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Unionisation and Firm Performance in China's Manufacturing Industries

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This paper examines the link between unionisation and firm performance in China's manufacturing industries. The empirical results suggest that unionisation has not greatly benefitted workers in China's textile industry but it has contributed to much larger increase in average wages in both domestic and foreign invested firms in communication equipment, computer and other electronic equipment manufacturing industry. In the case of the general equipment manufacturing industry, unionised domestic firms pay higher average wages but there is no link between unionisation and average wage in foreign invested firms.

Key Words: Unionisation; Manufacturing firms; Coarsened exact matching; China.

JEL Codes: J01; J31; J50

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1. Introduction

Prior to the reform process that started in 1978, the Chinese economy was dominated by the agricultural sector. The Chinese economy of today is dominated by an urban-export oriented sector. This transformation resulted in significant migration from rural to urban areas. The number of migrant workers in China is estimated to be in excess of 140 million. Approximately 17.8% of the Chinese population used to live in urban areas in 1978 but this proportion increased to 43% in 2005.¹ Migrant workers have contributed to a significant increase in labour supply in China. However, recent figures suggest that labour supply reached its peak in 2010 (Yao and Zhong, 2013). Massive foreign investment and a significant increase in the minimum wage over the past two decades have contributed to increase in labour cost in China. Knight, Deng and Li (2011) suggest that in 2009 alone there was an increase in the real wages of migrant workers by 17.3%.

Rising prosperity has also coincided with rising income inequality in China. A number of studies have examined various types of income inequalities – e.g., regional income inequality, urban-rural income inequality, skilled-unskilled wage inequality, etc.² In order to address the issue of rising regional inequality, the Chinese government is constantly encouraging foreign firms to invest in the Western provinces. This policy seems to be working and companies like Intel, Hewlett-Packard and Pfizer have shown some interest in taking advantage of relatively more favourable economic conditions in these areas.³ The Chinese government has also raised the minimum wage. Because the cost of living varies

¹ The share of the agricultural sector in GDP and the share of agricultural sector employment as a proportion of total employment have significantly declined (Lee, 2009). Recent years have also witnessed the rapid expansion of the private sector in China (which includes both domestic and foreign firms) at the expense of state owned firms.

² See Anwar and Sun (2012) and references therein.

³ An interesting discussion of the related issues can be found in Lu, et al. (2010) and Wright and Sahni and Zamora (2011).

from region to region, the minimum wage is not the same everywhere. The minimum wage is highest in Shanghai and the lowest in Ningxia (Xu, 2010).⁴ Trade unions can play an important role in addressing the issue of rising income inequality. This paper focuses on the link between unionisation in Chinese firms and firm performance.

There has been a significant increase in unionisation in Chinese firms from 2007. At the grassroots level, the number of trade unions is well in excess of 1.8 million; managed by more than 400,000 full-time and a similar number of part-time union officials (Yao and Zhong, 2013). Unionisation has affected both domestic and foreign invested firms in China. In recent years, there has been a sharp increase in legal action arising from labour disputes. Labour disputes related law suits increased from 45,172 in 2001 to 225,061 in 2008 (Yuan, Jianqi and Wong, 2011). Like all aspects of the society, unions in China are controlled by the Communist Part of China (CPC). With a rapid increase in the number of labour disputes, the unions are finding it hard always to side with the CPC and the employers. The aim of government and the CPC is to minimise and, if possible, totally eliminate disruption to production schedules that could adversely affect China's reputation as a reliable supplier to its international clients.⁵

Since the beginning of the current era of reform and openness in China that started from the late 1970s, labour unions in China have also gone through some changes. In 1992, the Chinese government introduced its new Trade Union Law that defines the nature and functions of the Chinese trade unions. This law highlights the need for union to take a more

⁴ More recent figures on the minimum wage in China can be found in China Briefing (2012).

⁵ Several incidences of labour exploitation in China's export sector have been reported in the media. Notable recent labour disputes include a strike at the Honda plant in 2010 and worker suicides at Foxconn, which is a very large OEM electronics producer (Cunningham and Wasserstrom, 2011). Other studies, such as Nagi (2005), Sum and Nagi (2005) and Chan and Siu (2010) suggest that some domestic firms have been involved in worker exploitation which can take the form of forced overtime. In some cases, Chinese firms have used a voluntary code of conduct to control the workers.

active role in protecting workers interests. Additional rights were granted to labour unions in 1994. The rapid inflow of foreign investment in China coincided with labour shortages and a sharp rise in labour disputes. In an attempt to maintain harmony in the Chinese society, the government granted additional rights to trade unions. The unions play a major role in dispute resolution (Chan, 2010).⁶

Based on their research that mainly covers China's Hainan province in 2004 and 2005, Metcalf and Li (2005) believe that unions are viewed as irrelevant by many workers. They argue that there is a need for effective representation in unions. Collective bargaining which aims to maximise the income of union members does not take place in China.⁷ Yuan, Jianqi and Wong (2011) argue that trade unions do not affect industrial labour income in China. They suggest that inactive trade unions in fact have contributed to a rise in income inequality. They believe that only independent trade unions can have a significant impact on labour income in China. On the other hand, the empirical work of Yao and Zhong (2008 and 2013) suggests that unionisation has resulted in an increase in the hourly wage and pension coverage in China. This study concludes that unionisation has resulted in welfare improvement. Yao and Zhong's work is based on cross-sectional data collected from 1268 firms in 12 cities. They argue that despite government control, unions in China are effective. Their empirical results suggest that unionisation has resulted in a decrease in workplace accidents and an increase in unemployment insurance.

Due to unavailability of data, few studies have considered the impact of unionisation in China. These studies produced mixed results. Lu, et al. (2010) used a sample of 3,837 private firms in 2006. They found that the relationship between wages and unionisation was not significant. However, unionisation has resulted in an increase in worker benefits. Both

⁶ For an interesting discussion of the transformation of Chinese labour relations, see Kai and Brown (2013).

⁷ See Wang, et al. (2009) for an interesting analysis of the movement towards collective bargaining in China.

Yao and Zhong (2008) and Yao and Zhong (2013) use Seemingly Unrelated Regression (SUR). However, the former study also acknowledges the possibility of two-way causality between wages and unionisation. In order to reduce the potential bias, Yao and Zhong (2008) used instrumental variables 3SLS estimation. Yao and Zhong (2008 & 2013) found the impact of unionisation on wages and working hours to be statistically significant.

Unionisation has reduced working hours and wages are higher. However, as indicated earlier, the empirical evidence provided by Yuan, Jianqi and Wong (2011) suggests that unionisation has not made a significant contribution to labour income. In a very interesting study, Ge (2013) considers the impact of unionisation on employee benefits and firm performance. This study which is based on data collected in 2004 suggests that unionisation has resulted in an improvement in worker wages and benefits. For example the impact of unionisation on worker training was found to be positive. However, this study does not appear to have taken the endogeneity problem into account.

