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# **UNION PAY PREMIUM IN CHINA: AN INDIVIDUAL-LEVEL ANALYSIS**

## **Abstract**

Based on data from the 2010 China Family Panel Studies (CFPS) we find a gross union-nonunion pay gap (wages + bonuses) of 42%, dropping to 12% after controlling for the effect of other pay determining factors. The union impact on wages is only 8%, but bonuses are about twice as high for union workers. The union impact is essentially zero for SOEs and for foreign owned firms but it is large at 16% for private firms and even larger at 22% for government agencies. Of the overall pay gap of 42%, about three-quarters is attributable to differences in their endowments of pay determining characteristics and about one-quarter to differences in the returns for the same endowments of characteristics. The single most important factor explaining the overall pay gap is years of schooling both because union workers have more schooling and especially because they receive higher returns to their schooling. Quantile regressions reveal that the pure or adjusted union wage premium exhibits a u-shaped pattern being highest in the bottom and to a lesser extent the top of the pay distribution. Many of these patterns are consistent with the situation in China where unions are prominent in higher paying professional and administrative jobs in government agencies.

Keywords: union impact, wages, bonuses, pay distribution, China.

JEL Classification: J31, J33, J51

**Word Count: 9,847 of paper, tables and references**

## **UNION PAY PREMIUM IN CHINA: AN INDIVIDUAL-LEVEL ANALYSIS**

### **1. INTRODUCTION**

A number of recent studies provide rich documentation of the role of unions in China and the rapidly changing legal environment in which unions operate, as China makes the transition towards a more market oriented economy.<sup>1</sup> There is a dearth of empirical studies, however, that focus on the impact of unions on wages and other forms of compensation in China. While most studies have focused on the wage impact at the enterprise level, to our knowledge, ours is the first to use data at the level of the individual worker. Theoretically, this adds to our understanding of the function of unions in China and the impact of enterprise unions at the individual level.

The purpose of this paper is to exploit the individual nature of the data and estimate the union impact separately for wages and bonuses as well as total compensation to include both wages and bonuses. As well, we analyze how the union-nonunion pay differential (wages and bonuses separately as well as their total) varies as control variables are added and how it varies by such factors as age, gender, education, tenure with the organization and the type of firm ownership. This enables a portrayal of the pure union pay premium after controlling for these other factors that also affect pay, and it illustrates which factors are most important in explaining the overall union-nonunion pay gap. The overall union-nonunion pay gap is also decomposed into a portion due to differences between union and non-union workers in their *endowments* of pay determining characteristics (i.e., a compositional effect) and a portion due

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<sup>1</sup> Such studies include Chan (2009), Clarke, Lee and Li (2004), Clarke and Pringle (2009), Fang and Ge (2013), Friedman (2014), Friedman and Lee (2010), Liu (2010), Liu and Li (2014), Ng and Warner (1998), Shen and Benson (2008) and Warner (2000) as well as numerous additional references cited therein.

to differences in their monetary returns to those characteristics (i.e., a pure union wage effect that arises because unions affect the *returns* that workers get for factors such as education and tenure). Quantile regressions are then estimated to show how these separate portions are also calculated throughout the pay distribution. This illustrates, for example, how the portion of the overall union-nonunion pay gap due to different endowments of pay determining characteristics (the compositional effect) and the portion due to different monetary returns to those characteristics (the pure union wage effect) vary by low-pay, medium-pay and high-paid workers. This in turn highlights the potential effects that unions have on the distribution of income – an issue of growing concern in China. We also provide descriptive statistics which indicate which types of workers are more likely to be in a union.

## **2. LITERATURE, UNION FORMATION AND FUNCTION OF UNIONS IN CHINA**

Union formation in China is different from that in most Western developed countries. In Western countries individuals typically vote on whether to have a union in their organization, typically with strong resistance from management. If a union is certified, it represents all workers in the bargaining unit whether they voted for the union or not. There may be more than one union in the company depending on their different community of interests, and some workers in the company may be in jobs that are non-union.

In contrast, in China individual workers do not vote on whether to have a union. Rather, union formation in China tends to be “tops down.” This occurs in various forms (Liu, 2010). The All-China Federation of Trade Unions (ACFTU) is sanctioned by the government to form “official” unions at companies in order to foster “harmonious” relations. This is done at the enterprise level usually by gaining the approval of employers, sometimes with pressure from the government and often local officials in the interest of growth and stability. Once established, all employees are members of the union and there is only one union in the

company. In addition to ACFTU organizing, in some regions union associations have been formed to cover all workers in multiple small workplaces. As well, regional sectoral bargaining at the industry level is sometimes imposed for all workers in the industry. Although rare, there have also been cases of more “grass roots” union formation such as at Walmart’s Nanchang Bai store where the union was successful in defending an employee from dismissal, fostering the formation of a union so as to co-opt further “grass roots” actions (Bai, 2011; Liu and Li 2014). In other cases, individual workers have resorted to their own illegal strike or protest and this has prompted the government to establish an “official” union (Liu and Li, 2014). As well, when enterprise unions get established in the conventional ways, it is often with the help of workers (Liu, 2010).

As indicated, unions in China represent the instruments of the state and the Party, designed to foster harmony between workers and employers in the interest of enhancing stability and growth, and to co-opt the possibility of independent unions (Clarke 2005, p. 5; Ge 2007, p. 9; Liu 2010, p.30; Liu and Li 2014, p. 30; Shen and Benson 2008, p. 231; Zhang 2009, p. 213; Friedman and Lee 2010, p. 522; and Metcalf and Li 2006). Union functions typically include: administering social and welfare policy; holding production conferences; administering sick pay, visiting the sick and weeding out malingerers; smoothing over disputes; allocating housing, kindergarten spaces, and vacation time; organizing events and festivals; counseling; and providing assistance for those in need (Clarke 2005, p. 5, 6).

Even though unions in China adhere to the interest of the Party-State, they can still have an impact on the compensation of their members through means other than the channel of rent extraction through monopoly power as conventional in Western countries. To the extent that unions foster harmony and have better relationships with employers, this can lead to enhanced productivity and members may share in those gains by being rewarded with higher pay.

In addition, a compensation premium may be necessary to co-opt unions and their members into not pushing for a more aggressive adversarial and confrontational role as is common in many Western economies, and which is a potential threat that unions can have even as they serve a more passive role (Chen 2003, p. 1008). As stated by Ng and Warner (1998, p. 55) citing the president of the centralized union body, the All-China Federation of Trade Unions (ACFTU), unions must “increase the attraction to workers and enjoy more confidence from the workers, leaving no opportunity for those who attempt to organize ‘independent trade unions.’” In 1988, the ACFTU specifically called for “greater independence for the unions to head off the threat of independent worker organizations” (Clarke and Pringle 2009, p. 86).

