

Firm Characteristics and the Gender Wage Gap: Evidence from the China Employer Employee Survey

Christina Jenq ^{*} Albert Park [†]

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Abstract

This article analyzes a novel employer-employee survey of manufacturing firms in China to present new findings on the gender wage gap. After adding a rich set of characteristics describing human capital, including personality and English ability, job tasks, occupation, industry, and ownership, the unexplained gender wage gap remains at 17 log points. Ownership sector and other firm characteristics play an important role in explaining the gender wage gap (GWG). The GWG varies significantly by ownership; it is weakest in Foreign-controlled firms, and is the most consistently significant in the State/Collective, Domestic Private, and Other ownership sectors. Higher firm profitability improves male wages, but not for female wages. There is a significant gender gap in time until promotion, and it can be largely explained by the proximate factors of firm maternity insurance policies interacting with gender.

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JEL classifications: J16, J31, J71

^{*}NYU Shanghai, e-mail: cjenq@nyu.edu

[†]Hong Kong University of Science and Technology (HKUST), e-mail: albertpark@ust.hk We are grateful for comments provided by Xiaohuan Lan, Lu Ming, and seminar participants at Fudan University.

1 Introduction

While gender wage gaps have been stagnant or declining in the U.S. and other developed economies in recent decades as female educational attainment has increased, gender earnings gaps in China have been increasing during a period of rising female educational attainment (Figure 1).

Several studies have documented the increase in gender earnings inequality, and wage inequality more broadly, in China since the 1990's (Gustafsson and Li 2000; Shu and Bian 2003; Millimet and Wang 2006; Zhang et al. 2007; Meng 2012). This article presents new results about the gender wage gap in a sample of manufacturing firms in China. We analyze a unique matched employer-employee survey of manufacturing firms in Guangdong and Hubei provinces from three analytical perspectives to highlight several potential mechanisms of gender inequality that warrant further investigation.

The first analytical perspective exploits the rich level of cross-sectional detail on employees and firms in Guangdong and Hubei provinces to analyze the influence of a rich variety of proximate factors on gender differences in wage determination. Then, I examine gender differences in employees' ability to extract higher firm rents (surplus) as wages by exploiting cross-sectional variation in firm profitability. Lastly, we analyze gender differences in employee promotion history to see whether gender gaps in promotion rates exist, and I relate these findings to the gender wage gap findings.

We find that even after including a rich set of human capital controls and controlling for sorting into different types of jobs, there still exists an unexplained gender wage gap of about 17 log points (about an 18% wage shortfall). Most of the cross-sectional gender wage inequality is from within-firm inequality, as allowing for firm heterogeneity in wage setting through firm fixed effects only explains about 2 log points

Furthermore, the gender wage gap varies by ownership. Firms controlled by foreign entities (excluding those in Hong Kong, Macao, and Taiwan) have consistently weaker estimates for the gender wage gap in terms of both significance and magnitude. Meanwhile, there is a consistent gender wage gap in the State/Collective, Domestic Private and Other ownership sectors, though the relative magnitudes depend on province.

In addition, the gender wage gap is consistent across almost all occupations (Senior Managers, Administrative/Clerical, Technical Design, Production/Frontline). The gender wage gap does not vary across age groups or education levels, with the exception of the most highly educated subgroup.

From the second analytical perspective, we present evidence that wages are not only determined by human capital and job characteristics, but also determined through a bargaining process between the firm and worker that divides firm surplus (rents). The main result is that while

male wages increase with firm profitability, female wages do not. We hypothesize that there may be gender differences in wage bargaining. This result is evidence against other gender-neutral mechanisms that would produce a positive relationship between firm profitability and wages.

We also test the relationship of other firm characteristics that might have an effect on the gender wage gap. An analysis of other firm-level wage determination mechanisms finds that neither the presence of collective wage bargaining nor the extent to which merit is considered in promotion has any influence on the gender wage gap.

A notable result is that the existence of a maternity insurance policy at the firm affects female wages differently relative to male wages, and this influence differs by sector. State/Collective firms that offer maternity insurance pay females less, all else equal, while there is no influence of maternity insurance on male wages. In the Foreign and HK/TW/MC ownership sector, the estimates suggest that the presence of maternity insurance is positively associated with females wages relative to male wages.

The third set of analyses focuses on the outcome of time until first promotion at the employee's current job. This outcome is of particular interest because time until promotion is not only related to wages, but is a better measure of worker and firm investment in the job match.

I find that there is also a gender gap in promotion probabilities, and it is concentrated in the Domestic Private ownership and in the Production/Front-line occupation. This is also where the gender wage gap is concentrated, suggesting a possible mechanism for the gender gap in wages.

In addition, the inclusion of gender interacted with maternity insurance renders the gender gap in promotion probabilities insignificant and lower in magnitude. Additional proxies for female labor supply, the presence of a child and the existence of a work history interruption, further reduce the magnitude of the estimate.

This result is important because recent work suggests that more generous maternity leave policies can have unintended negative consequences on the promotion rates of females (Thomas 2015). Firms may be less willing to make an investment in an employee of a particular gender if their labor force attachment is more uncertain due to the presence of a relatively more generous leave policy.

However, caution needs to be taken when interpreting this result, as the presence of a maternity insurance policy is endogenous, as firms choose whether or not to participate in this policy scheme. It can thus only be concluded that the existence of a maternity insurance policy and measures of female labor supply are important proximate factors in both the gender gap in promotions and the gender gap in wages.

I conclude that the mechanisms of inequality in wages and promotions are different across ownership sector, so that wage inequality results should always be carefully interpreted within the heterogeneous and unique ownership structures of Chinese firms. While other empirical

literature analyzing gender wage inequality in other economies has pointed to the increasing role of firm inequality, this article emphasizes the role of ownership sector in understanding the role of firm inequality in the Chinese institutional context.

There are two mechanisms of interest that can explain the gender gap in wages and promotion rates that warrant further investigation. The first is that there may be gender differences in bargaining power for wages (and perhaps promotions). These gender differences may be due to outright gender discrimination, statistical discrimination based on factors related to gender, among other explanations. Secondly, the labor market effects of the significant gender difference in parental leave benefits needs to be investigated, as this article presents evidence that this may have negatively affect female promotion rates. A statistical discrimination equilibrium could explain gender gaps in promotions rates, given the extent of a significantly more generous female parental leave policy relative to males. Thus, gender-specific labor market policies like the length of maternity and paternity leave that interact with a firm's willingness to invest in a particular employee need to be more carefully investigated.

The rest of this article is structured as follows. Section 2 reviews related literature, Section 3 describes the empirical methodologies, Section 4 presents and discusses the results, and Section 5 concludes.

2 Related Literature

Articles studying labor market gender gaps in urban China typically analyze the earnings gender gap. Using various regression and decomposition methods, these studies all document a growing gender gap in earnings and find a growing "unobserved" component of the gender earnings gap that cannot be explained by observable characteristics. These unobserved characteristics have been given different interpretations, such as changes in relative distributions of unobserved skills, changes in the prices of unobserved skills, and discrimination.

Song et al. (2017) uses waves of the China Household Income Project from 1995 to 2013 to provide consistent estimates of the gender wage gap in urban China. They find that while there was a widening of the gender wage gap from 1995 to 2007, there was a narrowing from 2007 to 2013, with a gender wage gap of between 19 and 25 percent in 2013. Their decomposition analyses show that, over time, the component of the gap explained by observable characteristics has been declining over time. By 2013, they find the gender wage gap is largely unexplained. In a related paper, Gustafsson and Wan (2018) find that older workers' wages have particularly suffered in more recent waves of the survey. Zhang et al. (2008) analyze the Urban Household Survey from 1988-2004 and find that the earnings gap widened much more at the lower end of the earnings distribution. In older studies, Gustafsson et al. (2000), Shu and Bian (2003),

and Millimet et al. (2006) analyze the gender earnings gap in 1988 and 1995. There is no clear consensus about the mechanisms in these studies, and none directly analyze the evolution of gender differences in labor supply.

There is some preliminary work looking at role of firm-specific wage-setting mechanisms in growing gender wage inequality. Li and Dong (2011) points to gender differences in productivity and firm-specific effects to explain wage differences between males and females. They analyze the wage structure from a sample of employer-employee matched data of firms under the jurisdiction of the Nanjing municipality from 1994 to 2001 and find that wage setting at the firm level plays a much larger role in determining the gender earnings inequality than individual observable characteristics. They find that the earnings gap is highest in firms facing the most perceived product market competition, firms who tend to pay based on piece rate, suggesting lower female productivity as a reason behind the earnings gap.

This study also relates to the empirical work analyzing wage determination in several different labor markets through the process of firm-worker bargaining (Arai 2003; Abowd et al. 1999a; Abowd et al. 1999b).

This article is also related to the recent empirical literature documenting that increasing wage inequality is mostly due to an increase in between-firm inequality. Card, Cardoso, Heining and Kline (2018) review the literature on firm-level drivers of labor market inequality and conclude that firm pay setting is important for wage inequality. To explain these results, they describe a model where workplace environments are viewed as imperfect substitutes by workers, and firms set wages with some degree of market power, which match the stylized empirical findings of rent-sharing elasticities and the structure of firm-specific pay premiums. Song, Price, Guvenen, Bloom, and Wachter (2016) find that that over two-thirds of the increase in earnings inequality from 1982 to 2013 can be accounted for by the rising variance of earnings between firms. They are also able to examine the mobility of employees across firms and find that the increase in between-firm inequality has been driven by increased employee segregation, as high- and low-paid employees are increasingly clustering in different firms.