While the earlier studies are mainly based on aggregate data, this paper considers the impact of unionisation on three major manufacturing industries; (i) textile, (ii) general equipment manufacturing and (iii) communication, computer and other electronic equipment manufacturing. Due to unavailability of more recent data from published sources, the empirical results presented in this paper are based on data collected in 2004. Almost all available studies that deal with the impact of unionisation in China are based on cross-sectional data. Among other things, studies based on cross-section data may be affected by that fact that some industries are better unionised as compared to others. In order to overcome this problem, we examine the impact of unionisation on firm performance within industry groups. As foreign invested firms were slow to embrace unionisation, we consider the link between firm performance and unionisation within each of the three industries in aggregate as well as separately for domestic and foreign invested firms. Firm productivity, sales,

profitability and average wage are used as indicators of firm performance. Workers are mainly interested in wages whereas, from the point of view of firms, labour productivity, sales and profitability are likely to be the main issues of concern. By examining the impact of unionisation on productivity, sales, profitability and average wage, we may be able to assess the extent to which unions in China are able to work in the best interests of (i) workers and (ii) employers.

In addition, in order to account for the possible endogeneity problem, this paper utilises a Coarsened Exact Matching (CEM) technique that allows one to investigate the impact of unionisation on firm performance. This technique involves construction of a comparison group (see Iacus, et al., 2011a & 2011b). The idea is to find a non-unionised twin of a unionised firm. The difference between the performance of a firm and its twin can then be attributed to unionisation. Unionisation can be endogenous as big firms tend to be unionised. However, the CEM technique, which allows one to calculate the difference between a unionised firm and its non-unionised twin, tends to eliminate the possible bias due to this endogeneity.

The rest of the paper is organised as follows. Section 2 contains a brief discussion of the nature of unionisation in China. The empirical methods are explained in section 3. Section 4 contains a discussion of the empirical results whereas section 5 contains some concluding remarks.

2. Labour Unions in China

The All-China Federation of Trade Unions (ACFTU) is the only government approved trade union in China. It was established in 1925 and socialist control of China in 1949 led to restructuring of the union. In reality, the communist party of China uses ACFTU to control workers. The economic reforms of 1978 led to the use of surplus labour from the

agriculture sector to China's growing industrial sector. These reforms also signalled the end of lifelong employment (Athreya, 2004 and Liu, 2010). Labour market first emerged in the agricultural sector and then expanded to cover the fast growing industrial sector.⁸

China's trade union law as amended in 2001 requires all firms (domestic and foreign invested) having 25 or more employees to form a union. Up until a few years ago, some foreign invested firms did not comply with this requirement. For example Foxconn Technology group (a Taiwan based firm) unionised only after bad publicity concerning long shifts without a break. Unionisation was initially resisted by foreign invested firms and unions in these firms were relatively weak. However, in recent years, foreign firms such as Walmart have allowed unions (Shen and Yao, 2009). The formation of ACFTU recognised unions in foreign invested firms can help foreign firms in China to establish a good rapport with the central government.

While the private sector in China is growing fast and ACFTU has become a bit more independent, its links with the communist party remain strong. With the increase in the frequency of industrial disputes in China, ACFTU is facing additional pressure to side with the workers (Traub-Merz, 2011). However, due to strict government control, trade unions in China are not always able to work in the best interests of the workers. Unions in China tend to pay more attention to relatively minor disputes. These disputes usually revolve around individual grievances and family or personal issues. In other words, unions play an important role in settling disputes between firms and individual workers. However, dissatisfaction with trade unions in China appears to be growing.⁹ Lee (2009) argues that union intervention has resulted in better social security and less intra-firm wage inequality. However, when it comes

⁸ For an interesting analysis of the challenges faced by workers in China's labour market, see Dong and Xu (2008) and Friedman and Lee (2010).

⁹ Nicholas and Zhao (2010) highlighted the extent of dissatisfaction with unions in China. Their work is based on interviews conducted in three SOEs in Hubei Province's auto industry.

to big issues that could affect company profits or production, unions almost always accept the government line. Given the Chinese government's pre-occupation with meeting export targets and schedules, ACFTU rarely authorises worker strikes (Gross, 2009).

Trade union officials in China are career civil servants. These officials are trained by the government in different areas including administration and politics. Union officials can be transferred to the Chinese Communist Party or related positions.¹⁰ A survey of more than 500 union heads in 2007 found that approximately 50% of the union heads also held, at the same time, important posts in the CPC (Qiao, 2007). Unions are financed by taxes and company profit. Member contributions account for 0.5% of gross wages and companies with unions pay 2% of their payroll cost as union levy. The revenue collected by ACFTU is distributed to various groups of unions operating under its umbrella. In other words, union officials are effectively controlled by the government and the unions do not have significant autonomy (Traub-Merz, 2011). It is further argued that the unions in China are based on socialist principles whereas the labour market is not and hence unions are not as effective as they might be.

While the trade union laws in China have been amended several times, the improved version of the laws does not recognise a basic freedom – workers' right to strike. The ACFTU is attempting to protect workers' legal rights but asking for the right to strike is not on its agenda. Coordinated bargaining with Chinese characteristics does not involve the right to strike. Unlike unions in Western countries, unions in China do not take an active role in collective bargaining. The cross-sectional study of Yao and Zhong (2009) found that unions that were elected by union members were more effective in achieving a positive outcome such as an increase in wages. 7

¹⁰ The dual role played by labour unions in China is also highlighted by Chan et al. (2006).

3. Methodology

We employ a matching technique to investigate the impact of labour unions on firm performance. An indicator variable $dunion_{it} \in \{0,1\}$ is used to capture the extent of unionisation. The indicator variable takes a value of 1 if a firm is unionised; zero otherwise. The impact of unionisation on firm performance is defined as follows:

$$\rho_{it} = p_{it}^1 - p_{it}^0 \quad (1)$$

where p_{it}^1 and p_{it}^0 respectively are the performances of a unionised and non-unionised firm.

Equation (1) measures the difference between the performance of a unionised and non-unionised firms in terms of labour productivity, sales, profitability and average wage. At one point in time, a firm can only be either unionised or non-unionised and hence in real life we can only observe either p_{it}^1 or p_{it}^0 . Accordingly, equation (1) is not identified. Following the existing literature, (see for example Roy 1951, Rubin 1974, Heckman *et al.* 1997, Dehejia and Wahba 2002), we estimate the average impact of unionisation on firm performance as follows:

$$E\{p_{it}^1 - p_{it}^0 | dunion_{it} = 1\} = E\{p_{it}^1 | dunion_{it} = 1\} - E\{p_{it}^0 | dunion_{it} = 0\} \quad (2)$$

where the unobserved $E\{p_{it}^0 | dunion_{it} = 1\}$ is estimated by $E\{p_{it}^0 | dunion_{it} = 0\}$.

For Equation (2) to be valid, we need to construct an appropriate counterfactual comparison group to control for possible self-selection bias which arises from factors that affect both union formation and firm performance.