In addition to these efforts to control and co-opt unions, some local and regional unions can exert bargaining power to gain benefits on behalf of workers (Liu 2010, p. 44; Clarke and Pringle 2009; Yao and Zhong 2013, p. 641). Zhang (2009, p. 205) also refers to “an indisputable discrepancy between government unions and enterprise unions” and highlights that enterprise unions can be particularly effective in bargaining for workers in private companies (p. 207). He further states that in private firms the union’s “goals of negotiating a better package for workers can be also viewed as a preemptive attempt to avoid direct open conflicts between companies and their workers.”

The various ways in which unions get established highlight that it usually does not directly involve individual worker decisions as to whether to join a union or not, although individual actions can prompt union formation. However, the process does highlight that there is likely considerable individual heterogeneity in who is in a union or not, hence giving rise to a potential union wage premium that varies by individuals. Our analysis will highlight this heterogeneity and how the impact of unions varies across such different individuals.

As well, while unions in China are generally formed at the enterprise level, this can filter down to a wage premium at the individual level. In a qualitative study, Clarke, Lee and Li (2004) indicate that trade unions generally prepare the first draft of the labor contract which specifies the subsidies (included in our measure of annual income) for workers. While their study indicates that no new subsidies are included in this initial draft, for firms previously without union representation, starting from a base template that all other unions have used can represent an increase in subsidies for the workers. Clarke et al. (2004) also indicate that in wage negotiations, the most difficult task is not the size of the increase but the variance among workers in the enterprise union. Unions play a role not only in allowing higher variation of wages among all employees, but also ensuring that the wages of workers at the bottom of the distribution are not reduced. In accepting higher variation and establishing an effective wage floor, the overall wages of workers in enterprise unions can thereby increase. Clearly, the impact of unions on wages in China is ultimately an empirical proposition; they could have a positive impact, no impact or even a negative impact.

As discussed subsequently, Ge (2007), Lu, Tao and Wang (2010) and Yao and Zhong (2013) use aggregate firm-level data where their dependent variable is the average wage level in the organization (i.e. payroll expenditure divided by the number of workers) and their union measure is a dummy variable indicating whether or not a union is present). Their use of aggregate firm-level data reflects the general lack of union identification information in the publicly available data that has information on wages or earnings.<sup>2</sup> We use data at the individual level to estimate whether there are benefits in the form of pay gains, in spite of the generally weak position of unions in China.

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<sup>2</sup> This is the case, for example, in the China Health and Nutrition Survey (CHNS), the Chinese Household Income Project (CHIPs), the Urban Household Income and Expenditure Surveys (UHIES).

### 3. METHODOLOGY

Our methodology involves different estimation procedures as appropriate for the nature of the data and the dependent variables. After presenting the descriptive statistics in Table 1, we estimate conventional (ln) earnings equations with a union dummy variable

$$(1) \quad y = X\beta + \alpha U + e$$

where  $y$  is the natural log of annual income (annual wage + annual bonus)  $X$  is a vector of endowments of individual wage determining characteristics or control variables (e.g., age, gender, years of schooling, years of tenure with the organization, the ownership type of the firm (private, SOE, government, foreign) along with province, industry and occupation fixed effects),  $U$  is a dummy variable indicating whether the individual is a union member, and  $e$  is a residual error term. Individual subscripts are omitted for simplicity.

The single equation estimation with a dummy variable for union status restricts the coefficients on the wage determining control variables to be the same for union and non-union workers. It is still informative, however, since it provides a simple measure or summary statistic of the net or adjusted pay gap between union and non-union workers after controlling for the effect of other pay determining factors. These results are portrayed in Table 2, indicating how the union impact varies as additional control variables are added. The final equation in Table 2 involves the full set of control variables

This is followed in Table 3 by estimating the union impact on the various components of compensation: probit equations on the probability of receiving a bonus; OLS estimates of the magnitude of the bonus conditional upon it being received; Tobit estimates of the unconditional magnitude of the bonus to account for the clustering at zero for those who do not receive a bonus; OLS estimates of the wage component of total compensation; and OLS estimates on total compensation. Table 4 then gives estimates of the union impact by the various ownership types of the firm – government, SOE, foreign and private.



Since different returns for the pay determining characteristics for union and non-union persons may be a mechanism whereby unions have their impact, separate equations are also estimated for union and non-union workers so as to allow the monetary returns to those pay-determining characteristics to differ between the union and non-union workers. Table 5 presents the separate union-nonunion pay equations and the mean values of the explanatory variables to illustrate the extent to which the two groups differ in their average endowments of pay determining characteristics as well as differences in their returns or pay premiums associated with those characteristics. These also form the basis of the subsequent decomposition analysis.

Since a property of regression analysis is that the intercept adjustment ensures that the regressions pass through the means of the data then:

$$(2) \quad \bar{y}_u = \bar{X}_u \beta_u \text{ for union workers and}$$

$$(3) \quad \bar{y}_n = \bar{X}_n \beta_n \text{ for non-union workers, and where the variables are defined as previously.}$$

As outlined in Oaxaca (1973), some basic manipulations yield:

$$(4) \quad \bar{y}_u - \bar{y}_n = (\bar{X}_u - \bar{X}_n) \beta_n + (\beta_u - \beta_n) \bar{X}_u .$$

That is, the average pay differential between union and non-union workers can be decomposed into two components. The first or “explained” component is due to differences in the average value of the endowments of wage determining characteristics,  $(\bar{X}_u - \bar{X}_n)$ , evaluated according to the returns that non-union workers receive for those characteristics,  $\beta_n$ , since those returns reflect the counterfactual of the more competitive norm. The second component is differences in the pay or returns,  $(\beta_u - \beta_n)$ , that union and non-union workers receive for the same wage-determining characteristics,  $\bar{X}_u$ . This later component is interpreted as a measure of the pure union pay premium since it reflects differences in pay for the same productivity related characteristics. The magnitudes of these two components are presented in Table 6, along with

the relative contribution of each of the variables in explaining the union-nonunion pay gap.

Lastly, quantile regressions are estimated to provide evidence on how the decomposition results and the union impact vary across the different deciles of the pay distribution (Table 7). Given the concern with growing wage inequality in China and elsewhere, the impact of unions on wage inequality is of potential policy interest.

#### **4. DATA**

Our data is taken from the 2010 China Family Panel Studies (CFPS), a nationally representative survey in China, conducted by the Institute of Social Science Survey (ISSS) of Peking University. It is designed to capture both the economic and non-economic status and well-being of Chinese communities, families, and individuals. The survey contains a wealth of information such as economic activities, education outcomes, family dynamics and relationships, migration, and health.

CFPS utilizes a stratified multi-stage sampling strategy covering 25 provinces in China. In 2010, it successfully interviewed 14,798 households from 635 communities, with 33,600 adults and 8,990 children in total. The response rate is approximately 81%, with the majority of the non-response due to non-contact. The survey was carefully designed to represent 95% of the total population in China in 2010 (Xie 2012). The claim was confirmed by Xu and Xie (2013), who find that distribution of the main demographic and social economic indicators in CFPS are not significantly different from the census.