3 Empirical Methodology

The first set of estimates uses a wage regression specification similar to the Mincerian wage specifications that include schooling and education as measures for human capital characteristics that determine wages:

$$Y_i = \alpha + \delta f_i + \beta X_i + \eta \Gamma_i + \gamma_j + \gamma_k + \gamma_t + \epsilon_{ijkt} \quad (1)$$

X_i is a vector of person-specific human capital characteristics, Γ_j is a vector of firm-specific characteristics, f_i is an indicator for whether individual i is female, and the gender wage gap estimate of interest is δ . City controls are added to incorporate the effects of city-level factors such as local levels of unemployment. Because of over-sampling of senior managers in the employer sample, observations are re-weighted according to the occupational structure of the overall firm sample. All standard errors are clustered by city.

Carefully chosen human capital and job characteristic are included that not only reflect the unique institutional context of firms in China, but also provide observed measures of human capital not typically included in labor market and household surveys. This includes ownership sector, personality measures, English language ability, task descriptions, and other variables in the traditional wage analysis framework that have not been included in previous empirical analyses of the Chinese labor market, as they all are related to labor demand and labor supply characteristics that determine wages.

This article's definition of the gender wage gap, δ , is not necessarily the amount of "discrimination" against females, as it also reflects unobservables correlated to gender that have not been accounted for in the set of controls. Rather, the estimate is the remaining gender gap in wages that cannot be explained by the combination of the control variables added in the regression. Omitted variables leading to the gender wage gap that are correlated with being female would be included in this estimate of the gender wage gap.

I note that this model obscures any firm heterogeneity in the determination of wages, as this specification assumes that measures of human capital, such as educational attainment, personality, and English ability, are valued equally across firms, all other job characteristics equal. In addition, this model does not account for the possibility that different ownership sectors and industries price the same skills differently.

The second set of estimates looks at the relationship between firm profitability and wages.

This perspective takes a stance on the type of firm-level heterogeneity that can determine wages, and is motivated by two strands of literature.

First, recent empirical work documenting that increasing wage inequality is mostly due to an increase in between-firm inequality. These studies exploit longitudinal data in both firms and employees to estimate firm and individual fixed effects. (Card et al. 2013; Card et al. 2018; Song et al. 2015). Secondly, other empirical work analyzes wage determination in several different labor markets through the process of firm-worker bargaining (Arai 2003; Abowd et al. 1999a; Abowd et al. 1999b).

And as discussed previously, the wage regression framework in the previous analyses obfuscates any firm heterogeneity in the determination of wages. When including human capital and job characteristic variables that relate to labor supply and labor demand factor, the implicit as-

sumption is that the determination of wages in response to these characteristics is common across firms. This approach takes a particularly stance on firm-level heterogeneity. This set of analyses estimates the following model,

$$Y_i = \alpha + \gamma\pi_j + \eta\Gamma_j + \beta X_i + \gamma_k + \gamma_t + \epsilon_{ijkt} \quad (2)$$

where π_j is a profits per employee, a measure of firm profitability, Γ_j is vector of firm-level variables that may mediate the wage-profit relationship, such as capital intensity and firm size, X_i is a vector of individual-level characteristics that affect wages, and γ_k and γ_t are city and year fixed effects, respectively. All standard errors are clustered by city.

The estimate γ represents the extent to which workers are able to bargain for higher profits in terms of wages. A positive estimate of γ means that at least some share of higher profits go towards employees as wages. Here, I view wages as the function of a bargaining process that divides firm surplus into employee wages and shareholder profits.

The third section of the paper estimates a Cox Proportional Hazard model on data about the time until the first promotion of each worker's current job or, if it is censored, the length of job tenure if the employee at the current job has not yet been promoted. The incidence of 'failure' is the incidence of promotion.

3.1 Data Description

The employer and employee surveys from the China Employer Employee Survey (CEES) are used in the analysis. This survey was conducted in Guangdong province in 2015, and in Guangdong and Hubei provinces in 2016. The 2015 wave spans 20 counties and 13 cities, and the 2016 wave spans counties and cities in Guangdong and Hubei. The employee survey is a sample of employees from the set of employers, with senior managers over-sampled. The employer survey consists of 570 firms of different ownership types and industries. Further detail about this survey is provided in the Appendix.

3.2 Constructing Manager Sampling Weights

Because managers were over-sampled in the CEES data, sampling Weights Were generated across the different occupational classifications to reflect the actual distribution of occupations implied from the employer survey module. Appendix Table 2a shows the observed distribution of occupations from the employee survey, while Appendix Table 2b shows the actual distribution of occupations from the employer survey. The differences in occupation share reflect the fact that senior managers were oversampled in the employee survey.

Adjusted sampling weights were created by calculating post stratification adjustments that used the actual distribution of occupations to calculate control totals. All analysis in this article incorporates these adjusted sampling weights.

3.3 Summary Statistics

Tables 1 and 2 provide summary statistics of the 2016 CEES employee sample by province and gender, respectively. The 2015 CEES employee sample, containing Guangdong only employees, is similar to the 2016 Guangdong sample, and a summary of this data is not shown.

From Table 1, we observe that wages in Guangdong province are about 13 log points higher than wages in Hubei. Those working in Hubei are more likely to have been promoted at the current job, and employees in the Hubei sample are on average older and more educated than in the Guangdong sample. Their occupational distributions are roughly similar. The distribution across ownership types is markedly different for the two provinces; Hubei employees are relatively more represented in the Collective/State sector and the Other sector, while Guangdong employees are more represented in the Foreign and HK/MC/TW sector. The industrial composition of the two provinces are quite different. Guangdong employees are relatively more represented in the Electronic Devices / Equipment and Metal industrial sector, while Hubei employees are relatively more represented in the Food, Textile and Leather sectors.

From Table 2, we observe a raw gender difference in wages of about 23 log points. Males are significantly more likely to have been promoted at their current job, and the prevalence of a work history interruption is double in females relative to males. The female sample is slightly less educated than the male sample, and females are much more represented in the Textile & Leather manufacturing sector.

The prevalence of male senior managers is about double that of female managers, while the prevalence of females relative to males in the "Admin/Other Mgmt" occupation is about double. There is an approximately 3:1 ratio of males to females in the Technical or Design occupations, while females are more represented in the Salesperson occupation. Lastly, there are relatively more males in the Collective or State ownership sector, and relatively more females in the Foreign and HK/MC/TW ownership sector

Table 1 summarizes the firm-level characteristics from the 2016 wave of the Employer survey by province. Guangdong firms are significantly larger than Hubei firms, and are 2 times more likely to export relative to Hubei firms. Hubei firms have greater profitability, measured as profits per employee, relative to Guangdong firms. Firms with negative profits are deleted from the analysis sample.

Guangdong firms are significantly more likely to participate in the maternity insurance fund

relative to Hubei firms. Collective wage bargaining is slightly more prevalent in the Hubei sample relative to the Guangdong firm sample. Of the sample of firms with nonzero capital intensity, Hubei firms have higher capital intensity relative to Guangdong firms. Based on the firm unit, Hubei firms are overrepresented in the Collective/State and Domestic Private ownership sector while Guangdong firms are overrepresented in the Foreign and HK/MC/TW sector.

Hubei firms report more barriers in terms of financing costs, volatility of government policy, while Guangdong firms report more barriers with taxes and workforce costs.

3.4 The "Other" Ownership Category

While the "Other" ownership category is unclear in terms of its structure, Appendix Table A1 gives evidence that this category is similar to the Domestic Private ownership category, with both sectors reporting that access to financing and government approval and regulation is a somewhat or very significant barrier. I hypothesize that these barriers to financing may be an explanation for why the R-squared for the wage regression estimates are significantly different lower for Domestic Private and Other.

4 Results and Discussion

4.1 Wage Regressions

This section examines to what extent the gender wage gap can be explained using the analytical framework of the Mincerian wage regressions.

Table 3 estimates the female dummy in a wage regression that includes different sets of detailed controls. Panel A gives estimates from the pooled sample combining 2016 Hubei and 2015 and 2016 Guangdong data. Panel B gives the estimates for the Guangdong only sample (both years), and Panel C gives estimates for the Hubei only sample. These estimates includes novel control variables not usually included in previous wage structure analysis in the Chinese labor market context, such as personality, task composition, and English speaking ability. The main result is that, after adding a rich set of controls that even includes firm fixed effects, there still remains an almost 17 log point gender wage gap. This translates to an 18.5 percent shortfall in female wages relative to male wages.

From Panel A, Columns 1 to 4 show that adding a rich set of controls only explains 4-5 log points of the gender wage gap. In other words, after accounting for measures of human capital, personality, skills, and job characteristics, there is still a 17 log point gender wage gap that remains unexplained.

This means that much of the gender wage gap in this sample cannot be attributable to gender differences in human capital characteristics (i.e. educational attainment or work experience) or gender differences in sorting into jobs with different types of characteristics. Even after taking into account that females may choose to enter different industries and occupations relative to males, the gender wage gap remains.

Taking into account firm heterogeneity in average wage setting by adding firm fixed effects only explains about 2 log points of the gender wage gap. This suggests that most of the gender wage gap is due to within-firm inequality rather than due to between-firm inequality ¹.

Panels B and C show that the behavior of the gender wage gap is similar for both provinces after adding the series of controls.

Firm heterogeneity plays a larger role in Guangdong province relative to Hubei province. While adding firm fixed effects only slightly increases the ability of the model to explain wage variance in Hubei, with the R-squared increasing from only 0.22 to 0.26 (Columns 4 and 5), doing so in the Guangdong sample increases the R-squared from 0.17 to 0.38. The gender wage gap varies by ownership sector.