Iacus *et al.* (2011a, 2011b) propose a coarsened exact matching (CEM) technique, which can be used to construct an appropriate comparison group. Assuming that, conditional

on observable factors, the outcome (firm performance) is independent of the treatment (formation of a labour union), namely the unconfoundedness assumption, the CEM algorithm first coarsens the observable factors.¹¹ The observable factors are then grouped into categories. The factors in each category take substantively indistinguishable values. Using these categories, CEM stratifies the data and at each stratum, treated firms (i.e., unionised firms) are matched to non-treated firms (i.e., non-unionised firms) to create an appropriate comparison group.

For the comparison group to be valid, its distributions of the factors have to be similar to those of treated groups (i.e., the unionised firms). To check whether a comparison group (i.e., the imbalance between treated and comparison groups) is valid, Iacus *et al.* (2011b) propose a L_1 - type distance measure, as follows:

$$L_1(f, g) = \sum_{l_1 \dots l_k} |f_{l_1 \dots l_k} - g_{l_1 \dots l_k}| \quad (3)$$

where f and g respectively represent the relative frequency of treated and control units that are obtained by discretising and cross-tabulating the factors used in the coarsening; $l_1 \dots l_k$ are the number of bins used in the discretization or levels of categorical factors. L_1 varies in the range 0-1, where a value of 1 indicates complete imbalance and zero complete balance.

With an appropriate comparison group in hand, regression analysis can be used to estimate the treatment effect, namely the difference in firm performance that is due to unionisation. In summary, CEM works with some observed covariates, attempts to find

¹¹ The assumption of unconfoundedness allows one to appropriately interpret the difference between treated and non-treated groups. This involves adjusting for differences in a fixed set of covariates that removes biases in comparisons between treated and non-treated control groups (Rubin, 1990 and Imbes and Wooldridge, 2007).

common support and performs a particular kind of matching.¹² It is relatively quick as it drops strata when exact matches cannot be found in the blurred strata it creates. And matches (and distance) are judged by L1 (as a way to go from a multidimensional space to a single distance measure). Like any statistical technique, CEM has its own weaknesses but this technique solves the problem of endogeneity.

In this paper we use four indicators of firm performance; labour productivity, sales, profitability and average wage. Wage is an important issue from the point of view of workers. Labour productivity is closely linked with wages. Wages are also closely linked with firm sales and profitability but, from the point of view of firms, sales and profitability are very important. As union officials in China are paid from a levy on firm profits, it would be interesting to examine the extent to which unions in China are also able to look after the interests of firms. The impact of unionisation on each of these factors can be empirically evaluated by means of equations (4) to (7) as follows:

$$\ln(lp) = \alpha_0 + \alpha_1 firmsize + \alpha_2 age + \alpha_3 k + \alpha_4 ownership + \alpha_5 western + \alpha_6 middle + \alpha_7 whetherfdi + \alpha_8 dunion + u_1 \quad (4)$$

$$\ln(sales) = \beta_0 + \beta_1 firmsize + \beta_2 age + \beta_3 k + \beta_4 ownership + \beta_5 western + \beta_6 middle + \beta_7 whetherfdi + \beta_8 dunion + u_2 \quad (5)$$

$$profitability = \gamma_0 + \gamma_1 firmsize + \gamma_2 age + \gamma_3 k + \gamma_4 ownership + \gamma_5 western + \gamma_6 middle + \gamma_7 whetherfdi + \gamma_8 dunion + u_3 \quad (6)$$

$$averagewage = \lambda_0 + \lambda_1 firmsize + \lambda_2 age + \lambda_3 k + \lambda_4 ownership + \lambda_5 western + \lambda_6 middle + \lambda_7 whetherfdi + \lambda_8 dunion + u_4 \quad (7)$$

where lp is labour productivity, namely the value added per worker in 2005 prices; $sales$ denotes firm sales in 2005 prices; $profitability$ is the ratio of total profits to sales;

¹² Unlike OLS, CEM is nonparametric and can work well when support is a problem.

averagewage is firm average wage which equals total salary divided by the number of employees; *firmsize* is firm size which is measured by the number of employees; *k* is capital intensity which is measured by fixed assets per employee; *ownership* is a dummy variable that takes a value of 1 if a firm is privately owned; *western* and *middle* are two dummy variables that take a value of 1 if a firm is located respectively in Western and Central China; *whertherfdi* is a dummy variable that takes a value of 1 if a firms is FDI invested and 0 otherwise; *dunion* is a dummy variable that takes a value of 1 if a firm is unionised, 0 otherwise; and u_1 , u_2 , u_3 , and u_4 are the usual error terms.

As the error terms may be correlated across the four equations, we estimate (4) to (7) by means of Seemingly Unrelated Regression (SUR) technique. The estimated coefficient of *dunion* is the main variable of interest with its coefficient measuring the impact of unionisation on firm performance. The other variables included in equations (4) to (7) are control variables that account for the remaining imbalance between treated and control groups. The dependent variables in equations (4) to (7) are the imbalance.

3.1 Data

The empirical analysis presented in this paper is based on firm level data collected from the 2004 enterprise survey conducted by China National Bureau of Statistics (NBS). This survey covers a large number of firms, accounting for over 85 per cent of China's industrial output. In this paper, we explore the impact of unionisation within three two-digit industries; (i) textile industry, (ii) general equipment manufacturing industry and (iii) communication equipment, computer and other electronic equipment manufacturing industry. These industries account for a significant proportion of China's manufacturing output. The survey conducted by NBS in 2004 is the most comprehensive. All the data used in this paper are not available for other years and hence we have no choice but to use 2004 data. As

indicated earlier, other available studies that examine the impact of unionisation in China are also based on cross-section data.

Tables 1, 2, and 3 present the summary statistics of the three industries. These tables highlight a few interesting features. First, the sample size is very large. The sample used covers 18,300 firms in the textile industry, while the number of firms respectively in general equipment manufacturing industry and communication equipment, computer and other electronic equipment manufacturing industries is 16,598 and 6,519. Second, the data set exhibits substantial variation in all three industries. For example in the general equipment manufacturing industry, the mean of labour productivity is 5.0727, while its standard deviation is 0.8291. Third, less than 50 per cent of the firms in all three industries are unionised.

<insert Tables 1-3 here>

4. Results

We utilize a package developed by Blackwell et al. (2008) to implement the CEM. The coarsening is carried out over region, firm size, age, capital intensity, ownership structure, and whether FDI invested. For the textile industry, the CEM procedure created 175 strata. Out of these 175 strata, 62 are matched and 7,586 firms that are unionised are matched to 10,486 non-unionised firms. For the general equipment manufacturing industry, 7,770 unionised firms are matched to 8,553 non-unionised firms, with 195 strata created and 61 strata matched. In the case of communication equipment, computer and other electronic equipment manufacturing industry, the CEM procedure generated 99 strata and 2,562 unionised firms were matched to 3,829 non-unionised firms within 39 matched strata.

Table 4 presents the imbalance before and after the CEM matching. Comparing the imbalance before matching with that of post-matching, we observe that the imbalance is reduced significantly as the overall L_1 measure in all three industries decreased by more than 50 per cent. In addition, in all these industries, L_1 for individual factors also dropped significantly after the matching. For example, L_1 of firm size in the general equipment manufacturing industry decreased from 0.27 to 0.12.¹³ It can therefore be argued that the CEM procedure has resulted in a valid comparison group.