We restrict the data to wage earners, which excludes persons not in labor force, currently unemployed, or self-employed. After dropping individuals with missing values in our key dependent variables (wage and bonus), we are left with 5628 observations. In addition, there are 23 observations with zero wage but positive bonus, which we choose not to include. This left us with a consistent working sample of 5605 individuals. Their basic demographic

information includes age, gender, years of schooling, and years of tenure (i.e., years worked with the current organization). Their work related information includes their annual wage, annual bonus, union status, firm ownership, province, industry and occupation. The summary statistics of these variables are reported in Table 1.<sup>3</sup>

Province is aggregated into various geographical regions across China with the largest urban centers (Beijing and Shanghai) forming one category. Industry is at the two-digit level but aggregated into nine categories. Occupational groupings are also aggregated into five categories.<sup>4</sup>

The categorization of individuals by ownership, industry and occupation is a complicated issue in the context of China. Due to China's economic history which focused on a high-level of involvement by the government in industry, the distinctions in ownership, industry and occupation are not necessarily easy to make. One example of this difficulty can be seen for organizations owned by the government. If an individual works for a government agency or institution, this individual might work in one of multiple occupations such as an official, a clerk, a technician or simply as a government worker. In addition, depending on the function of the government agency, the individual's job might be categorized into different industry sectors if the government agency provides specialized public services to that industry (e.g., sports stadiums) as opposed to being categorized in the public administrative industry. As a result, this may lead to some overlap between the categorizations of ownership, industry and occupation.

Our measure of annual wage is constructed using the sum of basic monthly salary

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<sup>3</sup> The government industry includes 22 observations in agriculture, only one of which is unionized. Dropping those 22 observations does not alter our basic results.

<sup>4</sup> Broadening the industry category to the 2-digit level, the geographical level to the finest categorization in the survey, and the occupation categories to 9 and 88 categories at the 3-digit level did not alter our substantive conclusions, but risk few observations in some of the categories.

multiplied by the number of months worked by the individual plus all the bonuses paid to the individual during the year. The measure of the bonus received by the individuals includes project bonuses, overtime pay, subsidies, and year-end bonuses.

Our measure of union membership was generated from a question asking whether the individual belonged to certain institutions (of which unions were one of the choices and respondents could check more than one answer). Individuals who indicated that they belonged to a union were coded as 1; all other observations were coded as 0.

## **5. RESULTS**

### **5.1 Summary Statistics**

Table 1 provides the summary statistics of the data, both overall and separately for union and non-union workers. All dimensions of earnings are substantially higher for union compared to non-union workers. As indicated in the last column, annual wages are 32% higher and bonuses for those who receive them are twice as high for union workers so that annual total income or compensation (wages plus bonuses) is 43% higher for union workers. The probability of receiving a bonus is 81% for union workers compared to 66% for non-union workers, and the probability of receiving a large bonus of over 2000 Yuan is 46% for union workers compared to 30% for non-union workers.

As indicated by the other attributes, much of this higher compensation reflects the fact that union workers tend to have characteristics that are associated with higher pay. For example, they tend to be older, male, more educated, longer tenured and disproportionately employed in Beijing and Shanghai and in professional jobs that are higher paying. The relative contribution of these and other pay determining characteristics will be analyzed more systematically in the subsequent decomposition analysis.

The summary statistics reveal that only 8.4% (471/5605) of the individuals surveyed

reported that they belonged to a union. This is considerably lower than the rate of about 40% reported in Liu (2010), although Liu indicates that this rate may be considerably overstated, as is the report of 280 million union members by the ACFTU in 2012, since it is based upon statistics by the unions who often overstate their numbers due to the need for local unions to meet certain membership criteria (Liu, 2010). Furthermore, it is also possible that individuals in our data set do not know that they have automatically joined a union in the workplace (Bai, 2011). This possibility is enhanced by the fact that union branches are often not established in smaller companies, and the terms of the bargaining contract are often not implemented in these smaller firms through sectoral bargaining (Friedman, 2014). Our results should be qualified, however, by the fact that they are based on individual survey data that yields what appears to be a low unionization rate.

The summary statistics of Table 1 also indicate the types of workers who are more likely to be in a union.. The likelihood of being in a union is higher if a worker is older, has more tenure (defined as the number of years in which the employee has worked in the current firm), has more education and is male. These likely indicate that unions target more established firms with more traditional and established workforces. Moreover, the likelihood of being in a union is higher if the individual works in a state-owned enterprise or government organization, reflecting the close association between unions and the government in China. Individuals are more likely to be unionized in the Northeast and Beijing and Shanghai, reflecting the extensive presence of government and large firms. Individuals are also more likely to be unionized in the education industry and in professional and administrative occupations, consistent with the notion that Party pressure may be stronger to organize such workers to exert a degree of control and to co-opt stronger forms of voice that otherwise may occur.

## 5.2 Union Premium as Controls Added

Table 2 illustrates how the union premium<sup>5</sup> in annual income (total compensation to include annual wages plus bonuses) varies as additional control variables are added. The annual income measure is used because it is the relevant measure of total compensation. As indicated in column 1, the overall union – nonunion total compensation pay gap is 42% before adjusting for other factors that affect that gap. The gap drops monotonically after controls are sequentially added, highlighting how the overall unadjusted gap reflects the fact that union workers tend to have characteristics that positively affect pay and/ or they receive a higher pay premium than do non-union workers for those pay determining characteristics. (The separate effect of differences in endowments of pay determining characteristics and differences in the returns for those characteristics is analyzed subsequently in the decomposition analysis). Specifically, the gap drops to: 39% after controlling for differences in the industry distribution (column 2); 34% after also controlling for province (column 3); 32% after controlling for occupation (column 4); 30% after controlling for age (column 5); and 29% after controlling for gender (column 6). The large drop to 17% occurs after controlling for education (column 7) with a further drop to 12% after controlling for tenure (column 8) and remaining at 12% after controlling for the ownership type of the firms in which they work (column 9).

The overall net union wage premium of 12% after controlling for the effect of the other pay determining factors given in the table is in line with the range of 8.9% to 12.4% found in the meta-analysis of Jarrell and Stanley (1990) based on 152 estimates from 114 U.S. studies.

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<sup>5</sup> In log earnings equations, the true proportional change for a categorical independent variable like union status is  $\exp(\beta) - 1$  where  $\beta$  is the estimated coefficient. For low values of  $\beta$  the approximation is very close, underestimating the true value by about 0.005 for values of  $\beta$  of around 0.10 which is the case for our union variable after controlling for the other determinants of pay; hence we report the  $\beta$  coefficients.

