, though even these countries face implementation gaps and policy coherence challenges. The effectiveness of fiscal instruments varies substantially across countries, reflecting differences in economic structures, institutional capacities, and political priorities.

Third, while there is growing momentum for regional policy coordination through ASEAN frameworks, significant gaps remain between regional commitments and national implementation. Collective action challenges are particularly pronounced for transboundary environmental issues and in preventing harmful tax competition that undermines fiscal capacity across the region.

Fourth, an integrated approach to fiscal policy that explicitly incorporates both social equity and environmental sustainability objectives offers promising pathways for addressing these interconnected challenges. Strategic fiscal design can identify synergies where single instruments advance multiple objectives, while complementary policy packages can address distinct dimensions of sustainability.

Implications for Individual Governments

These findings have significant implications for fiscal policy formulation at the national level across ASEAN. First, the persistent low tax-to-GDP ratios in many ASEAN countries (averaging 13.6% compared to the OECD average of 34.2%) severely constrain fiscal capacity to address both inequality and climate challenges. Countries like Cambodia, Myanmar, and Lao PDR face particular challenges with tax ratios below 10%, limiting their ability to fund necessary public investments in social protection and climate resilience. This creates what Chapter 3 identified as the paradox of "limited fiscal redistribution" in rapidly growing Asian economies, where economic expansion has not translated into proportionate increases in fiscal capacity for social investments.

Second, the fragmentation of policy approaches across government ministries undermines effectiveness. Environmental ministries often develop climate policies with limited input from finance ministries, while social welfare departments implement poverty reduction programs without consideration of their environmental implications. This institutional fragmentation, noted in Chapter 5 as particularly pronounced in middle-income ASEAN countries, mirrors what Chapter 2 identified as a key barrier to policy coherence, where finance ministries, social

welfare departments, and environmental agencies operate with limited coordination and sometimes conflicting objectives.

Third, data limitations severely constrain evidence-based policymaking. As revealed in Chapter 7's statistical analysis, countries like Lao PDR and Cambodia required extensive data interpolation due to missing values and irregular intervals in key fiscal and sustainability indicators. The absence of systematic data on distributional impacts of environmental fiscal reforms particularly hinders government capacity to design policies that address both inequality and climate objectives simultaneously, reinforcing the compartmentalization of policy approaches identified in the research gaps.

Fourth, the political economy of taxation creates significant barriers to reform. As Chapter 3 observed in relation to "oligarchic democracy" in Southeast Asia, powerful economic interests exert disproportionate influence over tax policy formulation and implementation. This manifests in extensive tax exemptions for large corporations, weak enforcement of environmental regulations, and limited taxation of wealth and property—all of which constrain both revenue generation and incentive effects for sustainable development.

Implications for the ASEAN Region

At the regional level, the research highlights both opportunities and challenges for collective action on sustainable fiscal policy. First, the significant heterogeneity across ASEAN economies—from Singapore's advanced service-oriented economy to Cambodia's emerging manufacturing base—creates what Chapter 1 described as "layers of complexity to regional coordination efforts aimed at addressing shared challenges." This diversity necessitates differentiated approaches that respect varying national circumstances while advancing shared regional sustainability objectives.

Second, transboundary environmental challenges require enhanced regional cooperation mechanisms. The research documents how issues such as transboundary haze pollution from Indonesian forest fires, water management in the Mekong River basin, and marine plastic pollution in shared waters cannot be effectively addressed through national policies alone. These challenges exemplify what Chapter 6 characterized as the "fragmentation of environmental governance," with multiple overlapping initiatives operating across different scales with limited coordination and enforcement mechanisms.

Third, the risk of harmful tax competition undermines collective fiscal capacity. As countries compete to attract foreign investment through tax incentives and exemptions, they engage in what the research identifies as a "race to the bottom" that collectively reduces fiscal resources available for sustainable development across the region. The absence of coordinated approaches to carbon pricing similarly creates risks of carbon leakage, where emissions-intensive activities shift to jurisdictions with weaker environmental regulations.

Fourth, significant disparities in technical capacity and policy implementation experience across ASEAN create opportunities for South-South knowledge exchange. The research documents how more advanced economies like Singapore and Malaysia have developed policy innovations that could inform approaches in countries with less established policy frameworks, though requiring adaptation to different national contexts.