<insert Table 4 here>

With the valid control group, we used the seemingly unrelated regression technique to estimate the impact of unionisation on firm performance. In other words, equations (4) to (7) are estimated by means of SUR. The estimated results are reported in Tables 5-12.

4.1 The impact of unionisation – the case of textile industry

The estimated coefficient of *dunion*, which takes a value of 1 if a firm is unionised, is the variable of interest. The estimated results presented in Table 5 indicate that, as compared to non-unionised firms, the productivity of unionised firms in textile industry is on average 0.0261 per cent lower. However, the sales of unionised firms in the same industry are 0.0229 per cent higher. The estimated coefficient of the variable *dunion* in profitability equation in Table 5 is statistically insignificant. Accordingly, one can argue that there is no difference in profitability across unionised and non-unionised firms within China's textile industry. However, on average, the unionised firms pay 0.0141% higher wages.

<insert Table 5 here>

¹³ These differences are standardised.

Table 5 shows that firm size has a negative effect on productivity and average wage but its effect on firm sales is positive and significant. Larger firms are expected to have higher sales but the impact of firm size in the case of textile industry profitability appears to be statistically insignificant. Higher capital intensity has positive and statistically significant effect on all indicators of firm performance. Older firms in the textile industry are less productive and less profitable which appears to suggest that these firms are perhaps relatively less modernised. However, older firms experience higher sales and pay higher average wage. FDI invested firms pay higher wages and these firms are also more profitable. Table 14 contains the estimated results when all control variables are excluded from the model. The top section of Table 14 shows that, except for the average wage equation, in qualitative terms there is little change in the estimated results. The estimated coefficient in the average wage equation when all control variables have been excluded is statistically insignificant which appears to suggest that the bias arising from the exclusion of control variables is significant. In overall terms, majority of the results presented in this paper appear to be robust.

<insert Tables 6 & 7 here>

The existing literature suggests that foreign invested firms were slow to unionise and hence equations (4) to (7) are re-estimated after splitting the sample into domestic and foreign invested firms. Tables (6) and (7) respectively show the estimated results of SUR for domestic and foreign invested firms within the textile industry. It is interesting to note that performance of unionised and non-unionised firms in textile industry varies significantly across the domestic and foreign invested firms. Specifically, the productivity of unionised domestic firms is on average 0.0306% lower than the productivity of non-unionised domestic firms. However, as compared to domestic firms, the size of the unionised-non-unionised productivity gap in China's foreign invested firms in textile industry as shown in Table 7 is statistically insignificant. The sales of unionised firms in both foreign invested and domestic

firms in textile industry are higher as compared to the sales of non-unionised firms. However, the unionised-non-unionised firm sales gap is relatively higher in domestic firms. Table 6 shows that, on average, profitability in unionised domestic firms is 0.0014% lower than non-unionised domestic firms. However, the unionised domestic firms pay higher wages.¹⁴ The relationship between profitability and unionisation in domestic firms is negative but statistically significant only at the 10% level. On the other hand, the results presented in Table 7 suggest that productivity, profitability and average wage do not vary across unionised and non-unionised foreign invested firms. In summary, as far as the impact of unionisation on profitability and average wage in textile industry is concerned, Tables 6 and 7 highlight an interesting contrast across domestic and foreign invested firms. In addition, the impact of age on indicators of firm performance varies across domestic and foreign invested firms.

4.2 The impact of unionisation – the case of the general equipment manufacturing industry

The estimated results reported in Table 8 reveal that, within China's general equipment manufacturing industry, the productivity and profitability of unionised firms is lower. However, as compared to non-unionised firms, sales and average wage in unionised firms are higher. Table 9 shows that these results are also valid for domestic firms. However, Table 10 shows that, within the foreign invested firms in general equipment manufacturing, unionisation has no effect on productivity, profitability and average wage but sales of unionised firms are on average 0.0265% higher. These results reveal interesting variations cross unionised and non-unionised domestic and foreign invested firms across industries. It is generally believed that as compared to domestic firms, foreign invested firms pay higher wages.

<insert Table 8 here>

¹⁴ Ge (2013) found the impact of unionisation on firm profitability to be negative. However, Ge's work is based on aggregate data.

As far as the impact of control variables on firm performance is concerned, higher capital intensity positively affects all indicators of firm performance in aggregate as well as across domestic and foreign firms which is not surprising. Firm age has a negative effect on average wage in domestic firms but its impact on average wage in foreign invested firms is positive. This could be attributed to a differential impact on firm sales. Firm size has no effect on average wage in domestic firms but it reduces average wage in foreign invested firms.

<insert Tables 9 & 10 here>

Table 14 contains the estimated results when all control variables are excluded from the model. The middle section of Table 14 shows that in qualitative terms, as compared to the results reported in Table 8, there is no change in the estimated results. It can therefore be argued that the estimated results are robust.

4.3 The impact of unionisation – the case of communication, computer and other electronic equipment manufacturing industry

The estimated results reported in Table 11 reveal that, within China's communication equipment, computer and other electronic equipment manufacturing industry, unionisation has no effect on firm productivity. However, sales, profitability and average wage, respectively, in unionised firms, are on average 0.0257%, 0.0045% and 0.0794% higher. The impact on profitability is significant only at the 10% level and very small. Table 11 shows that, as expected, capital intensity has a positive and highly significant impact on all indicators of firm performance. However, older firms appear to be doing badly in the areas of productivity, profitability and sales. Large firms have higher sales and these firms are also more productive but their profitability is declining. The bottom panel of Table 14 shows that once we exclude all control variables except for the impact on productivity, all other results continue to hold.

<insert Table 11 here>

Tables 12 and 13 reveal that both domestic and foreign invested unionised firms pay higher wages and their sales are also higher. Based on the size of the impact on average wage, it can be argued that unions are more effective in domestic firm. Unionised domestic firms are more profitable but less productive. Table 13 shows that unionised foreign invested firms are more productive but in terms of profitability there is no difference between the unionised and non-unionised foreign invested firms. The impact of capital intensity on all indicators of firm performance is positive and significant in the case of both domestic and foreign invested firms. Large domestic firms are less productive but their sales are higher. On the other hand, large foreign invested firms are more productive but less profitable.

<insert Tables 12, 13 & 14 here>

The empirical results presented in this paper reveal that the impact of unionisation on firm performance in China is heterogeneous. The heterogeneity has several dimensions – the impact of unionisation varies across industries as well as across domestic and foreign invested firms. In general, it seems that unionisation has a negative impact on labour productivity and a positive impact on average wage. Out of the three industries considered, unionisation has the smallest positive impact on average wage in textile industry. Unions are relatively more effective in domestic firms. While the impact of unionisation on average wage varies across domestic and foreign invested firms, the impact on sales is positive across both domestic and foreign invested firms.