The 12% for China, however, may appear large given that unions in China lack bargaining power and the strike weapon. But it is in line with the recent estimates for China of 10.4% in Ge (2007) and 8.7% to 12.6% in Yao and Zhong (2013). Neither of these studies nor ours is consistent with Lu, Tao and Wang (2010) who find no evidence of a union effect on wages or bonuses. That study, however, was based on aggregate firm-level data for the private sector where the measure of compensation was total wages and bonuses divided by total employment and the union indicator was a dummy variable indicating whether or not the firm had a union. Our study includes a measure of the union impact on a broad variety of different firm types, and is based on the individual as the unit of observation.

As discussed previously, in spite of the lack of bargaining power and the strike weapon, there are reasons for why a 12% premium may be sustained. It may be a compensating premium for delivering services and bearing the brunt of the complaints about their inadequacy when in short supply. The premium may reflect the sharing of any productivity gains<sup>6</sup> from their fostering harmony with employers or for co-opting unions and their members into not pushing for a more aggressive adversarial and confrontational role by forming independent unions. Furthermore, local and enterprise unions do bargain for wage gains for their members. As part of their unionization strategy, Chinese unions have tried to organize in areas with a high concentration of individually-owned businesses and privately-owned enterprises and giving these union associations more freedom for bargaining power. As well, unions have begun organizing by trades and this may foster the union pay premium (Liu, 2010). Yao and Zhong (2013) find that unionized firms in China are more likely to sign collective contracts and that firms are more likely to offer individual contracts to union workers. Given the increased legal enforceability of working under a contract, this

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<sup>6</sup> The possibility that some of the 12% total compensation premium may reflect higher productivity and hence be sustained even under competitive pressures is enhanced by the fact that, as outlined subsequently, the union wage premium is only 8%, with the remaining gain reflecting bonuses which are productivity related.

may further explain the union premium in the private sector.

Our overall union premium of 12% is used to benchmark how the union impact varies by such factors as: controlling for the impact of other determinants of pay (Table 2); examining the various components of compensation (Table 3); the type of ownership of the organization (Table 4); the various determinants of pay (Table 5); the relative contribution of pay determining characteristics and returns to those characteristics (Table 6); and the pay distribution (Table 7).

The reasonableness of the estimates is further evidenced by that fact that the other variables have effects that are generally in the expected direction. As indicated in column 9 of Table 2, age exhibits the normal age-earnings profile increasing at younger ages, reaching a maximum and then decreasing at older ages. Specifically, the effect of an additional year of age is 4% when evaluated at age 20, 2% at age 30, 0% at age 40, -2% at age 50 and -4% at age 60, with the peak occurring at age 40.<sup>7</sup> This peak is earlier than that which prevails in most developed countries, perhaps reflecting that younger workers are more adept at adjusting to the pressures in the transition to a market economy. Males earn substantially more (27%) than females even after controlling for the array of pay determining factors. Returns to additional years of education are 5.8%, increasing to 6.8% if the controls for occupation and industry are not included on the grounds that these are mechanisms through which education may positively affect wages.<sup>8</sup>

Each additional year of tenure with the organization is associated with a 1.6% pay

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<sup>7</sup>This is calculated as  $\partial \ln Y / \partial \text{Age} = \alpha + 2\beta \text{Age}$  where  $\alpha$  is the coefficient on the Age variable and  $\beta$  the coefficient on Age Squared. The maximum occurs where  $\partial \ln Y / \partial \text{Age} = 0$  or when  $\text{Age} = -\alpha / 2\beta$ . The calculations reported in the text are based on the unrounded coefficients for Age and Age Squared as opposed to the rounded ones reported in Table 2.

<sup>8</sup> These returns of 6.8% are at the lower end of the range of 5-15%, averaging around 10%, found in developed countries (Gunderson and Oreopoulos 2010 and references cited therein), and they are slightly lower than the approximately 10% for China documented in Zhang et al., 2005, perhaps because the later focused on urban workers.



increase, reflecting the effect of seniority and the quality of the job match. Relative to the omitted category of private firms, pay is not significantly different in government agencies<sup>9</sup> or state owned firms (SOEs), but it is 12% higher in foreign-owned firms. In essence, foreign-owned firms are the outlier in terms of paying a substantial pay premium of around 12% relative to the other ownership types.

### **5.3 Union Impact on Components of Compensation**

Table 3 probes in more detail, the union impact on the various components of total compensation. The final regression based on total income (wages plus bonuses) as given previously in Table 2 is repeated in column 5 for comparison purposes. As indicated in the first row, the probability of receiving an annual bonus is 11% greater for union as opposed to non-union workers (column 1). Conditional on receiving a bonus, the magnitude of the bonus is 22.6% greater for union compared to non-union workers (column 2). These combined effects of a higher probability of receiving a bonus and a larger bonus conditional upon receiving one are illustrated in the Tobit marginal effects of column 3 where the unconditional magnitude of the bonus is 129% higher for unionized workers.

Column 4 indicates that the union premium in annual wages of 7.8% is substantially less than the premium of 11.7% for total compensation (wages plus bonuses) as indicated in the last column. This reflects the fact that unionized workers are more likely to receive bonuses (column 1) and to receive larger ones (column 2). Combining the 7.8% union premium on wages and the much larger effect on bonuses yields the overall union premium of 11.7% in total compensation (wages plus bonuses). This highlights that focusing only on wages would underestimate the union impact on total compensation in China by 50% (i.e.,  $(11.7-7.8)/7.8$ ).

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<sup>9</sup> Government agencies in our data include persons employed by the Government or Party, society organizations, institutions such as hospitals, and village committees.

The relationship between the other covariates and the various forms of compensation are best summarized by comparing their effect on wages alone (column 4) and wages plus bonuses (column 5). In general, those relationships are fairly similar for the other covariates suggesting that they do not have a differential effect on wages and bonuses. This sometimes reflects, however, the effect of offsetting factors on the different components of compensation. For example, the total compensation (wages plus bonuses) for the government is not different from the private sector omitted reference category. But this is a result of offsetting forces. Government employees have a 7% higher probability of receiving a bonus (column 1) and a 32% larger bonus (column 2) and hence have (unconditional expected) bonuses that are 100% larger than employees of private firms (column 3). But this is largely offset by the fact that they receive wages that are 7% lower (column 4) so that the overall effect is essentially zero (column 5). To a lesser extent there is also a difference for employees in foreign firms. They have a 58.7% larger bonus (column 3) than do employees of private firms, mainly because of the larger bonus they receive conditional on receiving a bonus (column 2). This gives rise to a 12% higher total compensation of wages plus bonuses (column 5) compared to their 8.8% premium in wages alone (column 4). Otherwise the effect of the other covariates tends to be similar for wages and total compensation to include bonuses.