Table 4 provides estimates of the gender wage gap by ownership sector from a specification that interacts the female indicator with different ownership categories. (This table provides the linear combination of estimates for the gender wage gap of each ownership category.) Meanwhile, Figure 2 plots these estimates this town subdivided by province.

Table 4 shows that the Foreign ownership sector has the weakest estimate for the gender wage gap in terms of both statistical significance and magnitude. Meanwhile, the State/Collective sector has a significant gender wage gap, though its magnitude varies depending on province. Column 1 gives an estimates of 21 log points for the gender wage gap in the State/Collective sector for the pooled sample. Figure 2 shows that the gender wage gap estimates for Guangdong and Hubei are relatively more different in magnitude. (An F-test for equality shows that the difference in estimates is approaching significance at the 10% level, not shown).

The Domestic Private and Other ownership sectors also have a consistently significant gender wage gap, and the magnitude of the estimates are similar by province, with estimates ranging from 15-18 log points for the Domestic Private sector, and 21-22 log points for the Other ownership sector. This is another piece of evidence that the Other and Domestic Private ownership sectors

¹Because I do not have access to comparable data samples before 2015, I cannot analyze whether the change in wage inequality over time has been due to changing within-firm inequality or between-firm inequality. In addition, because I do not have repeated observations of individuals in different firms, I cannot estimate individual fixed effects that can help one determine to what extent higher wages may be due to the sorting of high-ability males and females into the labor force. Specifically, individual fixed effects could be used to determine whether females in the labor force are overall relatively negatively selected into employment relative to males. Or, having access to ancillary data of the overall population of working-age men and women would also shed light on gender differences in sorting into the labor force.

are similar to each other.

The HK/MC/TW ownership sector reports a significant gender wage gap of about 11 log points for the Guangdong sample, but it is insignificant in the Hubei sample.

Appendix Table 1 provides another set of gender wage gap, but by ownership subsamples that allows the other covariate estimates to vary by ownership.

The results are broadly similar to the results in Table 4, With the COLlective/State Domestic Private having the largest gender wage gaps by magnitude, and the Foreign and HK/MC/TW sector having the smallest gender wage gaps.

Table 5 estimates the female indicator interacted with occupation categories to generate gender wage gap estimates for different occupation categories. There are significant and sizeable gender wage gaps among the Senior Manager, Administrative/Clerical, Technical/Design, and Production/Front-line worker occupations, but not for the Salesperson and Other occupations. These estimates are not statistically significant across provinces (results not shown). Figure 3 plots these estimates by province, and shows that there are relatively larger gender wage gap differences across provinces in the Sales, Front-line/Production, and Other occupations.

Appendix Table 2 estimates the gender wage gap by separate occupation subsamples for the four occupations with significant gender wage gaps estimated in Table 5. It shows that the gender wage gap is similar across a subset of the largest occupations, specifically, senior managers, administrative/clerical workers, technical and design staff, and front-line workers.

Table 6 shows that the gender wage gap is consistent across all age and education categories, except among those with at least a Junior College education. The results are similar for the province subsamples (not shown).

4.2 The Role of Profitability, Firm Size, and Capital Intensity on the Gender Wage Gap by Ownership Category

Previous theoretical and empirical work documents the important role of capital intensity, firm profitability, and firm size in wage-setting. Table 7 analyzes to what extent the influence of capital intensity, firm profitability, and firm size may affect wage determination by ownership sector.

First, the results for the pooled sample in Columns 1 through 4 show that capital intensity, firm profitability, and firm size do not significantly explain the gender wage gap, as the estimates for the female dummy do not change significantly with the addition of the different controls.

Columns 5-10 show that wage determination is significantly different between males and females. Comparing columns 6 and 9 shows that the positive relationship between firm profitability and wages is found only in among males, primarily in the State/Collective sector.

Comparing column 5 and 8 shows that higher capital intensities are associated with higher

male wages for the State/Collective ownership sector, and there is no relationship between capital intensity with female wages for any ownership sector.

The higher rents from higher capital intensity firms in the State/Collective sector are derived from the fact that higher capital intensity firms are associated with greater market power, usually by government design. Moreover, the table suggests that males are better able to bargain for higher wages (extract rents) in higher capital intensity firms within the State/Collective sector.

A possible mechanism behind this interpretation is that industries with high capital intensity tend to be male-dominated, and male managers may be more willing to give higher wages to males. Another possible mechanism is that high capital intensity industries tend to be state-controlled, and to the extent the state prioritizes male employment in high capital intensity industries, this may result in relatively higher wages for men. Appendix Table AXX shows the relationship between industry sector and capital intensity.

4.3 Wages and Profitability

There is a literature that views wages as the result of a bargaining process that divides match surplus into wages and firm profits. For example, given a bargaining mechanism in which a fixed proportion of the surplus is given as wages (after profits are determined), wages and profits would be observed to have a positive relationship. The gender wage gap can also be analyzed from the perspective of wage bargaining between the worker and the firm to test whether there may be gender differences in the process of bargaining between workers and firms.

Adding this perspective to analyzing wages is important because the wage regression framework in the previous section generally obscures any firm heterogeneity in the determination of wages, and the inclusion of firm fixed effects does not provide much clues as to what firm-level mechanisms are at work in the gender differences in wage determination. When including human capital and job characteristic variables that relate to labor supply and labor demand factors, it is assumed that the determination of wages in response to these characteristics is common across firms. For example, this econometric specification assumes that measures of human capital, such as educational attainment, personality, and English ability, are valued equally across firms, all other characteristics equal.

Table 8 estimates the wage profit relationship with different sets of controls. We see that the addition of controls related to firm profitability, capital intensity, and firm size do not much of an effect on the gender wage gap estimate. Columns 3, 4, and 5 include firm-level variables that could mediate the wage-profit relationship that have been included in previous studies. These include industry average levels of firm profitability, firm capital intensity, and firm size. Columns 4 to 6 show that higher firm capital intensity is associated with higher wages, and that larger firm

size is associated with higher wages.

The positive relationship between industry average profitability and wages indicates that there is a less coordinated wage bargaining process across industry. This differs from the findings of Arai (2003), which indicate a more coordinated wage bargaining process across industry in the Swedish context. However, this relationship disappears with the inclusion of human capital and job characteristics (Column 5), indicating that there is sorting across industries that can explain this relationship. The wage-profit relationship also disappears with the addition of human capital and job characteristics (Column 5), also indicating that there is sorting by human capital and job characteristics that can explain the wage-profit relationship.

However, the wage-profitability relationship re-appears after taking into account the non-linearity of this relationship with respect to firm capital intensity. Columns 7 and 8 analyze whether the profitability-wage relationship varies by capital intensity and firm size, respectively, and finds that the wage-profitability relationship is nonlinear with respect to capital intensity, but not firm size. Specifically, the wage-profitability relationship is greater at low levels of capital intensity; for example, the estimates predict that at zero capital intensity, the wage-profitability relationship is estimated to have an elasticity of 0.03, so that a 100

The positive relationship between firm capital intensity and wages, and firm size and wages, is robust across all specifications. I argue that both capital intensity and firm size are related to firm market power, which can raise both profits and wages. Indeed, the disappearance of the significance of the profitability estimate indicates that these measures of market power largely mediate the relationship between profitability and wages.

The results in Column 6 suggest that the wage-profitability relationship for females may be smaller than that for males. Column 6 interacts the female indicator with firm profitability to see if the wage-profitability relationship is significantly different for females. The magnitude of the interaction term is negative, and the estimate of the wage-profit relationship for females, overall, is smaller in magnitude and less significant than that for males. A one-sided t-test for whether the profitability estimate for males is less than or equal to that of females is not significant.

There could be a few alternative explanations for a positive relationship between wages and profitability that have little to do with the ability of employees to bargain for a greater share of firm surplus. First, firms that have high profits in the first period could be attracting workers with good unobservable characteristics that they pay more for.² Another explanation is that higher wages may correspond to less supervision; higher wages are offered to discourage shirking on outcomes that are difficult to observe and measure. This "supervision hypothesis" would also predict higher wages with higher profitability to the extent that more profitable firms require tasks that are more difficult to supervise.

²This is called a wage efficiency argument in some literatures, and a sorting mechanism in other literatures.

This type of problem may lead to higher profitability concurrently, or in the future. Or, through sorting workers with unobserved high abilities (resulting in higher wages) sort into firms that then earn higher profits because of the high unobserved ability of the worker. A variant of this explanation is a situation in which higher wages are offered due to asymmetric information about worker activities, which means higher supervision costs.

This sorting mechanism can be tested using worker fixed effects if there were repeated observations about workers at different firms. However, this data is not available ³. We note that previous articles, Arai (2003) using Swedish data and Abowd et al. (1999) using French data, find no evidence of worker sorting due to unobserved worker characteristics.

In Arai (2003), direct self-reports of supervision and other variables to measure the extent to which their work flow was directed was associated with lower wages. In other words, work that involved higher supervision, or was steered more, earned less. The CEES data does not have a clear set of variables for the degree of supervision, or the degree to which the workers' work pace is steered, but variables for the amount of time spent managing other employees, interacting with suppliers, apprentices, and customers, and the amount of machine usage are included. IN results not shown we include variables that attempt to measure the degree to which the workers' work pace is steered by machinery, co-workers, and clients. The motivation for adding these measures is to analyze the extent to which the wage-profit relationships by gender can be explained by gender differences in the extent to which they are supervised. In results not shown we find that the addition of these variables does not affect the estimates on profitability, capital intensity, firm size, and industry-average profitabilities. In fact, none of these variables seem to have an effect on wages except for machine usage (estimates not shown). Using a machine is significantly associated with higher wages, about 5 log points, all else equal, but it does not explain much of the gender wage gap estimate.