<insert Tables 12, 13 & 14 here>

5. Concluding Remarks

The economic reform process that started in the late 1970s has transformed China from agrarian to an urban-based industrialised economy. This transformation led to a rapid rise in wages in the urban areas which resulted in significant labour migration from rural to urban areas. Rising prosperity and a recent decline in rural to urban migration has resulted in a situation where labour cost in China has sharply risen, giving China the third highest wages amongst emerging Asian nations. A very large number of firms in China are unionised. However, unions in China do not play their traditional role. While unions in China play an important role in resolving worker-employer disputes, they are not involved in collective bargaining. In fact, unions officials in China are paid from a levy imposed on firm profits. In addition, a number of union officials concurrently hold positions in the Communist Party of China. Unions in China are practically under government control.

This paper examines the impact of unionisation on firm performance in China's (i) textile industry, (ii) general equipment manufacturing industry and (iii) communication equipment, computer equipment and other equipment manufacturing industry. We focus on four indicators of firm performance; labour productivity, sales, profitability and average wage. As the unions in China do not play their traditional role, it would be useful to examine the impact of unionisation on both workers and employer's interests. Workers are of course interested in wages whereas the management is more concerned about sales, profitability and labour productivity. It is well-known that self selection can lead to significant bias when the unionised-non-unionised firm performance gap is calculated. In order to avoid this bias, we use the Coarsened Exact Matching (CEM) technique which involves finding a unionised firm and its non-unionised twin. One can then calculate the unionised-non-unionised firm performance gap. We use Seemingly Unrelated Regression to examine the impact of unionisation on the performance gap. The empirical analysis presented in this paper is based

on data collected from a national survey conducted by China's National Bureau of Statistics in 2004. This survey contains all the data that we need. Obviously, it would have been preferable if panel data were available, but it is perhaps worth mentioning that only a handful of studies have examined the impact of unionisation on wages and worker welfare in China and these studies also used cross-section data. However, this paper utilises a different methodology and focuses on three industries within China's manufacturing sector.

The empirical results presented in this paper reveal interesting variations across sectors and also across domestic and foreign invested firms. In the case of the textile industry, we find that on average workers in unionised domestic firms are less productive and firm profitability as compared to non-unionised firms is also lower. The sales of unionised domestic textile firms are higher. On average, unionised firms pay higher wages but further investigation revealed that the positive impact on average wage in textile industry is restricted to workers in domestic firms; unionisation has not affected average wage in foreign invested textile firms. However, unionisation in the textile industry appears to have helped the employers and perhaps the union officials; the sales of both domestic and foreign invested unionised firms are higher.

In the case of the general equipment manufacturing industry, our empirical results suggest that unionised domestic firms pay higher average wages but the average wage gap between unionised and non-unionised foreign invested firms is statistically insignificant. Sales of both unionised domestic and unionised foreign invested firms are higher. Labour productivity in unionised domestic firms is lower and the same applies to firm profitability. The difference between the productivity and profitability of unionised and non-unionised foreign invested firms in general equipment manufacturing industry is statistically insignificant.

In the case of the communication equipment, computer equipment and other equipment manufacturing industry, we found that both unionised domestic and unionised foreign invested firms pay higher wages. While the sales of both unionised domestic and unionised foreign invested firms are higher, workers in unionised foreign invested firms are more productive but the opposite is true in the case of unionised domestic firms. Unionisation has not resulted in a change in the profitability of foreign invested firms but it has a positive impact on profitability of unionised domestic firms.

In summary, while unions in China are currently not playing their traditional role, one could not claim that they are totally ineffective. Our results suggest that the impact of unionisation on average wage varies across industries. In relative terms, the gain to workers in domestic textile firms is the smallest and workers in foreign invested textile firms have not gained at all. Workers in domestically owned firms in the general equipment manufacturing sectors have gained but workers in foreign invested firms have not benefitted from unionisation. There is however, one conclusion that appears to hold across all industries and all types of unionised firms that have been considered in this paper - unionisation has resulted in increases in sales. It seems that while unions are able to exert a positive influence on wages in some industries, they are successful in looking after the interests of the employers across all industries and all types of firms (domestic as well as foreign invested).

Finally, as this study is based on cross-section data, it would be useful to examine the impact of unionisation on firm performance when panel data becomes available. At this stage, due to unavailability of data, we have no choice but to rely on cross-sectional data. Lack of data also dictated our choice of control variables, which has implications for the identification strategy.

Table 1: Summary Statistics of Textile Industry					
Variable	Obs	Mean	Std. Dev.	Min	Max
ln(labour productivity)	18287	5.0622	0.8789	-2.0614	9.1298
ln(sales)	18300	2.2848	0.1046	1.6035	2.8092
profitability	18300	0.0396	0.0518	0	0.9029
ln(average wage)	18300	2.3103	0.4328	-2.6707	5.2868
firm size	18300	0.2304	0.5500	0.0080	28.5860
age	18300	7.1144	7.2204	1	139
capital intensity	18300	60.6359	103.0774	0.0036	3780.6920
ownership	18300	0.8128			
whether FDI invested	18300	0.1983			
western	18300	0.0257			
middle	18300	0.0799			
dunion	18300	0.4263			
Note: Unit of firm size is thousand persons; Unit of average wage and capital intensity is thousand yuan per person.					
Source: NBS, 2004.					

Table 2: Summary Statistics of General Equipment Manufacturing Industry					
Variable	Obs	Mean	Std. Dev.	Min	Max
ln(labour productivity)	16587	5.0727	0.8291	-1.1787	9.6748
ln(sales)	16598	2.2683	0.1100	0.2924	2.8095
profitability	16598	0.0598	0.0750	0	0.9820
ln(average wage)	16598	2.4649	0.5006	-2.5649	5.6091
firm size	16598	0.1680	0.3757	0.0080	17.2740
age	16598	10.0815	10.5865	1	146
capital intensity	16598	51.2975	86.5309	0.0095	2917.0000
ownership	16598	0.6647			
whether FDI invested	16598	0.1406			
western	16598	0.0480			
middle	16598	0.1091			
dunion	16598	0.4834			
Note: Unit of firm size is thousand persons; Unit of average wage and capital intensity is thousand yuan per person.					
Source: NBS, 2004.					

Table 3: Summary Statistics of Communication Equipment, Computer and Other Electronic Equipment Manufacturing Industry					
Variable	Obs	Mean	Std. Dev.	Min	Max
ln(labour productivity)	6508	5.1560	1.1151	-0.0834	11.7138
ln(sales)	6519	2.3387	0.1456	1.6614	2.8926
profitability	6519	0.0753	0.0985	0	0.9929
ln(average wage)	6519	2.6989	0.6080	-0.3994	6.2948
firm size	6519	0.4588	1.3763	0.0080	71.9150
age	6519	7.8578	6.8005	1	69
capital intensity	6519	74.3723	216.5588	0.0100	11575.9000
ownership	6519	0.7744			
whether FDI invested	6519	0.4745			
western	6519	0.0393			
middle	6519	0.0436			
dunion	6519	0.4097			
Note: Unit of firm size is thousand persons; Unit of average wage and capital intensity is thousand yuan per person.					
Source: NBS, 2004.					