#### **5.4 Union Impact by Ownership Type**

Table 4 illustrates how the union impact on total compensation varies by the type of ownership of the firm. The impact is statistically insignificant for SOEs and for foreign owned firms but it is large at 16% for private firms and even larger at 22% for government agencies after controlling for the effect of other pay determining variables. In essence, there is extreme variation in the average union impact of 11.7% (column 5) across the different ownership types of firms. Just as the union impact varies substantially by the form of

compensation it also varies by the ownership of the firm.

The absence of a union pay premium in foreign-owned firms may reflect the possibility that they already pay above-market rates (12% documented previously) or meet the minimum employment standards outlined in the new labor contract law perhaps because they are sensitive to their public image as a foreign-owned firm. As well, rent extraction is difficult because of competitive market pressures. The same may apply to SOE's which are increasingly under competitive pressures and expected to make profits.

In contrast, the very large union impact in the government sector likely reflects the fact that the government sector operates more under a political constraint than under a profit constraint. Since unions are largely a political institution in China, then such rent extraction is understandable. As well, almost all permanent government staff are union members, some of the union premium may simply reflect a pay gap between permanent and temporary employees. Some may also reflect the situation that non-unionized government employees work for smaller and more unimportant government departments and hence receive lower wages for their work. Also, most pure government organizations are found in government headquarters in Beijing which tends to be a high-wage city.<sup>10</sup> As outlined previously, the government sector in China is a very heterogeneous group and changing rapidly in response to government decisions. As such, the large union pay premium may dissipate in the future if the sectors within government that pay such a premium are phased-out or regulated more stringently.

The large union premium of 16% in the private sector is more puzzling since they are under competitive market pressures rather than political pressures and yet they pay a large union premium. The large premium may be sustainable in spite of competitive pressures

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<sup>10</sup> The impact of being in a high-wage city like Beijing is illustrated by the fact that if we add a separate control variable for Beijing, the union premium in the government sector is reduced from 0.22 to 0.17.

because the private sector has by far the smallest portion of its workforce that is unionized (19.1%) compared to its portion of the overall workforce (44.3%) as indicated previously in Table 1. While the high union premium in the private sector may induce workers to want to join a union, the competitive pressures faced by employers in the private sector may foster their resistance to unions, yielding a low unionization rate. The low unionization rate implies a low ratio of union labour cost to total cost so that those few union members may be able to negotiate higher rates in private firms as discussed previously and outlined in Zhang (2009). The union premium also might be higher in private firms and government in that the law requires that firms with more than twenty-five workers be unionized, although this law is not strictly enforced (Liu, 2010). This can lead to the unionization of individuals who work in larger private firms which may be associated with a higher wage.

The effects of the other covariates are fairly similar across the different ownership types and hence are fairly similar to the aggregate total effects repeated in the last column. There are, however, some noticeable differences. The pay advantage for males over females, after controlling for the other factors that influence pay is substantially higher in the private sector (31%) and in foreign-owned firms (29%) compared to the government sector (18%) and the SOEs (21%). To the extent that at least part of that male pay advantage reflects discrimination, it is possible that the political constraints of the government sector and to a lesser extent the SOEs inhibit such discrimination to the extent that they are under more public scrutiny.

The returns to schooling are considerably less in the private sector (3.5%) especially compared to the government sector (8.9%). Reasons for this are not obvious. It could be that the government sector may use education credentials as a way of allocating jobs. Also private sector jobs may be more routine and not require education compared to the government sector where more discretionary decision making is involved. However, it is

not obvious that such routines are more prominent in the private sector compared to the SOEs or foreign-owned firms were the returns to education are higher at around 7%.

### **5.5 Separate Union and Nonunion Equations**

The pure union wage premium of 12% in total compensation is based on a union dummy variable indicating the effect of union status after controlling for the other determinants of pay. It essentially restricts the coefficients on the other covariates to be the same in the union and non-union sectors. The regressions of Table 5 relax that restriction and provide separate estimates for the union and non-union wage equations so as to highlight how the various pay determining variables may have a different effect in the union and non-union sectors. These separate regressions also enable the decomposition analysis as detailed subsequently. The separate union and non-union equations are presented for total income (wages plus bonuses) since that is the most relevant measure of compensation.

Of particular note, the age-earnings profile is very different between the union and non-union sectors. In the non-union sector, the age earnings profile follows the conventional concave pattern of increasing with age, reaching a peak and then declining slowly afterwards. Specifically, in the non-union sector the effect of an additional year of age is calculated as 4% when evaluated at age 20, 2% at age 30, reaching a peak at age 38, then declining by -2% at age 50 and -4% at age 60. In marked contrast, in the union sector, the age earnings profile is relatively flat. Specifically, the effect of an additional year of age is calculated as 1% when evaluated at age 20 and age 30, 0% at age 40 and 50 and declining slightly by -1% at age 60, reaching its peak at age 43 in the union sector. This flatter age-earnings profile for unionized employees is consistent with the phenomenon of unions reducing pay differentials across various characteristics – in this case, age.

The pay premium for males after controlling for the effect of the other pay determining

characteristics is considerably smaller at 18% for unionized workers compared to 28% for non-union workers. This again is consistent with unions reducing wage differences across various characteristics. To the extent that the male-female pay gap reflects discrimination, it is also consistent with unions reducing the extent of such discrimination.

The returns to education are higher for union compared to non-union workers (7.8% vs. 5.6%). This likely reflects the fact that unionized workers in China are disproportionately in professional and administrative jobs that pay well and where education matters.

Non-union workers in foreign-owned companies receive much higher pay than in other ownership types – about 14% more than non-union workers in private firms which also pay about the same as do government agencies and SOEs. In marked contrast, unionized workers receive a large premium of about 19% in the government sector relative to private firms. As indicated, this likely reflects the ability of unions to extract rents in the government sector to the extent that it operates more under a political constraint than a profit constraint. Since such rent extraction is sustainable in the absence of competitive market forces, this also helps explain the high rate of unionization in the government sector as indicated in our summary statistics of Table 1.

Beijing and Shanghai are the high-paying regions for both union and non-union workers as evidenced by the large negative coefficients for all other regions. The regional pattern is fairly similar between union and non-union workers as evidenced by the generally similar magnitudes of the coefficients between union and non-union workers. An exception is the Eastern provinces where the negative coefficient of 40% for non-union workers is about twice as high as the coefficient of 20% for union workers.

The industry patterns are quite different for union and non-union workers as evidenced by the different magnitudes and significance as well as (often) differences in sign between union and non-union workers. Of particular note, relative to the omitted reference category of

manufacturing, unionized workers in construction receive a 38% premium while non-union workers are paid 14% less. This may reflect the heterogeneity of the changing union strategies in China as some have evolved from organizing through firms (hence the concept of enterprise unions) towards occupations. The low pay of non-union workers may also reflect the importance of migrant workers in construction, who would be low-paid and non-union.