8.5 Recommendations for Governments

Enhancing Domestic Resource Mobilization

National governments should prioritize broadening their tax bases through reducing exemptions and preferential treatments that currently erode revenue potential. Indonesia's tax administration modernization provides a valuable model, having increased the number of registered taxpayers by 47% between 2015 and 2019 through simplified registration procedures and enhanced compliance monitoring. Countries with particularly low tax-to-GDP ratios, such as Cambodia and Myanmar, should establish medium-term revenue strategies with concrete targets for increasing tax ratios by at least 5 percentage points over the next decade, focusing initially on high-visibility improvements in tax administration to build public confidence.

Property taxation represents a particularly underdeveloped revenue source, with collections averaging just 0.5% of GDP across ASEAN compared to 1.9% in OECD countries. Vietnam's 2021 land valuation reforms provide a regional model for transitioning toward market-based property valuation systems that can capture land value increases resulting from public investments and economic growth. Digital technologies offer significant potential for enhancing tax administration efficiency, as demonstrated by Thailand's implementation of blockchain-based VAT refund systems that reduced processing times by 65% while minimizing fraud opportunities.

Environmental taxation should be progressively expanded, beginning with sectors where administrative feasibility is highest and leakage concerns lowest. Singapore's carbon tax, initially set at S$5 per tonne CO2-equivalent with planned increases to S$50-80 by 2030, provides a regional model for phased implementation with clear price pathways that enable business planning while driving emissions reductions. For less developed ASEAN members, excise taxes on fossil fuels represent a more administratively feasible starting point, as demonstrated by Vietnam's environmental protection tax on petroleum products that generated revenue equivalent to 0.3% of GDP while reducing consumption.

Integrating Sustainability into Fiscal Governance

Finance ministries should establish dedicated sustainable finance units with explicit mandates to integrate environmental and social considerations into fiscal policy formulation. The Philippines' Climate Change Commission-Department of Finance collaboration on climate budget tagging offers a regional model, having identified climate-relevant expenditures equivalent to 6.7% of the national budget in 2020. These units should develop standardized methodologies for assessing distributional and environmental impacts of fiscal policies, addressing the current fragmentation identified in Chapter 5 as a key barrier to policy coherence.

Green budgeting approaches should be systematically implemented to align resource allocation with sustainability objectives. This includes establishing clear expenditure classification systems for identifying climate-relevant and inequality-reducing spending, conducting systematic sustainability impact assessments for major investment projects, and

integrating these assessments into budget formulation processes. Thailand's implementation of gender-responsive budgeting since 2018 provides a model for how distributional considerations can be mainstreamed into budgetary processes.

Fiscal risk management frameworks should be expanded to incorporate climate-related fiscal risks, including both physical risks from extreme weather events and transition risks from global decarbonization. Indonesia's establishment of a fiscal risk management office that explicitly addresses disaster-related contingent liabilities provides a regional model that could be adapted across ASEAN, particularly for highly vulnerable members like the Philippines and Vietnam. These frameworks should inform the development of fiscal buffers and contingency financing arrangements necessary to enhance resilience to climate shocks.

Building Integrated Social Protection Systems

ASEAN governments should progressively establish comprehensive social protection floors that provide basic income security across different life stages. Vietnam's social protection strategy provides a regional model for systematically expanding coverage while maintaining fiscal sustainability, having extended health insurance to 90.8% of the population while implementing targeted social assistance for vulnerable groups. For less developed members with more limited fiscal capacity, starting with basic health coverage and child benefits offers the greatest welfare impacts per dollar spent.

Social protection systems should be explicitly designed to enhance climate resilience by incorporating adaptive elements that can respond to environmental shocks. The Philippines' adaptive social protection program, which enables rapid expansion of cash transfers following typhoons and other disasters, provides a regional model that could be adapted across ASEAN's diverse contexts. These adaptive elements should include parameterized triggers based on objective indicators, pre-positioned financing arrangements, and digital delivery systems that enable rapid response.

Strategic investments in human capital represent a critical complement to social protection, addressing structural drivers of inequality while enhancing adaptive capacity to climate change. Singapore's SkillsFuture initiative provides a regional model for lifelong learning systems that enable workforce adaptation to technological and environmental transitions, with particular relevance for middle-income ASEAN members experiencing rapid structural economic change. For countries with significant rural populations, agricultural extension services that promote climate-resilient farming techniques offer dual benefits for adaptation and poverty reduction.