Table 4: Measurement of Imbalance												
	Textile Industry				General Equipment Manufacturing Industry				Communication Equipment, Computer and Other Electronic Equipment Manufacturing Industry			
	L1		mean		L1		Mean		L1		Mean	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
overall L1	0.51	0.22			0.52	0.21			0.45	0.17		
region	0.01	0.00	0.02	0.00	0.03	0.00	0.09	0.00	0.03	0.00	0.08	0.00
firm size	0.23	0.11	0.21	0.10	0.27	0.12	0.14	0.07	0.11	0.04	0.17	0.10
age	0.22	0.14	3.50	0.77	0.22	0.09	5.74	0.69	0.27	0.07	4.28	0.30
capital intensity	0.07	0.01	7.25	2.72	0.08	0.02	3.43	2.97	0.10	0.05	13.55	16.85
ownership	0.10	0.00	-0.10	0.00	0.18	0.00	-0.18	0.00	0.16	0.00	-0.16	0.00
whether or not FDI invested	0.04	0.00	0.04	0.00	0.01	0.00	-0.01	0.00	0.06	0.00	-0.06	0.00

Note: “Before” and “After” denote the imbalance before and after the CEM matching respectively.
Source: Authors’ own calculation based on the sample.

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.3918***	-23.29	0.1517***	89.20	0.0014	1.31	-0.1001***	-11.73
<i>age</i>	-0.0051***	-6.01	0.0011***	12.71	-0.0001**	-2.26	0.0014***	3.33
<i>k</i>	0.0034***	49.71	0.0002***	34.00	0.0001***	11.31	0.0006***	17.55
<i>ownership</i>	-0.0025	-0.16	-0.0079***	-5.01	-0.0074***	-7.37	0.0412***	5.21
<i>whetherfdi</i>	-0.0827***	-5.43	0.0303***	19.70	0.0154***	15.65	0.1972***	25.53
<i>western</i>	-0.4343***	-11.49	-0.0116***	-3.04	0.0001	0.03	-0.3472***	-18.1
<i>middle</i>	-0.4001***	-17.80	-0.0136***	-5.98	0.0018	1.26	-0.3612***	-31.67
<i>dunion</i>	-0.0261**	-2.15	0.0229***	18.63	-0.0008	-1.00	0.0141**	2.29
<i>constant</i>	5.0441***	283.02	2.2225***	1234.04	0.0405***	35.18	2.2417***	247.86
No. of obs.	18060		18060		18060		18060	
χ^2	3963.73		11869		430.49		3093.78	
R ²	0.18		0.4		0.02		0.14	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively								

Regressors	productivity		sales		profitability		average wage	
	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.4268***	-21.58	0.1646***	81.59	0.0027**	2.16	-0.1255***	-12.51
<i>age</i>	-0.0040***	-4.70	0.0011***	12.49	0.0000	0.16	0.0010**	2.38
<i>k</i>	0.0034***	42.36	0.0002***	29.65	0.0001***	10.14	0.0006***	14.51
<i>ownership</i>	0.0012	0.08	-0.0062***	-4.03	-0.0064***	-6.86	0.0321***	4.2
<i>western</i>	-0.4401***	-11.83	-0.0115***	-3.03	0.0003	0.12	-0.3455***	-18.31
<i>middle</i>	-0.4049***	-17.76	-0.0149***	-6.42	0.0032**	2.29	-0.3709***	-32.07
<i>dunion</i>	-0.0306**	-2.32	0.0239***	17.76	-0.0014*	-1.76	0.0240***	3.58
<i>constant</i>	5.0411***	279.73	2.2180***	1207.12	0.0386***	34.38	2.2538***	246.54
No. of obs.	14482		14482		14482		14482	
Chi2	3156.7		9218.39		179.12		1986.67	
R ²	0.18		0.39		0.01		0.12	

Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.3217***	-9.54	0.1266***	38.53	0.0001	0.03	-0.0500***	-2.93
<i>age</i>	-0.0141***	-4.54	0.0011***	3.58	-0.0013***	-5.97	0.0047***	2.96
<i>k</i>	0.0034***	24.93	0.0002***	16.30	0.0000***	5.03	0.0006***	9.36
<i>ownership</i>	-0.3175*	-1.88	-0.0045	-0.27	-0.0114	-0.96	0.3317***	3.88
<i>western</i>	-0.3073*	-1.67	-0.0251	-1.40	-0.0020	-0.15	-0.3680***	-3.96
<i>middle</i>	-0.3451***	-4.42	-0.0097	-1.28	-0.0106*	-1.93	-0.2651***	-6.7
<i>dunion</i>	-0.0019	-0.06	0.0169***	5.83	0.0016	0.76	-0.0161	-1.07
<i>constant</i>	5.3133***	30.90	2.2610***	134.90	0.0692***	5.73	2.1170***	24.29
No. of obs.	3578		3578		3578		3578	
Chi2	821.93		1839.45		67.06		198.7	
R ²	0.19		0.34		0.02		0.05	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively								

Table 8: Estimated Results for Firms in General Equipment Manufacturing Industry

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.4247***	-13.77	0.2948***	89.38	-0.0094***	-3.27	-0.0479***	-2.66
<i>age</i>	-0.0076***	-13.79	-0.0002***	-2.63	-0.0003***	-6.40	-0.0010***	-3.21
<i>k</i>	0.0034***	34.46	0.0003***	27.55	0.0001***	13.89	0.0010***	17.66
<i>ownership</i>	0.0456***	3.29	-0.0011	-0.75	-0.0077***	-5.91	-0.0556***	-6.87
<i>whetherfdi</i>	0.2198***	11.15	0.0422***	20.01	0.0328***	17.77	0.4409***	38.32
<i>western</i>	-0.2736***	-9.90	-0.0147***	-4.96	-0.0115***	-4.47	-0.1075***	-6.67
<i>middle</i>	-0.2750***	-14.44	-0.0165***	-8.07	-0.0018	-1.02	-0.2519***	-22.66
<i>dunion</i>	-0.1030***	-8.32	0.0163***	12.34	-0.0029**	-2.55	0.0792***	10.97
<i>constant</i>	5.0765***	331.11	2.2007***	1341.85	0.0608***	42.46	2.3917***	267.34
No. of obs.	16312		16312		16312		16312	
chi2	2926.9		11886.4		788.94		3230.83	
R ²	0.15		0.42		0.05		0.17	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively								

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.6174***	-16.42	0.3325***	82.65	-0.0111***	-3.26	-0.0133	-0.63
<i>age</i>	-0.0070***	-12.54	-0.0003***	-5.55	-0.0003***	-5.79	-0.0015***	-4.89
<i>k</i>	0.0036***	28.40	0.0003***	21.93	0.0002***	13.94	0.0005***	7.51
<i>ownership</i>	0.0350**	2.53	-0.0004	-0.25	-0.0077***	-6.17	-0.0601***	-7.73
<i>western</i>	-0.2882***	-10.15	-0.0151***	-4.97	-0.0128***	-4.98	-0.1236***	-7.75
<i>middle</i>	-0.2826***	-14.56	-0.0178***	-8.59	-0.0023	-1.29	-0.2507***	-23.00
<i>dunion</i>	-0.1129***	-8.51	0.0127***	8.98	-0.0039***	-3.24	0.0819***	11.00
<i>constant</i>	5.0982***	319.02	2.1987***	1286.16	0.0599***	41.47	2.4142***	269.07
No. of obs.	14029		14029		14029		14029	
chi2	2061.2		8559.97		320.86		785.62	
R ²	0.13		0.38		0.02		0.05	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively								