There is some similarity in the occupational patterns for union and non-union workers, albeit there are also differences. Specifically, unionized service workers receive wages that are 23% lower than the omitted reference category of processing, while service workers who are not unionized receive about the same as those in processing. This result is puzzling, although it could reflect a closeness of the union with the firm leading to even lower wages compared to a non-union environment. Unionized government workers receive about 57% more than unionized workers in processing which is over twice the difference of 26% for non-unionized workers in government jobs. This is consistent with unionized workers in government being able to sustain rent extraction given the absence of competitive forces in the government sector compared to processing, which also helps explain the high rate of unionization in the government sector.

Clearly there is extensive heterogeneity in the union premium across ownership types, regions, industries and occupations, and we offered some explanation for these differences. This heterogeneity is consistent with the heterogeneous role and function of unions in China as discussed previously, highlighting that some can have a positive effect on pay, others no effect, and others even a negative effect. More research is necessary, however, to pierce inside the “black box” of union behavior in China to uncover the different channels through which unions have an effect.

The relative importance of these differences in the pay structure between unionized and

nonunion workers, as well as differences in their endowments of pay determining characteristics in explaining the overall pay gap between union and non-union workers is further illustrated in the decomposition analysis of Table 6.

### **5.6 Decomposition Analysis and Relative Contribution of Each Variable**

As indicated in the heading panel of Table 6, the overall union-nonunion difference in income (wages plus bonuses) is 41.8%. Of that pay gap of 0.418, 0.303 or about three-quarters (72.5%) is attributable to differences in their endowments of pay determining characteristics (explanatory variables) and 0.115 or about one-quarter (27.5%) is attributable to differences in the returns (coefficients) that union and non-union workers receive for the same endowments of characteristics. The fact that the union premium of 0.115 based on allowing the returns to vary across the different pay determining characteristics is almost identical to the union premium of 0.117 when based on a single union dummy variable that restricts the returns to be similar across the different characteristics, highlights that the single union dummy variable provides an adequate approximation to the pure union pay premium.

With respect to the relative importance of the different endowments of pay determining characteristics (column 2), the greater number of years of schooling and tenure with the organization are by far the most important factors, contributing 27% and 26% respectively in explaining the overall pay gap. The contribution of those two factors sum to 53% of the overall pay gap which is about three quarters of the 72.5% that is explained by differences in all of the endowments.

With respect to the relative importance of differences in the returns that union and nonunion workers receive for the same pay determining characteristics (column 4), the higher returns to schooling received by unionized workers is by far the most important factor accounting for almost two-thirds (65.6%) of the overall gap. The higher returns that union



workers receive for working in government owned firms accounts for a further 18% of the overall gap. Working in the other direction, the *lower* premium to being male and to tenure for union workers account for 16% and 41% respectively of the overall gap.

Many of the variables have effects that are offsetting. For example, union workers are slightly more likely to be male but they get a smaller pay premium to being male. Union workers have more tenure but they get lower returns to their tenure. The single most important factor explaining the union-nonunion pay gap is years of schooling both because union workers have more schooling (explains 27%) of the gap and because they receive higher returns to their schooling (contributes to 66% of the gap).

### **5.7 Decomposition Results for Quantile Regressions**

Table 7 illustrates how the union-nonunion pay gap and the relative importance of differences in endowments of pay determining characteristics and differences in returns to those characteristics vary across the percentiles of the pay distribution. The decomposition results from the conventional regression when evaluated at the means of pay as given in Table 6 are repeated at the bottom of Table 7 for comparison purposes.

Clearly, the overall pay gap declines almost monotonically going from 0.593 at the 10<sup>th</sup> percentile of the pay distribution, leveling off to around 0.34 at the 60<sup>th</sup> and subsequent percentiles (column 1). The proportion explained by differences in the endowments of pay determining characteristics does not vary much over the distribution and is fairly close to the 72.5% when evaluated at the mean in conventional regressions. The exception is at the top of the pay distribution where differences in endowments of pay determining characteristics explain 65% of the gap at the 80<sup>th</sup> percentile and 60% at the 90<sup>th</sup> percentile (column 3).

Column 4, however, is of most interest because it portrays how the pure union pay premium varies across the pay distribution. A u-shaped pattern is evident. The pure union

pay premium is highest at 19.7% in the bottom decile of the pay distribution, declining monotonically to 8.1% at the 60th percentile and then rising slightly to 13.7% at the 90<sup>th</sup> percentile. The larger premiums at the bottom of the percentiles are consistent with unions compressing the pay distribution by bargaining for similar absolute pay increases which translate into larger percentage increases for lower-paid workers. The larger union wage premiums in the higher percentiles of the pay distribution highlight that unions affect not only low-paid members but also the more well-paid members. This may reflect the large union premium in the government sector where unions are prominent in higher level administrative jobs within the government. As well, China has the unusual feature that members of management are not only likely to be a member of the union but also to be the union representative. Consequently, they may be more likely to negotiate for higher wages at the upper end of the distribution which affects their pay.

## **6. SUMMARY AND CONCLUDING OBSERVATIONS**

Overall, we regard the main contribution of our empirical work towards understanding unions in China as using individual data to provide a number of empirical facts. Those main facts are: the gross union-nonunion pay gap (wages + bonuses) of 42%, drops to 12% after controlling for the effect of other pay determining factors; the union impact on wages is only 8%, but bonuses are about twice as high for union workers; the union impact varies considerably by ownership type being essentially zero for SOEs and for foreign-owned firms but 16% for private firms and 22% for government agencies; of the overall pay gap of 42%, about three-quarters is attributable to differences in their endowments of pay determining characteristics and about one-quarter to differences in the returns for the same endowments of characteristics; the single most important factor explaining the overall pay gap is years of schooling both because union workers have more schooling and especially because they

receive higher returns to their schooling; the pure or adjusted union wage premium exhibits a u-shaped pattern being highest in the bottom and to a lesser extent the top of the pay distribution. Many of these patterns are consistent with the situation in China where unions are prominent in higher paying administrative jobs in government agencies. We did offer explanations for many of those patterns, but understanding the behavior of unions in China remains somewhat of a black box.

Our analysis has the limitation of most empirical studies of the impact of unions – the potential for selection bias since union status is not randomly assigned but rather can be based on unobservable characteristics that can affect union status as well as pay outcomes. Unfortunately, as is typical with the literature on the union impact based on cross-section data, we do not have suitable identifying instrumental variables that affect union status but are uncorrelated with the pay outcome. The hope is that the problem is mitigated somewhat by the covariates used in our analysis;<sup>11</sup> however, we acknowledge this potential limitation in identifying the causal impact of unions in China.

Overall, we regard dealing with the potential selection issue as well as unravelling the causal mechanisms within the “black box” through which unions have an impact, as important areas for future research on unions in China. We regard our work as an initial step in contributing to an understanding of unions in China by using individual data to set out the facts, with further work being merited in explaining those facts.

