

Wage Inequality between Skilled and Unskilled Workers in China

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Abstract

Using a panel of 29 provinces over the years 1986 to 2001, we explore the large regional variations in the skill premium and real wages in China and examine the provincial characteristics that are consistent with higher real wages and/or inequality. We find that higher levels of development are associated with higher wages and higher skill premiums universally, but that the effect of foreign direct investment varies by province. One of the reasons that FDI can have differential effects is that the type of FDI (export vs. import-oriented) varies substantially across the provinces. Export-oriented FDI raises the wages of unskilled workers, lowers the wages of skilled workers, and lowers the skill premium. Paradoxically, we find that a larger employment share of state-owned enterprises is associated with greater wage inequality. This effect increases with the amount of FDI received by a province, consistent with the idea that state-owned enterprises compete for skilled labor with foreign firms.

JEL Codes: P33, J31, P31, F23

Key words: wage inequality, state-owned enterprises, foreign direct investment

1 Introduction

China's economic reform from a centrally-planned to a market-oriented economy has spanned over two decades and has changed the country dramatically. GDP has grown impressively, yet, accompanying this growth in income has been increasing wage inequality across the country. Existing studies of wage inequality in China have focused on the wage differentials between urban and rural areas, coastal and inland regions, across different ownership types, and across different levels of education or skill. Previous work on wage inequality across skill types in China have used household level data to estimate the return to skill but incorporate location specific effects to account for regional differences. (See for example Zhao, 2001b; Fu and Gabriel, 1999; or Gregory and Meng, 1995). This paper builds on this previous work by uncovering some of the factors that are associated with these location effects. In other words, this paper asks the question: Why do skill premiums vary widely by location in China?

In answering this question, we find that both the market dynamics introduced by the economic reform and the domestic economic structure carried over from the past affect wage inequality between skilled and unskilled workers. Specifically, we find that the amount of foreign direct investment differentially affects the wages of skilled and unskilled workers, however, the direction of the effect differs by province. To obtain some insight into this finding, we show that the type of foreign direct investment (import-oriented vs. export-oriented) affects relative wages and that this type varies widely across the provinces. Furthermore, we find that the share of workers employed by State Owned Enterprises (SOEs) also affects wages paid to skilled and unskilled workers in a province in a surprising way. A higher share of SOE workers is associated with lower wages for both skilled and unskilled workers overall, but the decrease in

unskilled workers wages is slightly greater, creating a *positive* correlation between wage inequality and the employment share of SOEs. We find some evidence that this paradoxical result is due to interaction of the state and non-state sectors in China's transition economy. While the apparent inefficiency of the SOE's generates lower wages for all, it is the unskilled workers with limited opportunities in the non-state sector who bear the brunt of this inefficiency and must take on a disproportionate share of the lower wages.¹

Because we attribute some of the provincial variation in skill premiums to the variation in FDI received, our work is generally related to previous studies that have examined the impact of FDI on wages of skilled and unskilled workers in developing countries. For example, Feenstra and Hanson (1997) find that increasing FDI in Mexico played an important role in generating greater wage inequality between skilled and unskilled labor. Aitken, Harrison and Lipsey (1996) also show that foreign investment increases wage differentials more in the developing economies of Mexico and Venezuela than in the developed economy of the United States. Using a similar methodology to the one we employ, te Velde and Morrissey (2002) examine the impact that FDI has had on five East Asian countries. As we do, they find that the impact of FDI is location-specific: FDI increases wage inequality in Thailand but not in the other four countries they study.

More specifically, our work is related to a body of literature that investigates wage

¹Dong and Bowles (2002) argue that market segmentation in China is due to different ownership types, but find that wage setting behavior across all ownership types is similar. However, they find that wages of workers are sensitive to the characteristics of firms, especially the financial health of the enterprise. See Zheng, Liu and Bigsten, 2003; Fleisher and Wang, 2001; or Gordon and Li, 1999 for a discussion of efficiency in Chinese SOEs. In interpreting this result, we should point out that, like many studies of wage and income inequality, our study focuses on wages and not total compensation.

determination in China.² Zhao (2001a) uses household level data to investigate earnings differences between workers in Chinese state and non-state owned enterprises, while Zhao (2001b) uses the same household survey data to assess the impact of FDI on relative wages in China's segmented labor market. Gordon and Li (1998) examine theoretically and empirically how wage inequality responded in transition as state enterprises began to compete with non-state enterprises. Fu and Gabriel (1999), Liu (1998), and Gregory and Meng (1995) all apply a human capital model to micro data to explore the determinants of earnings in the transition economy. Finally, Wu (2001) develops a theoretical model that assesses the impact of different types of FDI on the relative returns to skill. All of these studies identify the importance of China's segmented labor market in the transition economy in generating wage inequality. Importantly for our work, many of the empirical studies using micro level data find that location is a critical determinant of the level of wages and wage inequality. This observation is the motivation for our work whose main purpose is to understand what regional characteristics are associated with economic environments that are consistent with higher wages and/or inequality in China's transition economy.