Motivated by the suggestive results in Column 7 and the fact that the female dummy is significant in explaining wages, both statistically and in terms of magnitude, we analyze the wage-profitability relationship separately by gender (Table 9). These specifications which allow the various characteristics that determine wages to vary by gender. The most striking result is that there is a positive wage-profitability relationship for males, but not females. This result is robust across all the different specifications (Columns 3 through 8).

Similar to our results, Arai (2003) estimates the wage-profit relationship separately by gender, and finds that for females there is an insignificant relationship between profit and wages for females, while it is significant for males.

³Unfortunately, because we do not have longitudinal data on workers we cannot estimate individual fixed effects that can be added that can account for whether individuals with unobserved high ability are systematically sorted into high-profit firms.

One suggested interpretation is that males are able to bargain for higher wages as firms increase in profitability, but females are not. Arai (2003) suggest that one explanation for the results is that women are assigned to jobs with less possibility of rent extraction compared to men.

A related explanation is that women could have less bargaining power than men, either through unobservable reasons related to household labor supply, gender norms, perceptions about mobility, or gender differences in the ability to bargain. Another explanation, related to the alternative mechanisms previously discussed, is that the male wage-profitability relationship could be partially or completely explained by a sorting or efficiency wage mechanism, so that higher wages lead to higher profits. Specifically, higher wages for male workers attract male workers with better unobservables which leads to greater profits.

Additionally, Columns 3 through 8 show that while female wages vary with firm capital intensity, male wages vary with profitability interacted with firm capital intensity. Specifically, the wage-profit relationship for males is highest for lower capital intensity firms. Columns 7 and 8 show that while female wages do not vary positively with firm profitability, they vary positively with capital intensity and firm size, while male wages do not.

One possible interpretation is that female wages are relatively more determined by firm market power, which can be proxied by capital intensity and firm size, while male wages are determined by a combination of firm profitability and firm market power. A high capital intensity firm is an indication of considerable fixed costs, implying high barriers to entry, and higher market power. Or, when labor costs are a minor part of firms' costs, it is reasonable to expect less pronounced resistance to high wage demands as compared to firms where labor costs constitute the major part of costs. And firm size could be an indirect measure of market power; those firms with greater market power endogenously grow larger.

Another interpretation of these results is that males are able to bargain for higher wages as firms increase in profitability, but females are not. This could come about if women are assigned to jobs with less possibility of rent extraction compared to men, either via promotion or lateral transfers. Relatedly, women could have less bargaining power than men, either through unobserved reasons, forms of statistical or taste-based discrimination based on reasons related to gender, or even gender differences in the ability to bargain.

Gender differences in the profit-wage relationship also differ by ownership sector.

Table 10 interacts firm profitability with ownership category to estimate the wage-profitability relationship by ownership categories. Column 1 generates estimates by ownership for males and females, while Columns 2 and 3 generate estimates by ownership and gender. Column 3 adds ownership interacted with female, and shows that the wage-profitability relationship is significantly weaker for females in the State/Collective.

Column 2, the preferred specification, shows that for all ownership sectors, except for Other,

males have a positive and significant wage-profitability relationship. The female estimates for the wage-profitability relationship are smaller in magnitude and not significant.

The bottom panel gives the results of one-sided t-tests for whether the female estimates are greater than or equal to the male estimates. We find that for the State/Collective and HK/MC/TW sectors, the male wage-profitability relationship is significantly larger than the female wage-profitability relationship.

4.4 Other Firm-level Mechanisms

The richness of the CEES Employee-Employer survey allows this type of analysis allows further investigation into other mechanisms of wage determination that are not possible in other surveys.

Table 11 analyzes to what extent three other firm-specific mechanisms may affect overall wage determination by gender for different ownership sectors.

Columns 2-4 analyze whether the presence of a formal wage bargaining process with employees may influence wage determination by ownership, Columns 5-7 analyze the presence of maternity insurance, and Column 8-10 analyze the extent to which merit is considered in the promotion of management personnel. We note that these results may reflect either a causal mechanism or a simply an association with an omitted variable, since the presence of wage bargaining, maternity insurance, and merit-based promotion of management are themselves endogenous outcomes.

We hypothesize that the presence of a formal wage bargaining process may affect wage determination differentially by gender. A collective wage bargaining process could compress wages by uniformly raising the wages of the lowest-paid workers, and thus decrease gender wage inequality. Or, the type of firm that adopts a collective wage bargaining process may determine wages in a way that may compress wages.

The presence of maternity insurance may affect promotion, and hence, wage outcomes differentially by gender. Recent work suggests that more generous maternity leave policies can have unintended negative consequences on promotion rates of females (Thomas 2015). The causal explanation is that firms may be less willing to make an investment in an employee of a particular gender if their labor force attachment is more uncertain due to the presence of a leave policy. There may also be an omitted variable explanation since the presence of a maternity leave policy is an endogenous outcome. Specifically, the type of firm that may adopt a maternity leave policy may be more or less willing to promote females or pay females higher wages.

Lastly, the extent to which merit is considered in the promotion of employees may lead to gender differences in wage determination. To the extent that females, all else equal, are thought of as less or more deserving of merit due to conscious or subconscious biases, the extent to which

merit is considered in promotion may affect the genders differently. Table 16 shows that none of the above firm level characteristics explain the gender wage gap, with gender wage gap estimates consistently ranging from about 19 to 20 log points in all specifications with the different firm-level characteristics.

Further, the presence of collective wage bargaining and the extent to which merit is considered does not affect wages differentially for males and females.

However, Columns 6 and 7 show that the presence of maternity insurance has a very different effect on females relative to males. In addition, it shows that those firms in the State/Collective sector that offer maternity insurance systematically pay females less, all else equal, while there is no influence of maternity insurance on male wages. Furthermore, in the non-State/Collective sectors, the presence of maternity insurance is positively associated with wages.

One possible explanation is that there is a causal negative wage effect of maternity insurance in the State/Collective sector, and that there is an association of adoption of maternity insurance and female wages for the other sectors, especially given the relative lack of a gender wage gap for firms in the Foreign sector. Specifically, the types of Foreign and HK/TW/MC firms that would offer maternity insurance may be more willing to promote and pay females higher wages.

4.5 Gender differences in Promotion Rates

This subsection analyzes gender differences in promotion rates as an outcome of interest. Given the possibility that a lack of a positive relationship between profits and wages for females is that females are not being endogenously matched with jobs that allow for greater rent sharing between employees and firm shareholder, analyzing promotion probabilities is of particularly interest, as one way that workers are endogenously matched with job opportunities for rent-sharing is through promotion.

In addition, the result that the presence of maternity insurance has an effect on female wages in the State and Collective sector, but not for other sectors motivates an analysis of promotion probabilities.

Maternity insurance, depending on how it is implemented, may cause firms to view female employees as incurring greater costs, both directly and indirectly. There are direct costs in terms of employer financial contributions to maternity insurance, and indirect opportunity costs to the employer in terms of the time that females are allowed to take off if they become pregnant. While enforcement of policies by province and city may vary, the legal guidelines are that employers are required to provide at least 98 days of paid maternity leave to females and at least 3 days of paternity leave to males. The large gender disparity of length of leave causes females to incur a much larger potential opportunity cost relative to hiring a male who would take less time off.

Profit-maximizing employers, when faced with a difference in the cost of hiring a certain gender, may invest (or promote) differently by gender. Thomas (2015) formalizes some of this logic into a model of asymmetric information in an investment game with signaling.

Tables 12 and 13 report the estimates of the gender gap in promotion probabilities for the 2016 subsample by ownership category and occupation, respectively. The analysis uses a Cox Proportional Hazard model on data about the time until the first promotion of each worker's current job or, if it is censored, the length of job tenure if the employee at the current job has not yet been promoted. The incidence of "failure" is the incidence of promotion.

In Table 13, Column 1 reports the gender gap in promotion probability after including not only human capital and job characteristics controls, but also controls for capital intensity and firm size. Column 2 reports the gender gap in promotion probabilities after maternity insurance controls are added, specifically, an indicator for whether the firm offers maternity insurance, and the indicator interacted with the female dummy to allow the influence of maternity insurance to affect promotion probabilities differently by gender. Column 3 adds labor supply controls, specifically, the presence of children, and the presence of a work history interruption with both interacted with the female dummy to allow for these proximate factors to influence promotion rate differently by gender.

Table 13 shows that the gender gap in promotion probabilities is being primarily driven by the Domestic Private ownership sector (Panel C). Moreover, much of the gender gap in promotion probabilities can be explained by the interaction of the availability of maternity insurance and being female. The estimate becomes insignificant and the magnitude significantly decreases. Labor supply controls change the magnitude of the estimate significantly so that it is slightly positive. There is very little gender gap in promotion probabilities for females in the Foreign and HK/MC/TW sector; it is notable that the point estimate in Column 1 of Panel D is positive. In fact, in the HK/MC/TW, female seem to have a slight advantage in promotion probabilities after maternity insurance availability is accounted for.

And while the estimate for the gender gap in promotion probability in the State/Collective and Other sectors are insignificant, adding labor supply controls (Column 3) changes the magnitude of the estimate from negative or positive, suggesting a non-trivial role for labor supply factors in promotion probabilities.

Table 12 shows that the gender gap in promotion probabilities is primarily occurring in the Production and Front Line worker occupation. Adding controls for maternity insurance availability decreases the significance of the gender gap estimate significantly, and adding labor supply controls decreases the magnitude of the estimate from -0.68 to -0.04. I note that the estimate for the relationship between maternity insurance and promotion rates is not a causal effect. There may also be an omitted variable explanation since the presence of a maternity leave

policy is an endogenous outcome. Specifically, the type of firm that may adopt a maternity leave policy may be more or less willing to promote females or pay females higher wages. In addition, the result that maternity insurance affects female wages differently from male wages suggests that the policy may be an important mechanism in the appearance of gender differences in wage and promotion outcomes.