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<sup>11</sup> In addition to expanding the list of covariates by broadening the industry, geographical and occupational categories as mentioned previously, adding a variable for urban hukou and membership in the Communist Party did not alter our substantive conclusions.

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Table 1: Summary Statistics

	Overall (n=5605) (1)	Non-union (n=5134) (2)	Union (n=471) (3)	Union/Non Ratio (4)
<i>Income</i>				
Annual wage	19712	19191	25386	1.32
Annual bonus	3569	3279	6731	2.05
I(Bonus>0)	0.67	0.66	0.81	1.24
I(Bonus>2000)	0.31	0.30	0.46	1.55
Annual income (wage+bonus)	23281	22470	32117	1.43
<i>Other Attributes</i>				
Age	37.57	37.16	41.94	1.13
Male	0.60	0.59	0.65	1.10
Years of schooling	10.35	10.18	12.21	1.20
Tenure	8.55	8.02	14.40	1.80
<i>Type of Firm</i>				
(Private Firm)	44.3%	46.6%	19.1%	0.41
SOE	24.0%	23.2%	33.1%	1.43
Government	19.3%	17.9%	34.4%	1.93
Foreign	12.5%	12.4%	13.4%	1.08
<i>Province</i>				
(Beijing, Shanghai)	20.2%	19.6%	27.0%	1.38
Eastern Provinces	12.6%	13.1%	7.4%	0.57
Southern Provinces	6.3%	6.7%	1.7%	0.25
Central Provinces	26.6%	26.8%	23.6%	0.88
Northern Provinces	10.0%	9.9%	10.8%	1.09
Northeast Provinces	16.7%	16.4%	20.4%	1.24
Northwest Provinces	7.6%	7.4%	9.1%	1.23
<i>Industry</i>				
(Manufacturing)	32.8%	33.0%	30.1%	0.91
Agricultural, Mining	4.1%	4.1%	4.5%	1.08
Utilities and Other	4.2%	4.2%	4.9%	1.17
Construction	5.4%	5.5%	4.0%	0.73
Transportation	8.3%	8.2%	10.0%	1.22
Technical/Fin/Real Estate	3.7%	3.7%	4.0%	1.10
Services	19.3%	19.8%	13.8%	0.70
Education	11.7%	11.2%	17.0%	1.51
Public Administration	10.4%	10.3%	11.7%	1.13
<i>Occupation</i>				
(Processing)	39.2%	39.7%	33.5%	0.84
Professional	15.4%	14.7%	22.1%	1.50
Administration	14.0%	13.4%	20.2%	1.51
Services	21.1%	21.8%	13.8%	0.63
Government	10.4%	10.4%	10.4%	1.00

Table 2. Union Premium in (ln) Annual Income

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Union	0.418*** [0.040]	0.386*** [0.039]	0.338*** [0.037]	0.315*** [0.037]	0.296*** [0.036]	0.287*** [0.036]	0.171*** [0.035]	0.121*** [0.034]	0.117*** [0.034]
Age					0.077*** [0.007]	0.089*** [0.007]	0.076*** [0.006]	0.072*** [0.006]	0.071*** [0.006]
Age Sq.					-0.001*** [0.000]	-0.001*** [0.000]	-0.001*** [0.000]	-0.001*** [0.000]	-0.001*** [0.000]
Male						0.312*** [0.022]	0.280*** [0.021]	0.270*** [0.021]	0.272*** [0.021]
Years of schooling							0.064*** [0.003]	0.058*** [0.003]	0.058*** [0.003]
Tenure								0.016*** [0.001]	0.016*** [0.001]
Government									-0.001 [0.036]
SOE									0.022 [0.028]
Foreign									0.119*** [0.030]
Constant	9.689*** [0.012]	9.644*** [0.019]	10.125*** [0.028]	10.034*** [0.029]	8.631*** [0.126]	8.251*** [0.127]	7.796*** [0.123]	7.963*** [0.122]	7.932*** [0.122]
Occupation FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Province FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	5,605	5,605	5,605	5,605	5,605	5,605	5,605	5,605	5,605
R-square	0.019	0.060	0.147	0.186	0.205	0.233	0.297	0.317	0.319

Note:

Private ownership is the omitted reference category for the type of ownership variable. Standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at 1%, 5% and 10% levels.

Table 3. Union Effects on Various Components of Compensation

Dep. Var.	I(bonus>0)	ln(bonus bonus>0)	ln(bonus)	ln(wage)	ln(wage+bonus)
	Probit	OLS	Tobit	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Union	0.113** [0.022]	0.226* [0.089]	1.288** [0.249]	0.078* [0.034]	0.117** [0.034]
Age	-0.012** [0.004]	0.011 [0.018]	-0.114* [0.047]	0.079** [0.006]	0.071** [0.006]
Age Sq.	0.000* [0.000]	0 [0.000]	0.001 [0.001]	-0.001** [0.000]	-0.001** [0.000]
Male	0.002 [0.014]	0.331** [0.057]	0.262 [0.151]	0.267** [0.020]	0.272** [0.021]
Yrs. schooling	0.017** [0.002]	0.100** [0.008]	0.254** [0.022]	0.053** [0.003]	0.058** [0.003]
Tenure	0.001 [0.001]	0.022** [0.004]	0.023* [0.010]	0.015** [0.001]	0.016** [0.001]
Government	0.069** [0.023]	0.322** [0.103]	1.001** [0.266]	-0.073* [0.035]	-0.001 [0.036]
SOE	0.119** [0.017]	0.316** [0.077]	1.486** [0.204]	-0.042 [0.027]	0.022 [0.028]
Foreign	0.03 [0.021]	0.407** [0.086]	0.587** [0.225]	0.088** [0.030]	0.119** [0.030]
Constant		6.347** [0.343]	4.705** [0.901]	7.659** [0.120]	7.932** [0.122]
Occupation FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Obs	5605	3753	5605	5605	5605
R-square	0.08	0.21	0.03	0.28	0.32

Note:

For the Probit (column 1) and Tobit (column 4) regression, the marginal effects are reported. The corresponding "R sq." is the pseudo R-squared. Private ownership is the omitted reference category for the type of ownership variable. Standard errors in brackets. \*\*\*, \*\*, and \* indicate significance at 1%, 5% and 10% levels.