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.0535	-0.99	0.2195***	39.54	-0.0060	-0.99	-0.1179***	-3.15
<i>age</i>	0.0013	0.32	0.0020***	4.78	-0.0018***	-3.78	0.0149***	5.19
<i>k</i>	0.0030***	19.73	0.0003***	16.89	0.0001***	4.69	0.0016***	15.33
<i>ownership</i>	0.5358**	2.41	0.0411*	1.79	0.0287	1.16	0.5411***	3.50
<i>western</i>	-0.0329	-0.30	-0.0171	-1.50	0.0065	0.53	0.0896	1.17
<i>middle</i>	-0.1003	-1.15	0.0011	0.12	0.0052	0.53	-0.3168***	-5.21
<i>dunion</i>	0.0002	0.01	0.0265***	7.53	0.0044	1.16	0.0370	1.56
<i>constant</i>	4.6281***	20.53	2.1962***	94.48	0.0678***	2.69	2.0919***	13.35
No. of obs.	2283		2283		2283		2283	
chi2	401.74		2113.49		40.69		322.62	
R ²	0.15		0.48		0.02		0.12	

Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	0.0872***	5.53	0.0919***	55.44	-0.0053***	-3.78	0.0033	0.38
<i>age</i>	-0.0168***	-8.89	-0.0012***	-6.05	-0.0015***	-9.05	0.0005	0.45
<i>k</i>	0.0028***	25.49	0.0002***	20.68	0.0001***	7.04	0.0010***	16.89
<i>ownership</i>	-0.0511	-1.46	-0.0157***	-4.26	-0.0146***	-4.69	-0.1527***	-7.85
<i>whetherfdi</i>	0.0773**	2.37	0.0682***	19.85	0.0177***	6.07	0.2351***	12.97
<i>western</i>	-0.0856	-1.29	0.0110	1.59	0.0282***	4.79	-0.0458	-1.25
<i>middle</i>	-0.1922***	-3.23	-0.0103*	-1.65	0.0113**	2.14	-0.2177***	-6.58
<i>dunion</i>	0.0078	0.30	0.0257***	9.28	0.0045*	1.91	0.0794***	5.44
<i>constant</i>	5.0727***	143.94	2.2608***	609.76	0.0816***	26.01	2.6038***	133.02
No. of obs.	6380		6380		6380		6380	
chi2	849.21		5498.11		233.42		639.02	
R ²	0.12		0.46		0.04		0.09	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively								

	productivity		sales		profitability		average wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	-0.1472***	-3.95	0.1466***	36.16	0.0023	0.66	-0.0109	-0.49
<i>age</i>	-0.0162***	-8.39	-0.0016***	-7.69	-0.0013***	-7.31	-0.0014	-1.22
<i>k</i>	0.0029***	15.01	0.0003***	12.23	0.0001***	6.07	0.0011***	9.92
<i>ownership</i>	-0.0715**	-2.13	-0.0134***	-3.67	-0.0143***	-4.49	-0.1623***	-8.14
<i>western</i>	-0.1264*	-1.90	0.0027	0.37	0.0297***	4.71	-0.0799**	-2.02
<i>middle</i>	-0.1731***	-2.76	-0.0073	-1.08	0.0099*	1.67	-0.2264***	-6.09
<i>dunion</i>	-0.0639*	-1.92	0.0249***	6.88	0.0076**	2.42	0.0897***	4.55
<i>constant</i>	5.1551***	140.63	2.2517***	564.96	0.0747***	21.57	2.6236***	120.75
No. of obs.	3336		3336		3336		3336	
chi2	316.42		1780.22		158.16		229.91	
R ²	0.09		0.35		0.05		0.06	

Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively

Table 13: Estimated Results for Foreign Invested Firms in Communication Equipment, Computer and Other Electronic Equipment Manufacturing Industry

Regressors	Productivity		Sales		Profitability		Average Wage	
	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
<i>firmsize</i>	0.1339***	7.30	0.0808***	44.23	-0.0064***	-4.10	0.0014	0.15
<i>age</i>	-0.0158***	-3.25	0.0001	0.12	-0.0028***	-6.69	0.0098***	3.81
<i>k</i>	0.0028***	20.27	0.0002***	16.79	0.0000***	3.99	0.0010***	14.07
<i>ownership</i>	0.1494	0.75	-0.0064	-0.32	0.0361**	2.14	-0.0970	-0.93
<i>western</i>	0.4454**	2.35	0.0115	0.61	0.0053	0.33	0.1687*	1.70
<i>middle</i>	-0.2314*	-1.67	-0.0436***	-3.15	0.0115	0.98	-0.2236***	-3.06
<i>dunion</i>	0.1329***	3.20	0.0172***	4.16	-0.0010	-0.28	0.0647***	2.96
<i>constant</i>	4.8559***	23.90	2.3214***	114.71	0.0648***	3.77	2.7097***	25.37
No. of obs.	3044		3044		3044		3044	
chi2	512.94		2352.1		102.04		228.67	
R ²	0.14		0.44		0.03		0.07	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively								

Table 14: Estimated Results without Control Variables								
	Productivity		Sales		Profitability		Average Wage	
Regressors	Coeff.	z	Coeff.	z	Coeff.	z	Coeff.	z
Textile Industry								
<i>dunion</i>	-0.0613***	-4.61	0.0391***	25.43	-0.0006	-0.78	0.0052	0.79
<i>constant</i>	5.0712***	589.44	2.2714***	2279.54	0.0406***	79.74	2.3096***	539.46
No. of obs.	18060		18060		18060		18060	
Chi2	21.28		646.59		0.6		0.63	
R ²	0.001		0.03		0		0	
General Equipment Manufacturing Industry								
<i>dunion</i>	-0.1311***	-9.94	0.0377***	22.36	-0.0036***	-3.07	0.0769***	9.92
<i>constant</i>	5.1014***	560.54	2.2491***	1931.47	0.0609***	75.69	2.4115***	450.56
No. of obs.	16312		16312		16312		16312	
Chi2	98.81		499.76		9.44		98.38	
R ²	0.01		0.03		0.001		0.006	
Communication Equipment, Computer and Other Electronic Equipment Manufacturing Industry								
<i>dunion</i>	0.0568**	2.04	0.0388***	10.44	0.0051**	2.16	0.0962***	6.34
<i>constant</i>	5.1027***	289.76	2.3184***	984.20	0.0689***	45.91	2.6541***	276.16
No. of obs.	6380		6380		6380		6380	
Chi2	4.17		109.03		4.66		40.19	
R ²	0.001		0.02		0.001		0.006	
Note: ***, **, and * denote significance at the 1, 5, and 10 per cent level respectively.								