Under these constraints, there is no significant difference in the gender gap in promotion probabilities across ownership categories. There seems to be a slight female advantage in promotion rates in the Technical/Design occupation, and a greater gender gap in promotion probabilities (relative to senior managers) in the Salesperson and Front-line Worker occupations.

5 Conclusion

This article has analyzed gender wage inequality from three different perspectives.

The first perspective uses the rich amount of cross-sectional provided by the China Employer and Employee Survey to analyze the influence of a rich variety of proximate factors on gender differences in wage determination. The second perspective examines gender differences in employees' ability to extract higher firm rents (profits) as wages by exploiting cross-sectional variation in firm profitability. The third perspective uses information on employee promotion history to analyze proximate factors of gender differences in promotion rates.

I come to two conclusions. First, the results from these three sets of analyses show that there are likely different mechanisms of gender inequality in wages and promotions across ownership sector and occupation. While it is difficult to isolate a single particular mechanism for the evolution of gender wage inequality, it is clear that there are different mechanisms at work for different ownership sectors. Estimates of the gender wage gap, the wage-profitability relationship, and the gender gap in promotion rates varies significantly by ownership sector. The wage regressions indicate that the State/Collective and Domestic Private sectors have significant gender wage gaps. Furthermore, the Domestic Private sector exhibits a significant gender gap in promotions.

Secondly, the results point to two mechanisms of gender inequality that need to be further investigated.

First, the stark gender difference in length of parental leave may be negatively affecting female promotion rates, among other labor market outcomes, since factors relating to female labor supply and the existence of maternity insurance policies seem to provide one potential mechanism for understanding the gender wage gap.

Secondly, there may be gender differences in wage bargaining power. This may be due to taste-based discrimination, gender differences in the ability to receive outside offers, or even a statistical discrimination based on gender norms or gender-differentiated policies that include

maternity leave.

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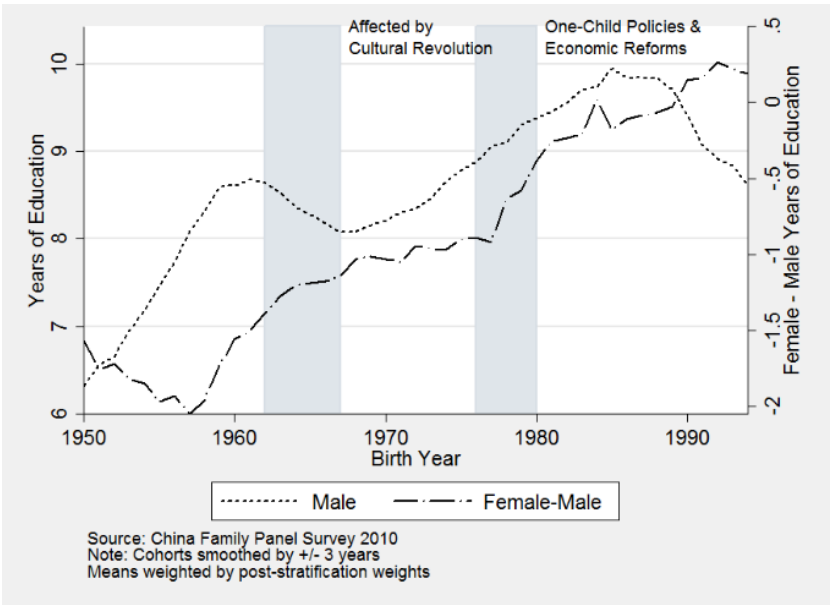
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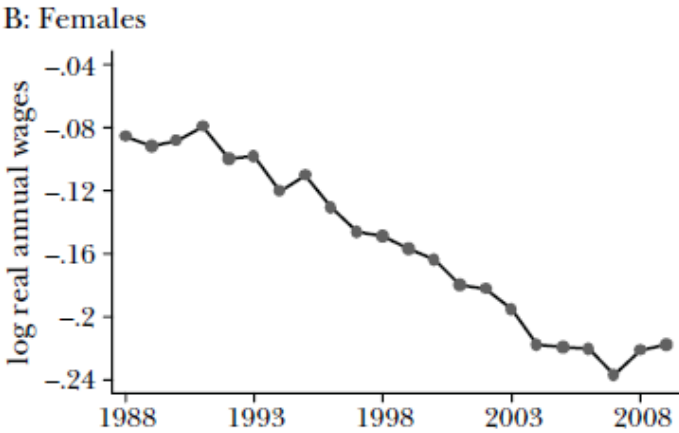
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Figure 1. Female Educational Attainment and the Gender Earnings Gap in CHina



Source: Jenq (2014)



Source: Meng (2012), 1988-2009 Urban Household Survey

Table 1. Summary Statistics by Gender and Province, CEES 2015 and 2016 Employee Survey

Category	Female	Male	Guangdong	Hubei
Variable	Mean*	Mean*	Mean*	Mean*
Log Past Month Wage	2.56	2.79	2.74	2.61
Promoted at Current Job?	5.5%	8.7%	4.8%	10.0%
Work History Interruption	44.8%	22.5%	32.9%	33.1%
<i>Education</i>				
No schooling	0.8%	0.6%	0.8%	0.7%
Primary School	11.2%	5.4%	8.9%	7.3%
Jr. Middle School	42.7%	34.2%	43.3%	32.4%
Sr. Middle School	16.0%	21.2%	16.8%	21.0%
Technical HS	13.6%	18.2%	14.9%	17.3%
Jr. College	10.1%	12.0%	9.6%	12.9%
4-yr University	5.0%	7.7%	5.4%	7.6%
Master's	0.5%	0.6%	0.3%	0.8%
<i>Age Group</i>				
16-24 yrs	9.7%	8.2%	11.7%	5.7%
25-34 yrs	36.5%	37.5%	41.2%	32.2%
35-44 yrs	32.7%	27.7%	29.8%	30.4%
45-54 yrs	19.9%	21.6%	15.9%	26.5%
55-64 yrs	1.2%	5.0%	1.5%	5.2%
<i>Manufacturing Industry</i>				
Chemical	7.6%	9.6%	7.2%	10.3%
Electronic Devices/Equip.	15.4%	11.1%	19.5%	5.8%
Food	4.7%	5.8%	3.0%	7.8%
Machine & Equipment	21.2%	27.2%	21.9%	27.2%
Metal	7.6%	12.0%	11.9%	7.6%
Nonmetal	6.2%	11.3%	7.6%	10.3%
Other	7.9%	7.4%	8.4%	6.8%
Textile and Leather	25.7%	10.5%	15.1%	20.7%
Wood and Paper	3.8%	5.1%	5.3%	3.5%
<i>Occupation</i>				
Senior Manager	2.6%	5.3%	3.9%	4.3%
Admin., Clerical	12.5%	6.2%	9.2%	9.2%
Technical or Design	4.4%	13.9%	10.4%	8.3%
Salesperson	3.3%	2.8%	3.0%	3.1%
Front-line (Production)	72.1%	67.0%	68.2%	70.8%
Other	5.1%	4.8%	5.4%	4.4%
<i>Ownership</i>				
Collective or State	7.8%	11.7%	6.2%	14.0%
Domestic Private	46.2%	50.3%	44.6%	52.8%
Foreign	10.0%	6.2%	12.3%	3.2%
HK/MC/TW	20.2%	14.0%	29.5%	2.5%
Other	15.7%	17.7%	7.5%	27.5%

Notes: *All means re-weighted to account for the oversampling of managers. Bolded numbers mean significantly greater at the 1% significance level. The unweighted size of the Guangdong sample is 8155 observations, the Hubei sample is 3587 observations. The unweighted female sample is 5223 observations and the unweighted male sample is 6519 observations.

Table 2. Summary Statistics by Province, CEES 2016 Employer Survey

Province	Guangdong					Hubei				
Variable	Mean	SD	N	Min	Max	Mean	SD	N	Min	Max
# of employees	1047	3,335	462	5	42,000	407	1,525	539	1	28,919
Firm Exports	62.8%	0	462	0	1	20.8%	0	539	0	1
Capital Intensity	83.69	1582	462	0	34023	30.40	107	539	0	2000
Profit/Employee	3.5	15.0	462	-49.3	190.5	6.4	25.6	539	-40.0	351.5
Maternity Insurance Fund	81%	--	462	0	1	53%	--	539	0	1
Collective Wage Bargaining	52.2%	--	462	0	1	61.2%	--	539	0	1
<i>Ownership Sector</i>										
Collective or State	1.9%	--	462	0	1	10.2%	--	539	0	1
Domestic Private	62.8%	--	462	0	1	84.6%	--	539	0	1
Foreign	10.8%	--	462	0	1	2.2%	--	539	0	1
HK/MC/TW	23.6%	--	462	0	1	2.2%	--	539	0	1
Other	0.9%	--	462	0	1	0.7%	--	539	0	1
<i>Self-reported firm barriers</i>										
Financing Means	14.9%	0	462	0	1	35.1%	0	539	0	1
Financing Costs	18.2%	0	462	0	1	36.0%	0	539	0	1
Market Demand	56.5%	0	462	0	1	54.0%	0	539	0	1
Innovative ability	31.4%	0	462	0	1	27.5%	0	539	0	1
Taxes	33.8%	0	462	0	1	24.1%	0	539	0	1
Intellectual Property Rights	13.9%	0	462	0	1	10.4%	0	539	0	1
Govt. Policy volatility	19.9%	0	462	0	1	26.2%	0	539	0	1
Managerial Talent	27.3%	0	462	0	1	30.8%	0	539	0	1
Technical Talent	36.4%	0	462	0	1	37.7%	0	539	0	1
Worker's Labor Skills	31.6%	0	462	0	1	28.0%	0	539	0	1
Workforce costs	66.0%	0	462	0	1	53.4%	0	539	0	1
Land	19.5%	0	462	0	1	18.0%	0	539	0	1
Gov't regulations	17.7%	0	462	0	1	21.3%	0	539	0	1