Table 4. Union Impact on (ln) Annual Income by Type of Firm Ownership

	By Ownership				Benchmark
	Government (1)	SOE (2)	Foreign (3)	Private (4)	Overall Sample (5)
Union	0.223*** [0.057]	0.024 [0.056]	-0.064 [0.098]	0.159** [0.078]	0.117*** [0.034]
Age	0.052*** [0.014]	0.050*** [0.015]	0.080*** [0.018]	0.096*** [0.010]	0.071*** [0.006]
Age Sq.	-0.001*** [0.000]	-0.001*** [0.000]	-0.001*** [0.000]	-0.001*** [0.000]	-0.001*** [0.000]
Male	0.168*** [0.040]	0.227*** [0.046]	0.301*** [0.057]	0.344*** [0.032]	0.272*** [0.021]
Yrs. schooling	0.089*** [0.006]	0.064*** [0.007]	0.071*** [0.008]	0.035*** [0.004]	0.058*** [0.003]
Tenure	0.017*** [0.002]	0.008*** [0.003]	0.007 [0.004]	0.018*** [0.002]	0.016*** [0.001]
Occupation FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Ownership FE	No	No	No	No	Yes
Obs	1,347	1,079	698	2,481	5,605
R-square	0.362	0.305	0.428	0.268	0.319

Note: Standard errors in brackets.

\*\*\*, \*\*, and \* indicate significance at 1%, 5% and 10% levels.

Table 5. Union and Nonunion Means and Coefficients Used in Decompositions; Dependent Variable (ln)Annual Income (Wages + Bonus)

	Means		Coefficients	
	Union	Non-union	Union	Non-Union
Age	41.94	37.16	0.017	0.076***
Age Sq.			-0.0002	-0.001***
Male	0.65	0.59	0.178***	0.283***
Years of schooling	12.21	10.18	0.078***	0.056***
Tenure	14.4	8.02	0.005	0.017***
(Private Firm)	19.10%	46.60%		
SOE	33.10%	23.20%	-0.014	0.031
Government	34.40%	17.90%	0.189*	-0.026
Foreign	13.40%	12.40%	-0.082	0.138***
(Beijing, Shanghai)	27.00%	19.60%		
Eastern Provinces	7.40%	13.10%	-0.204*	-0.397***
Southern Provinces	1.70%	6.70%	-0.605***	-0.628***
Central Provinces	23.60%	26.80%	-0.527***	-0.564***
Northern Provinces	10.80%	9.90%	-0.618***	-0.607***
Northeast Provinces	20.40%	16.40%	-0.476***	-0.602***
Northwest Provinces	9.10%	7.40%	-0.657***	-0.606***
(Manufacturing Industry)	30.10%	33.00%		
Agricultural, Mining	4.50%	4.10%	-0.075	0.128**
Utilities and Other	4.90%	4.20%	0.133	-0.139***
Construction	4.00%	5.50%	0.381***	-0.125***
Transportation	10.00%	8.20%	0.186*	0.138***
Technical/Fin/Real Estate	4.00%	3.70%	0.062	0.212***
Services	13.80%	19.80%	-0.121	-0.062*
Education	17.00%	11.20%	-0.163	-0.101**
Public Administration	11.70%	10.30%	-0.170	-0.101**
(Processing Occupations)	33.50%	39.70%		
Professional	22.10%	14.70%	0.209*	0.220***
Administration	20.20%	13.40%	-0.012	0.057
Services	13.80%	21.80%	-0.232**	0.0002
Government	10.40%	10.40%	0.568***	0.263***
Constant			8.815***	7.864***
Obs.	471	5134	471	5134
R-squared			0.38	0.31

Table 6. Decomposition of Overall Union-Nonunion Income Gap (Wage + Bonuses) and Relative Contribution of Each Variable

Overall Union-Nonunion Income Gap ( $\bar{Y}_u - \bar{Y}_n$ )		Explained, Due to Differences in Characteristics ( $(\bar{X}_u - \bar{X}_n)\beta_n$ )		Unexplained, Due to Difference in Returns ( $(\beta_u - \beta_n)\bar{X}_n$ )	
Amount	%	Amount	%	Amount	%
0.418	100%	0.303	72.49%	0.115	27.51%
		(1)	(2)	(3)	(4)
Male		0.016**	3.83%	-0.068	-16.27%
Years of schooling		0.113***	27.03%	0.274*	65.55%
Tenure		0.109***	26.08%	-0.170***	-40.67%
(Private Firm)				0.002	0.48%
SOE		0.005	1.20%	-0.011	-2.63%
Government		-0.003	-0.72%	0.075***	17.94%
Foreign		0.001	0.24%	-0.028***	-6.70%
(Beijing, Shanghai)				-0.012	-2.87%
Eastern Provinces		0.023***	5.50%	0.011	2.63%
Southern Provinces		0.032***	7.66%	-0.0004	-0.10%
Central Provinces		0.018	4.31%	-0.002	0.48%
Northern Provinces		-0.006	-1.44%	-0.006	-1.44%
Northeast Provinces		-0.024**	-5.74%	0.016	3.83%
Northwest Provinces		-0.010	-2.39%	-0.009	-2.15%
(Manufacturing Industry)				-0.009	-2.15%
Agricultural, Mining		0.0004	0.10%	-0.010	-2.39%
Utilities and Other		-0.001	-0.24%	0.012*	2.87%
Construction		0.002	0.48%	0.020***	4.78%
Transportation		0.002	0.48%	0.002	0.48%
Technical/Fin/Real Estate		0.001	0.24%	-0.007	-1.67%
Services		0.004	0.96%	-0.012	-2.87%
Education		-0.006*	-1.44%	-0.016	-3.83%
Public Administration		-0.001	-0.24%	-0.012	-2.87%
(Processing Occupations)				0.001	0.24%
Professional		0.016***	3.83%	-0.002	-0.48%
Administration		0.004	0.96%	-0.014	-3.35%
Services		-0.00002	0.00%	-0.032***	-7.66%
Government		0.00006	0.01%	0.032***	7.66%
Constant				1.014*	243.58%

Note: The relative contribution of age is not discussed because its quadratic formulation does not lead to a straightforward interpretation.

Table 7. Decomposition Results for Quantile Regression Estimates of the Union-Nonunion (ln) income gap (wage + bonus)

Percentile	Union-Nonunion Income Gap $(\bar{Y}_u - \bar{Y}_n)$	Explained, Due to Differences in Characteristics $(\bar{X}_u - \bar{X}_n)\beta_n$		Unexplained, Due to Difference in Returns $(\beta_u - \beta_n)\bar{X}_n$	
	Amount (1)	Amount (2)	% (3)	Amount (4)	% (5)
10	0.593	0.396	66.8%	0.197	33.2%
20	0.496	0.350	70.6%	0.146	29.4%
30	0.447	0.327	73.2%	0.119	26.6%
40	0.403	0.307	76.2%	0.096	23.8%
50	0.367	0.283	77.1%	0.083	22.6%
60	0.343	0.262	76.4%	0.081	23.6%
70	0.334	0.237	71.0%	0.098	29.0%
80	0.340	0.222	65.3%	0.118	34.7%
90	0.340	0.203	59.7%	0.137	40.3%
Mean	0.418	0.303	72.5%	0.115	27.5%