References

- Anwar, S. and Sun, S. (2012), "Trade Liberalisation, Market Competition and Wage Inequality in China's Manufacturing Sector," *Economic Modelling*, Vol. 29 (4), 1268-1277.
- Athreya, B. (2004), "China's Changing Labor Relations." *China Business Review*, Vol. 31 (1), 20-39.
- Blackwell, M., Iacus, S.M., King, G. and Porro, G. (2008), *CEM: Coarsened exact matching in stata* [online]. <http://gking.harvard.edu/cem/>
- Chan, A.W., Tong-Qing, F., Redman, T. and Snape, E. (2006), Union Commitment and Participation in the Chinese Context, *Industrial Relations: A Journal of Economy and Society*, Vol. 45(3), 485-490.
- Chan, C.K. (2010), *The Challenge of Labour in China: Strikes and the Changing Labour Regime in Global Factories*. New York: Routledge.
- Chan, A. and Siu, K. (2010). "Analyzing Exploitation: The Mechanisms Underpinning Low Wages and Excessive Overtime in Chinese Export Factories." *Critical Asian Studies*, Vol. 42 (2), 167-190.
- China Briefing (2012), Minimum Wage Levels Across China, <http://www.china-briefing.com/news/2012/02/22/minimum-wage-levels-across-china.html>
- Cunningham, M.E., and Wasserstrom, J.N. (2011), "Interpreting Protest in Modern China". *Dissent*, Vol. 58 (1), 13-18.
- Dehejia, R.H. and Wahba, S. (2002), "Propensity Score Matching Methods for Nonexperimental Causal Studies," *Review of Economics and Statistics*, 84 (1), 151-161.
- Dong, X., and Xu, C.L. (2008), "The Impact of China's Millennium Labour Restructuring Program on Firm Performance and Employee Earnings," *Economics of Transition*, Vol. 16 (2), 223-245.
- Friedman, E. and Lee, C.K. (2010), "Remaking the World of Chinese Labour: A 30-Year Retrospective." *British Journal of Industrial Relations*, Vol. 48, Issue 3, pp. 507-533.
- Ge, Y. (2013), "Do Chinese Unions Have "Real" Effect on Employee Compensation?" *Contemporary Economic Policy*. doi: 10.1111/coep.12012
- Gross, A. (2009), The Effects of China's Growing Labor Unions on Your Company, <Http://www.VentureOutsource.com>.
- Heckman, J., Ichimura, H. and Todd, P. (1997), "Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme," *Review of Economic Studies*, 64, 605-654.

Iacus, S.M., King, G. and Porro, G. (2011a), "Causal Inference Without Balance Checking: Coarsened Exact Matching," *Political Analysis*, In Press Available from: <http://gking.harvard.edu/files/cem.pdf>.

Iacus, S.M., King, G. and Porro, G. (2011b), "Multivariate Matching Methods that are Monotonic Imbalance Bounding," *Journal of the American Statistical Association*, 106, 345-361.

Imbens, G. and Wooldridge, J. (2007), *Estimation of Average Treatment Effects Under Unconfoundedness*, in *What's New in Econometrics*, NBER, Summer 2007.

Kai, C. and Brown, W. (2013), "The transition from individual to collective labour relations in China," *Industrial Relations Journal*, Vol. 44(2), 102-121.

Knight, J., Deng, Q., and Li, S. (2011), "The Puzzle of Migrant Labour Shortage and the Rural Labour Surplus in China", *China Economic Review*, Vol. 22 (4), 585-600.

Lee, C.H. (2009), *Industrial Relations and Collective Bargaining in China*, Working Paper No. 7 (Geneva, ILO).

Liu, M. (2010), "Union Organizing in China: Still a Monolithic Labor Movement?" *Industrial & Labor Relations Review*, Vol. 64 (1), 30-51.

Liu, G.S., Sun, P., and Woo, W.T. (2007), "What Motivate and Constraint Politicians to Privatize? The Case of China," *Economics Letters*, Vol.97 (1), 81-86.

Lu, Y., Tao, Z., and Wang, Y. (2010), "Union Effects on Performance and Employment Relations: Evidence from China," *China Economic Review*, Vol. 21 (1), 202-210.

Metcalf, D. and Li, J.W. (2005), "Chinese Unions: Nugatory or Transforming? An 'Alice' Analysis," CEPDP, 708. Centre for Economic Performance, London School of Economics and Political Science, London, UK.

NBS (2010), *China Statistical Yearbook*. National Bureau of Statistics. Beijing: China Statistical Press.

Ngai, P. (2005), "Global Production, Company Codes of Conduct, and Labor Conditions in China: A Case Study of Two Factories," *The China Journal*, No. 54, 101-113.

Nichols, T., and Zhao, W. (2010), "Disaffection with trade unions in China: some evidence from SOEs in the auto industry," *Industrial Relations Journal*, Vol. 41 (1), 19-33.

Qiao, J. (2007), *Between State, Enterprise and Workers: Multiple Roles of Trade Unions during Market Economy Transition*, in China Industrial Relations Institute (ed.); 2007 Beijing Trade Union Forum, Beijing, CIIR.

Roy, A. (1951), "Some Thoughts on the Distribution of Earnings," *Oxford Economic Papers*, Vol. 3, 135-145.

- Rubin, D., (1974), "Estimating Causal Effects to Treatments in Randomised and Nonrandomised Studies," *Journal of Educational Psychology*, Vol. 66, 688-701.
- Rubin, D., (1990), "Formal Modes of Statistical Inference for Causal Effects," *Journal of Statistical Planning and Inference*, Vol. 25, 279-292.
- Sum, N. and Ngai, P. (2005), "Globalization and Paradoxes of Ethical Transnational Production: Code of Conduct in a Chinese Workplace," *Competition and Change*, Vol. 9, 81-200.
- Traub-Merz, R. (2011), All China Federation of Trade Unions: Sytructure, functions and the challenge of collective bargaining, Working Ppaer No. 13, International Labour Organization, Geneva, Switzerland.
- Wang, H.Y., Appelbaumb, R.P., Degiulib, F., and Lichtenstein, N. (2009), "China's New Labour Contract Law: is China moving towards increased power for workers?" *Third World Quarterly*, Vol. 30 (3), 485-501.
- Wright, J., Sahni, M. and Zamora, R. (2011), Wage increases in China: Should multinationals rethink their manufacturing and sourcing strategies? Available online from http://www.accenture.com/Accenture_Wage_Increases_in_China.pdf
- Xu, Y. (2010), *China's Rising Labour Costs and the Labour Shortage Puzzle*, MAPI: USA.
- Yao, Y. and Zhong, N. (2013), "Unions and Workers' Welfare in Chinese Firm," *Journal of Labor Economics*, Vol. 31 (3), 633-667.
- Yao, Y. and Zhong, N. (2008), "Do China's Trade Unions Improve the Welfare of Workers – Empirical Evidence from 12 Cities," *World Economic Papers*, Vol. 5, 5-29.
- Yuan, Z., Jianqi, C., and Wong, P. (2011), "Effect of Trade Unions on Industrial Labour Income in China," *Asian Politics & Policy*, Vol. 3 (1), 95-114.