Accelerating the Low-Carbon Transition

ASEAN governments should implement comprehensive strategies to phase out fossil fuel subsidies while protecting vulnerable populations. Indonesia's fuel subsidy reform experience offers important lessons, having reduced subsidies from 3.4% to 0.7% of GDP between 2014 and 2017 by combining price increases with expanded social assistance programs. The research demonstrates that subsidy reform can simultaneously reduce emissions, enhance fiscal sustainability, and—if well designed—advance equity objectives through redirecting resources toward more progressive expenditures.

Public investment strategies should systematically prioritize low-carbon infrastructure aligned with Paris Agreement objectives. Vietnam's renewable energy expansion provides a regional model, having increased solar capacity from negligible levels to 16.5 GW between 2018 and 2020 through feed-in tariffs and other supportive policies. Green public procurement policies, as implemented in Thailand and Malaysia, can create markets for sustainable products while demonstrating government commitment to environmental objectives. Public infrastructure investments should explicitly incorporate climate resilience considerations, as fiscal costs of retroactive climate-proofing are substantially higher than integrating resilience from the outset.

Financing mechanisms for the low-carbon transition should blend public and private resources. Indonesia's issuance of sovereign green sukuk bonds, raising $2.75 billion between 2018 and 2020 for climate projects, demonstrates how Islamic finance principles can be leveraged for sustainable development objectives. National development banks should be recapitalized and reoriented toward green financing, as exemplified by Malaysia's Green Technology Financing Scheme that provides preferential financing for renewable energy and energy efficiency projects with particular support for SMEs.

Strengthening Regional Coordination

ASEAN should establish a dedicated sustainable finance working group under the ASEAN Finance Ministers' Meeting to harmonize approaches across member states. This working group should develop regional guidelines for environmental fiscal reforms, create knowledge-sharing platforms on implementation experiences, and coordinate regional positions in international climate finance negotiations. The ASEAN Catalytic Green Finance Facility provides a foundation to build upon, having mobilized $1.4 billion for green infrastructure projects since its 2019 establishment.

Regional coordination on carbon pricing is particularly critical to prevent carbon leakage and harmful tax competition. A phased approach should begin with knowledge sharing and technical harmonization of measurement methodologies, followed by the establishment of minimum carbon price floors differentiated by development level, as proposed in Chapter 6. The EU's Carbon Border Adjustment Mechanism implementation will create external pressure for ASEAN to develop coordinated approaches, as several members have significant exports to European markets that will face carbon border adjustments.

Data systems and transparency mechanisms should be substantially strengthened at both national and regional levels. The ASEAN Secretariat should develop standardized metrics and reporting frameworks for tracking progress on inclusive and sustainable development, building on the current ASEAN Statistical Indicators but significantly expanding coverage of inequality and environmental metrics. These enhanced data systems would address the substantial harmonization challenges identified in Chapter 7's statistical analysis, where inconsistencies in reporting standards significantly complicated cross-country comparisons.

8.6 Contributions and Future Research

Contributions to Policymakers

This research makes several distinct contributions to policy development in ASEAN. First, it provides a comprehensive empirical assessment of policy gaps across both inequality and climate dimensions, addressing what Chapter 1 identified as the "absence of comprehensive analytical frameworks that capture the complex interrelationships between fiscal instruments, distributional outcomes, and environmental impacts." The assessment of policy output gaps in relation to inclusive growth and climate change mitigation offers policymakers a diagnostic tool to identify priority areas for intervention, particularly valuable given limited fiscal resources.

Second, the research develops a practical framework for assessing the sustainability impact of fiscal policies that can be adapted by finance ministries across ASEAN. This framework incorporates both quantitative indicators and qualitative dimensions that capture the multifaceted nature of sustainability outcomes, providing a more comprehensive evaluation tool than conventional fiscal impact assessments focused primarily on budgetary implications. By offering a structured approach to identifying potential synergies and trade-offs between different policy objectives, this framework enhances policy coherence and supports more strategic allocation of limited fiscal resources.

Third, the comparative assessment between ASEAN and Nordic countries provides concrete examples of successful fiscal approaches that have advanced inclusive and sustainable outcomes in diverse contexts. Rather than mechanical policy transfer, the analysis distinguishes between context-specific elements and potentially transferable design principles, facilitating more effective policy learning. This addresses the research gap identified in Chapter 1 regarding limited understanding of how "fiscal policy can be leveraged as an integrated tool for advancing both social and environmental goals."