Table 3. The Gender Wage Gap with a richer set of controls

	(1)	(2)	(3)	(4)	(5)
Dep. Var.	Log Past Month's Wage				
VARIABLES					
<i>Panel A. Pooled Sample</i>					
Female	-0.235*** (0.0164)	-0.211*** (0.0158)	-0.204*** (0.0161)	-0.189*** (0.0132)	-0.168*** (0.0143)
Obs.	8,162	8,162	8,162	8,162	8,162
R-sq.	0.062	0.154	0.184	0.207	0.347
<i>Panel B. Guangdong Only</i>					
Female	-0.223*** (0.0256)	-0.198*** (0.0251)	-0.195*** (0.0258)	-0.188*** (0.0222)	-0.163*** (0.0189)
Obs.	5,430	5,430	5,430	5,430	5,430
R-sq.	0.039	0.115	0.146	0.173	0.383
<i>Panel C. Hubei Only</i>					
Female	-0.253*** (0.0217)	-0.233*** (0.0230)	-0.213*** (0.0246)	-0.180*** (0.0217)	-0.166*** (0.0226)
Obs.	3,389	3,389	3,389	3,389	3,389
R-sq.	0.058	0.168	0.193	0.222	0.251
Human Capital	N	Y	Y	Y	Y
Task Variables	N	N	Y	Y	Y
Personality Variab.	N	N	Y	Y	Y
English	N	N	Y	Y	Y
Industry Sector	N	N	N	Y	Y
Occupation	N	N	N	Y	Y
Ownership	N	N	N	Y	Y
Prov FE	Y	Y	Y	Y	N
Year FE	Y	Y	Y	Y	Y
Firm FE	N	N	N	N	Y

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: CEES 2015 and 2016.

Notes: Sample is reweighted to account for the oversampling of managers. All standard errors clustered by city.

Table 4. The Gender Wage Gap interacted with Ownership

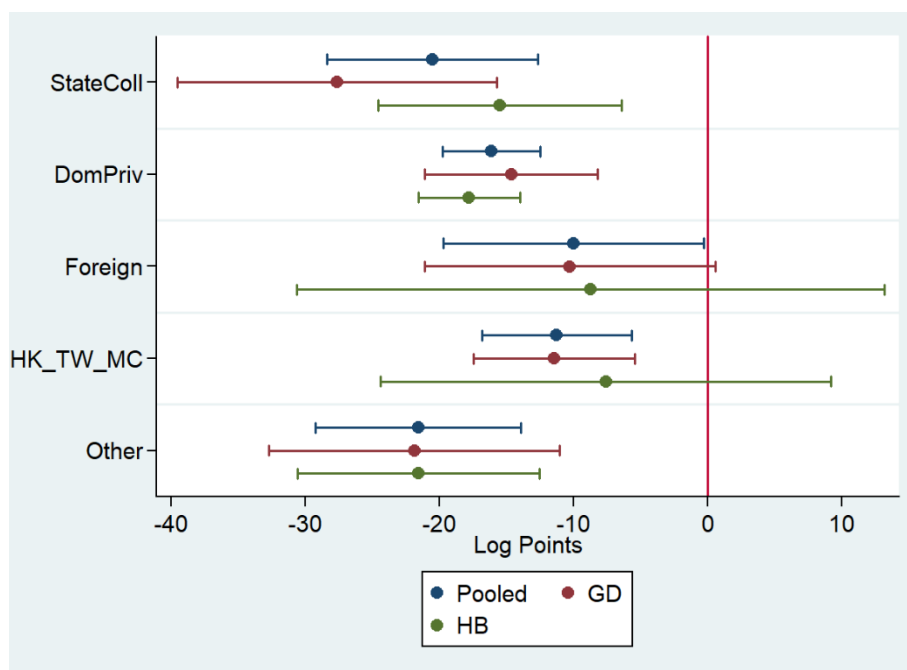
Province Sample Specification	(1)
	Pooled Base
F Est. (State/Collective)	-0.205***
p-value	0.000
F Est. (Domestic Private)	-0.161***
p-value	0.000
F Est. (Foreign)	-0.1**
p-value	0.043
F Est. (HK/MC/TW)	-0.113***
p-value	0.000
F Est. (Other)	-0.216***
p-value	0.000
Observations	8,776
R-squared	0.334

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: 2015 and 2016 CEES Employer Survey.

Note: All estimates include controls for potential experience, educational attainment, industry sector, occupation, task composition, personality, English language ability, and year and province fixed effects.

Figure 2. The Gender Wage Gap by Ownership and Province

Source: 2015 and 2016 CEES Employer Survey.

Note: All estimates include controls for potential experience, educational attainment, industry sector, occupation, task composition, personality, English language ability, and year and province fixed effects

Table 5. The Gender Wage Gap Interacted with Occupation

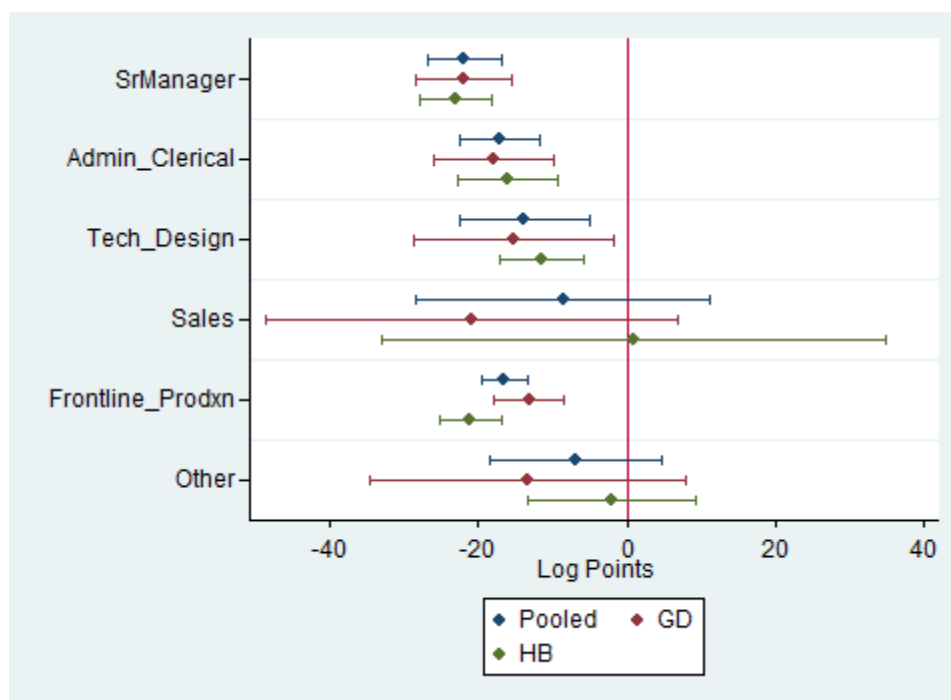
Specification	(1)
	Pooled F x Occ
Female (Sr. Mgr.)	-0.218***
p-value	0.000
Female (Admin./Clerical)	-0.171***
p-value	0.000
Female (Technical/Design)	-0.138***
p-value	0.003
Female (Salesperson)	-0.086
p-value	0.388
Female (Front-Line Worker)	-0.164***
p-value	0.000
Female (Other)	-0.0695
p-value	0.234
Observations	9,456
R-squared	0.333

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: All estimates include controls for potential experience, educational attainment, industry sector, occupation, task composition, personality, English language ability and year and province fixed effects.

Figure 3. The Gender Wage Gap by Occupation and Province



Source: 2015 and 2016 CEES Employer Survey.

Note: All estimates include controls for potential experience, educational attainment, industry sector, ownership, task composition, personality, English language ability, and year and province fixed effects

Table 6. The Gender Wage Gap by Education and Age

Dep. Var. Sample VARIABLES	(1)	(2)
	Log Last Month's Wage	
	Pooled	
Female	-0.193*** (0.0204)	-0.147*** (0.0378)
<i>x Age Group</i>		
x Age 26-35		-0.0137 (0.0419)
x Age 36-45		-0.0419 (0.0411)
x Age 46-55		0.00627 (0.0456)
x Age 56+		0.0287 (0.115)
<i>x Education</i>		
x Sr MS	0.0154 (0.0305)	
x HS/Poly/Tech	0.0619 (0.0385)	
x Jr Coll	0.0517 (0.0369)	
x Coll Plus	0.140*** (0.0266)	
Observations	8,776	8,773
R-squared	0.332	0.334

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: All estimates include the following controls: potential experience, occupation, sector, BFI personality, task characteristics, English ability, firm fixed effects, province fixed effects (pooled), year fixed effects (pooled). Errors are clustered at the city level and observations are re-weighted according to sampling probabilities.