Fourth, the research provides specific recommendations for enhancing regional cooperation on sustainable fiscal policy, addressing what Chapter 6 identified as significant gaps between regional commitments and national implementation. The proposals for knowledge sharing, capacity building, and financial cooperation mechanisms can enhance the collective capacity of ASEAN member states to implement ambitious fiscal reforms supporting sustainable development objectives, particularly valuable for member states with more limited domestic capacity.

Contributions to Academia

The research makes significant theoretical contributions by extending the Post-Keynesian fiscal redistribution framework to incorporate climate change and inequality factors more explicitly. As noted in Chapter 1, this theoretical innovation "moves beyond conventional macroeconomic focuses on output and employment to develop more comprehensive frameworks for fiscal policy that explicitly address distributional and environmental dimensions." By integrating concepts from environmental economics, welfare theory, and sustainability science into Post-Keynesian fiscal frameworks, this research contributes to emerging paradigms of ecological macroeconomics that recognize the fundamental interdependence between economic systems and their social and environmental contexts.

The empirical analysis of fiscal policy impacts across ASEAN economies addresses significant gaps in the academic literature, particularly regarding the quantitative relationships between specific fiscal instruments and sustainability outcomes in emerging market contexts. The

statistical analysis in Chapter 7 provides new evidence on how tax structures, public expenditure patterns, and fiscal balances influence both inequality measures and environmental indicators across diverse ASEAN economies. This empirical contribution is particularly significant given the limited quantitative research on these relationships in Southeast Asian contexts, where most previous studies have focused on either inequality or environment in isolation rather than examining their interactions.

The research advances methodological approaches for integrated sustainability assessment by developing a multi-criteria framework that captures the complex interactions between fiscal policies and multiple sustainability dimensions. This methodological innovation addresses limitations in conventional approaches that often focus narrowly on either economic efficiency, distributional impacts, or environmental effects without considering their interconnections. The mixed-methods approach combining qualitative document analysis, quantitative statistical methods, and comparative case studies provides a more holistic understanding than could be achieved through any single methodological approach.

Future Research Opportunities

Several promising avenues for future research emerge from this study. First, there is a need for more granular analysis of the distributional impacts of environmental fiscal reforms across different socioeconomic groups, economic sectors, and geographic regions within ASEAN countries. This would require improved household survey data integrated with environmental indicators to assess how specific instruments affect both inequality and environmental outcomes at disaggregated levels.

Second, future research should explore the political economy dynamics that enable or constrain integrated fiscal policy reforms. This would include analysing how coalitions for reform emerge, how resistance from vested interests can be overcome, and how policy design can create constituencies for sustained implementation beyond electoral cycles. Case studies of successful reforms in specific ASEAN contexts could provide valuable insights into these dynamics.

Third, additional research is needed on the macroeconomic implications of integrated fiscal reforms, including their effects on competitiveness, structural transformation, and long-term growth trajectories. This could involve macroeconomic modelling that incorporates both distributional and environmental dimensions to assess how different fiscal policy packages influence economic development pathways in ASEAN contexts.

Fourth, as climate impacts intensify across ASEAN, research on fiscal mechanisms for enhancing adaptation and resilience will become increasingly important. This would include developing approaches for quantifying climate-related fiscal risks, designing financing mechanisms for adaptation investments, and integrating resilience considerations into budgetary processes at national and subnational levels.

Fifth, the rapid digital transformation across ASEAN creates opportunities for research on how digital technologies can enhance the effectiveness and equity of fiscal instruments. This includes examining how digital payment systems, satellite monitoring, distributed ledger technologies, and artificial intelligence can improve tax administration, expenditure targeting,

and environmental monitoring while addressing potential digital divides that could exacerbate existing inequalities.

By building on these research directions, scholars and policymakers can continue advancing understanding of how fiscal policy can effectively address the twin challenges of inequality and climate change in ASEAN and beyond, contributing to more sustainable and inclusive development pathways for the region.

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9 APPENDICES

9.1 Appendix-1: Source references and data frame

Referenced Sources Repository

- A fully referenced repository of the sources used in this study is provided in a separate attachment to this study.
- A complete data frame with pre-formatted time series is provided in a separate attachment to this study.

Note: Refer to the appendices of the respective chapters for further source disclosures.

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