Table 7. The Role of Capital Intensity, Firm Profitability, and Firm Size on Wages

Dep. Var. Sample	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All				Log Past Month's Wage Female			Male		
Variables	Base	Capital Intensity	Firm Profitability	Firm Size	Capital Intensity	Firm Profitability	Firm Size	Capital Intensity	Firm Profitability	Firm Size
Female	-0.198*** (0.0181)	-0.201*** (0.0225)	-0.197*** (0.0188)	-0.346*** (0.0694)						
x Firm Variable		-0.000465 (0.00669)	0.0357 (0.0233)	0.0270** (0.0115)						
Firm Variable		0.0762* (0.0433)	-0.00589 (0.0114)	-0.0184 (0.0230)	0.0312 (0.0391)	0.00692 (0.0187)	-0.00509 (0.0313)	0.112*** (0.0300)	0.0461** (0.0207)	-0.00549 (0.0259)
x Domestic Private		-0.0873* (0.0439)	-0.0233 (0.0167)	0.0321 (0.0310)	-0.0430 (0.0383)	0.00187 (0.0183)	0.0420 (0.0361)	-0.132*** (0.0345)	-0.0406*** (0.0138)	0.0238 (0.0374)
x Foreign		-0.0607 (0.0370)	0.0133 (0.0210)	-0.0109 (0.0393)	0.00989 (0.0345)	0.0446 (0.0278)	-0.00275 (0.0503)	-0.120*** (0.0353)	-0.000977 (0.0329)	0.00106 (0.0365)
x HK/MC/TW		-0.0456 (0.0461)	-0.0248 (0.0277)	0.0685* (0.0348)	0.0323 (0.0420)	-0.0121 (0.0251)	0.0525 (0.0457)	-0.118** (0.0421)	-0.0180 (0.0293)	0.0940** (0.0367)
x Other		-0.0574 (0.0583)	-0.0429 (0.0310)	0.0187 (0.0250)	-0.0218 (0.0705)	-0.00929 (0.0418)	0.0574 (0.0382)	-0.0923** (0.0402)	-0.0579** (0.0222)	-0.0112 (0.0311)
Ownership	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,682	3,682	3,682	3,682	1,642	1,642	1,642	2,040	2,040	2,040
R-squared	0.277	0.285	0.282	0.284	0.247	0.241	0.247	0.279	0.273	0.270

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: CEES 2015 and 2015

Notes: All estimates include controls for potential experience, education, English ability, personality scores, occupation, industry sector, task descriptions, and province.

Standard errors are clustered by city. Sample is reweighted according to over-sampling.

Table 8. The Wage-Profitability Relationship and the GWG

Dep. Var. VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
			Log Past Month's Wage			
Female	-0.218*** (0.0223)	-0.214*** (0.0229)	-0.213*** (0.0230)	-0.211*** (0.0228)	-0.209*** (0.0221)	-0.204*** (0.0230)
Profit/Employee ^x		0.0160 (0.00961)	0.0152 (0.00938)	0.0110 (0.00888)	0.0322*** (0.00972)	0.0383*** (0.0101)
x Female						-0.0118 (0.0118)
Profit/Emp., Ind. Avg.			1.98e-06 (1.82e-06)	1.19e-06 (1.89e-06)	1.02e-06 (2.01e-06)	9.68e-07 (1.98e-06)
Capital Intensity				0.0158** (0.00595)	0.0188*** (0.00560)	0.0193*** (0.00561)
Firm Size				0.0193** (0.00708)	0.0194** (0.00751)	0.0194** (0.00755)
Profit/Employee x Capital Intensity					-0.0110*** (0.00226)	- (0.0113*** (0.00228))
Ownership	Y	Y	Y	Y	Y	Y
Human Capital, Job Char.	Y	Y	Y	Y	Y	Y
Profit/Employee (Female Est.)						0.026** (0.0119)
t-statistic (M<=F)						1.00
p-value (M<=F)						0.165
Observations	3,518	3,518	3,518	3,518	3,518	3,518
R-squared	0.260	0.264	0.264	0.268	0.272	0.273

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Profit/Employee is Log Profit per employee. Human Capital and Job Characteristics include Potential Experience, Educational Attainment indicators, BFI scores, English language ability, Occupational Category, Industry Sector category, Task Descriptions. All estimates include province and city fixed effects. Capital Intensity is the Capital-Labor Ratio, the Log of Total Value of Machines in 2015 (Millions of Yuan) / Number of employees. Firm size is the log number of employees in 2015. Standard errors are clustered by city.

Table 9. The Wage-Profitability Relationship by Gender

Dep. Var. Model	(1)	(2)	Log Last Month's Wage			
	Base					
	M	F	M	F	M	F
Profit/Employee*	0.0290* (0.0160)	0.0254* (0.0128)	0.0561*** (0.0180)	0.0253* (0.0144)	0.0442*** (0.0111)	0.0219 (0.0160)
Profit/Emp., Industry Avg.	1.89e-06 (2.48e-06)	8.62e-06** (3.23e-06)	6.88e-07 (2.45e-06)	5.72e-06 (3.31e-06)	5.94e-08 (2.36e-06)	1.24e-06 (3.47e-06)
Capital Intensity			0.0178 (0.0103)	0.0307*** (0.00865)	0.0116 (0.00689)	0.0215*** (0.00640)
Profit/Employee x Capital Intensity			-0.0153*** (0.00347)	-0.00588 (0.00613)	-0.0129*** (0.00218)	-0.00929 (0.00600)
Firm Size			0.0289** (0.0123)	0.0461*** (0.00929)	0.00856 (0.0137)	0.0344*** (0.00753)
Ownership	N	N	N	N	Y	Y
Human Capital and Job Characteristics	N	N	N	N	Y	Y
Observations	1,938	1,580	1,938	1,580	1,938	1,580
R-squared	0.080	0.111	0.100	0.135	0.255	0.241

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Profit/Employee is Log Profit per employee. Human Capital and Job Characteristics include Potential Experience, Educational Attainment indicators, BFI scores, English language ability, Occupational Category, Industry Sector category, Task Descriptions. All estimates include province and city fixed effects. The Capital-Labor Ratio is the Log of Total Value of Machines in 2015 (Millions of Yuan) / Number of employees. Firm size is the log number of employees in 2015. Standard errors are clustered by city.

Table 10. The Wage-Profitability Relationship by Gender and Ownership

Model	(1)	(2)	(3)
VARIABLES	Pooled	by Gender	by Gender
<i>Profitability Estimates by Ownership (All or Male)</i>			
State/Collective	0.0622*** 0.000119	0.0675*** 0.000309	0.0669*** 0.000284
Domestic Private	0.0413*** 0.00191	0.0366*** 0.00134	0.0329 0.193
Foreign	0.0707*** 0.00571	0.0641** 0.0429	0.0665* 0.0577
HK/MC/TW	0.0431* 0.0506	0.0591** 0.0156	0.0598 0.759
Other	0.0219 0.295	0.0172 0.248	0.0121 0.226
<i>Profitability Estimates by Ownership (Female)</i>			
State/Collective		0.026 0.207	0.0254 0.189
Domestic Private		0.0206 0.207	0.0214 0.193
Foreign		0.0506* 0.0604	0.0488* 0.0577
HK/MC/TW		0.00167 0.923	0.0053 0.759
Other		0.00134 0.975	0.00453 0.922
<i>Female >= Male Test by Ownership</i>			
State/C t-stat		1.43	1.51
p-value		0.085	0.074
Domest. t-stat		1.07	0.81
p-value		0.15	0.22
Foreign t-stat		0.35	0.48
p-value		0.37	0.32
HK/MC t-stat		3.64	5.65
p-value		0.001	0.000
Other t-stat		0.41	0.173
p-value		0.34	0.432
Ownership x F	N	N	Y
Observations	3,518	3,518	3,518
R-squared	0.278	0.279	0.281

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: All estimates include controls for education, potential experience, personality, task composition, province, occupation, industry sector, English ability,

** Firm size is Log Number of Employees in 2015*

Table 11. The role of other firm characteristics on wage determination

Dep. Var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
		Presence of Wage Bargaining Process			Log Last Month's Wage			The extent to which merit is used to promote management		
Firm Characteristic										
Sample		All	Female	Male	All	Female	Male	All	Female	Male
VARIABLES										
Female	-0.192*** (0.0155)	-0.192*** (0.0155)			-0.191*** (0.0157)			-0.189*** (0.0159)		
Firm Characteristic		0.0184 (0.0605)	-0.0646 (0.109)	0.0545 (0.0538)	-0.202** (0.0793)	-0.341** (0.124)	-0.0174 (0.0913)	0.148*** (0.0303)	0.119** (0.0424)	0.169*** (0.0324)
x Domestic Private		-0.0328 (0.0687)	0.0400 (0.100)	-0.0670 (0.0735)	0.170** (0.0694)	0.361*** (0.121)	-0.0626 (0.0915)	-0.149*** (0.0330)	-0.0962* (0.0545)	-0.193*** (0.0316)
x Foreign		-0.0768 (0.0881)	-0.0513 (0.183)	-0.0345 (0.0873)	0.316* (0.177)	0.550** (0.224)	-0.00411 (0.128)	-0.165*** (0.0301)	-0.154*** (0.0301)	-0.160*** (0.0515)
x HK/MC/TW		-0.103 (0.0785)	-0.0589 (0.128)	-0.0743 (0.0762)	0.283*** (0.0781)	0.465*** (0.122)	0.0343 (0.152)	-0.167*** (0.0360)	-0.165** (0.0673)	-0.160*** (0.0385)
x Other		-0.0394 (0.0658)	-0.0145 (0.0891)	-0.0258 (0.0792)	0.233*** (0.0723)	0.315*** (0.104)	0.0954 (0.0926)	-0.139*** (0.0268)	-0.144*** (0.0441)	-0.133*** (0.0367)
Observations	5,125	5,125	2,247	2,878	5,125	2,247	2,878	5,086	2,228	2,858
R-squared	0.239	0.240	0.194	0.236	0.241	0.196	0.240	0.243	0.195	0.246

Robust standard errors in parentheses











*** p<0.01, ** p<0.05, *

p<0.1

Source: CEES 2016

Notes: All estimated include controls for potential experience, education, English ability, personality, occupation, industry sector, task content, ownership sector, and province.

Table 12. Time Until Promotion, by Occupation

Dep. Var.	Time Until Promotion											
Occupation	All		Senior Managers		Administrative		Technical/Design		Production/Front Line		Other	
Cox Proportional Hazard Model												
Female	-0.367*** (0.118)	-0.157 (0.228)	-0.128 (0.0998)	-0.0499 (0.236)	-0.303 (0.213)	-0.348 (0.378)	0.337 (0.450)	2.299** (1.063)	-0.654*** (0.201)	-0.680* (0.367)	-0.149 (0.908)	-0.393 (1.313)
Maternity Insurance x Female	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
Obs.	5,180	5,180	 1,457	 1,457	 871	 871	 365	 365	 2,146	 2,146	 244	 244

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: All estimates include controls for capital intensity, firm size, their interactions with the female dummy, potential experience, educational attainment, BFI personality traits, task descriptions, English language ability, industry, ownership, and for certain specifications, occupation . Labor Supply controls include presence of children, and presence of a work history interruption, both interacted with the female dummy.

Table 13. Time Until Promotion, by Ownership

	(1)	(2)	(3)
Cox Proportional Hazard Model	Time until Promotion		
<i>Panel A. All Ownership</i>			
Female	-0.367*** (0.118)	-0.157 (0.228)	0.191 (0.338)
Obs.	5,180	5,180	5,180
<i>Panel B. State/Collective</i>			
Female	-0.482 (0.305)	-0.998 (1.025)	-0.625 (1.071)
Obs.	604	604	604
<i>Panel C. Domestic Private</i>			
Female	-0.568*** (0.186)	-0.361 (0.312)	0.0977 (0.510)
Obs.	2,599	2,599	2,599
<i>Panel D. Foreign</i>			
Female	0.362 (0.582)	0.404 (0.961)	0.159 (1.555)
Obs.	316	316	316
<i>Panel E. HK/TW/MC</i>			
Female	0.253 (0.453)	1.448* (0.873)	2.366* (1.348)
Obs.	578	578	578
<i>Panel F. Other</i>			
Female	-0.255 (0.273)	-0.622 (0.611)	0.162 (0.773)
Obs.	1,083	1,083	1,083
Maternity Insurance x Female	N	Y	Y
Labor Supply Controls	N	N	Y
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1			

Notes: All estimates include controls for capital intensity, firm size, their interactions with the female dummy, potential experience, educational attainment, BFI personality traits, task descriptions, English language ability, industry, occupation, and for certain specifications, ownership. Labor Supply controls include presence of children, and presence of a work history interruption, both interacted with the female dummy.

APPENDIX

Appendix Table 1. The Gender Wage Gap by Ownership Subsamples

	(1)	(2)	(3)	(4)	(5)
Ownership	Collective or State	Domestic Private	Foreign	HK/MC/TW	Other
VARIABLES					
Female	-0.162*** (0.0486)	-0.185*** (0.0204)	-0.137** (0.0536)	-0.124*** (0.0265)	-0.149*** (0.0370)
Obs.	875	4,096	725	1,822	1,301
R-sq.	0.509	0.387	0.485	0.340	0.346

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: All estimates include controls for potential experience, educ, occ, industry sector, occupation, personality, English, province FE, and firm FE. All standard errors are clustered by city. Weights account for oversampling.

Appendix Table 2. The Gender Wage Gap by Occupation Subsamples

	(1)	(2)	(3)	(4)
Dep. Var.	Log Past Month Wage			
Sample	Senior Managers	Administrative/clerical	Technical/Design Staff	Front-line Workers
VARIABLES				
Female	-0.170*** (0.0427)	-0.166*** (0.0265)	-0.142*** (0.0376)	-0.166*** (0.0193)
Obs.	2,471	1,490	664	3,719
R-sq.	0.491	0.451	0.642	0.340

Robust standard errors in
parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: All estimates include the following controls: potential experience, education, sector, BFI personality traits, task characteristics, English ability, firm fixed effects, province fixed effects and year fixed effects. Errors are clustered at the city level and observations are re-weighted according to sampling probabilities.

Appendix Table 3. Self-reported firm Constraints by Ownership

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13) Gov't approval and regulation interference a significant barrier to firm operati
VARIABLES	Financing Means	Financing Costs	Market Demand Obstruction	Innovation ability obstruction	Taxes	IPR protection	Volatility of govt and econ policy	Managerial Talent	Technical Personnel Talent	Worker's Labor Skills	Workforce costs	Land	
Domestic Private	0.130** (0.0512)	0.215*** (0.0526)	-0.0350 (0.0601)	-0.0665 (0.0552)	0.0134 (0.0541)	0.0103 (0.0395)	0.0727 (0.0509)	0.0330 (0.0546)	-0.0285 (0.0584)	-0.0265 (0.0551)	0.0198 (0.0594)	0.0870* (0.0464)	0.0992** (0.0472)
Foreign	-0.0648 (0.0579)	0.0309 (0.0595)	0.0140 (0.0680)	-0.0849 (0.0625)	0.0853 (0.0612)	0.0362 (0.0447)	0.0277 (0.0576)	-0.0180 (0.0618)	-0.0402 (0.0661)	-0.0396 (0.0623)	0.0749 (0.0672)	0.0626 (0.0525)	0.0362 (0.0534)
HK/MC/TW	0.0186 (0.0940)	-0.0352 (0.0966)	-0.0376 (0.110)	0.0686 (0.101)	0.0681 (0.0993)	0.0362 (0.0725)	-0.0305 (0.0934)	-0.0524 (0.100)	0.0286 (0.107)	0.00143 (0.101)	0.119 (0.109)	-0.0352 (0.0851)	0.108 (0.0867)
Other	0.507*** (0.180)	0.393** (0.185)	0.0933 (0.211)	0.140 (0.194)	-0.0867 (0.190)	0.0600 (0.139)	0.160 (0.179)	0.0667 (0.192)	-0.0667 (0.206)	0.0133 (0.194)	-0.227 (0.209)	0.0600 (0.163)	0.393** (0.166)
Constant	0.160*** (0.0490)	0.107** (0.0504)	0.573*** (0.0575)	0.360*** (0.0529)	0.253*** (0.0518)	0.107*** (0.0378)	0.173*** (0.0487)	0.267*** (0.0523)	0.400*** (0.0559)	0.320*** (0.0527)	0.560*** (0.0568)	0.107** (0.0444)	0.107** (0.0452)
Observations	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119	1,119
R-squared	0.037	0.040	0.002	0.005	0.004	0.001	0.004	0.003	0.001	0.000	0.004	0.005	0.010

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The barrier variables are an indicator that =1 if the firm self-reports as the characteristics being a somewhat or very significant barrier

Base Category: State and Collective Ownership Control

A Supplementary Materials (Appendix)

A.1 The China Employer-Employee Survey

The China Employer-Employee Survey (CEES) is a recent longitudinal study of manufacturing firms and workers in China. CEES was initiated Hong Cheng of Wuhan University, Hongbin Li of Stanford University, Yang Du at the Chinese Academy of Social Sciences and Albert Park at the Hong Kong University of Science and Technology. The survey is administered by the China Enterprise Survey and Data Center at Wuhan University, which is directed by Cheng and Li. It began in 2015 with a survey of firms and workers in the coastal province of Guangdong, which borders Hong Kong, and expanded to the interior province of Hubei in 2016.

Guangdong has been China's most important industrial province in the past few decades and accounted for 13.4 percent of all manufacturing firms and 19.4 percent of all manufacturing workers in China in 2015. In 1980, when the central government initiated the Special Economic Zones policy, three of the four Special Economic Zones were located in Guangdong. In recent years, the manufacturing sector has been expanding to the interior provinces like Hubei. In 2015, Hubei accounted for 4 percent of all manufacturing firms and 6.6 percent of all manufacturing workers.

In 2016, the China Employer-Employee Survey was conducted in Guangdong and Hubei. The survey used the third National Economic Census, which was conducted in early 2014, as the sampling frame. Sampling was conducted in two stages, each using probability proportionate-to-size sampling, with size defined as manufacturing employment. In the first stage, 20 county-level districts were randomly sampled in each province, with probabilities proportionate to manufacturing employment in each district. In the second stage, 50 firms were sampled in each district as a target sample, again with probabilities proportionate to manufacturing employment in each firm. Enumerators then visited the 50 firms and attempted to survey the first 36 eligible firms (that have production activities in the sampled district). With this approach, the firm sample can be viewed as reasonably representative of manufacturing firms in China. Employees were also randomly selected using stratification. We first asked each firm to provide a list of all employees enrolled at the end of the previous year, with middle and high-level managers listed separately. Ten employees were randomly selected in each firm (six to nine for smaller firms), three (two for smaller firms) of whom were middle and senior managers. If selected employees could not participate (for example, because they were not working on-site during the survey period), they were replaced with the closest name on the list of workers. This process continued until the targeted number of sampled employees was reached. After excluding firms that were no longer in operation, there were 1,326 firms across 26 prefectures in Guangdong and Hubei that were

eligible to be surveyed. In 2016, 1,115 firms were surveyed, a response rate of 84 percent. The median asset value of surveyed firms was 55.7 million CNY (roughly 9 million in US dollars). The median number of workers across these firms was 160, with a 25th percentile of 55 employees and a 75th percentile of 520. About 90 percent of the initially sampled workers participated in the employee surveys. This provides us with information on 8,848 workers, among which 3,691 are production-line workers.