Overall, our work confirms some of the results of previous research and contributes to the literature on wage inequality in transition economies by providing further evidence that increased market openness and domestic influences interact and often create a tradeoff between wage inequality and poverty reduction. Our results suggest that policy makers wishing to reduce both poverty and inequality in the short-run should aim to reduce the influence of SOEs. Our results

²We mention only a few of the recent studies on wage determination in China. Interested readers should also see Li (forthcoming), Dong and Bowles (2002), Hare (2002), Fleisher and Wang (2001), and Gustafsson, Shi, Novorozhkina, and Katz (2001).

also suggest that using FDI as a tool for development should be done cautiously as FDI can have either a positive or negative impact on the incomes of skilled and unskilled workers.

These results are discussed in the following 3 sections. Section 2 discusses our data and our methodology, section 3 presents our empirical results and section 4 concludes.

2 Methodology and Data

Our empirical approach is based on the conceptual framework developed in Katz and Murphy (1992). We use a CES production technology with two factors of production, skilled and unskilled workers. In this supply and demand framework, Katz and Murphy (1992) show that the ratio of wages to skilled and unskilled workers is a function of the ratio of the stock of skilled and unskilled workers and relative demand shifts. Thus,

$$\ln\left(\frac{w_s}{w_u}\right) = \left(\frac{1}{\sigma}\right) \left[D(t) - \ln\left(\frac{S_t}{U_t}\right) \right] \quad (1)$$

where σ is the elasticity of substitution between skilled and unskilled workers, S_t is the stock of skilled workers, U_t is the stock of unskilled workers and D_t are relative demand shifts. The demand shift is defined broadly and could include changes in the prices of other inputs in production or the changes in the supply of these inputs.

In a similar study, te Velde and Morrissey (2002) implement this framework to study the effect of foreign direct investment on wage inequality across five different countries in East Asia. Because the level of wages is also important if poverty reduction is of interest, te Velde and Morrissey (2002) also derive the level of real wages and show that they are a function of the

supply of workers (where supply is measured relative to real GDP) and demand shifters as well.

In applying this supply and demand framework to explain provincial variations in wages in the transitional economy of China, care must be taken so that the demand shifters include both market-oriented forces as well as economic structures of the planned economy. Thus, although a market-oriented framework influences our modeling strategy, our empirical framework for studying the determinants of wages in this transitional economy is really a hybrid that incorporates both market and non-market influences. Specifically, the base equation we estimate is:

$$\ln\left(\frac{W_{i,t}^s}{W_{i,t}^u}\right) = \alpha_i + \lambda_t + \beta \ln\left(\frac{S_{i,t}}{U_{i,t}}\right) + \gamma D_{i,t} + \varepsilon_{i,t} \quad (2)$$

where i denotes province i , t denotes year t , $D_{i,t}$ is a vector of demand shifters that includes real GDP per capita (RGDPC), real FDI per capita (RFDIPC), kilometers of highways per capita (HWPC), percent of workers employed in industry (INDSHARE), percent of workers employed in agriculture (AGRSHARE), percent of workers employed in SOEs (SOESHARE), the percent of workers employed in urban collectives (UCSHARE), α_i and λ_t are province and year specific effects, and $\varepsilon_{i,t}$ is a mean zero normally distributed error term.³ Following the formulation derived in te Velde and Morrissey (2002), when we examine the level of wages by skill group, we change the dependent variable to the natural log of real wages for either skilled or unskilled labor and use the appropriate stock of labor variable (either the stock of unskilled labor normalized by

³Descriptive statistics and more specific variable definitions are presented in Table 1 and discussed later in the text.

GDP, $U_{i,t}/Y_{i,t}$, or the stock of skilled labor normalized by GDP, $S_{i,t}/Y_{i,t}$). Thus, our demand shifters include a measure of the importance of SOEs, and Urban Collectives (UCs), as well as industry structure (percent of population employed in agriculture, percent of population employed in industry), infrastructure (length of highways), the scale of the economy (real gdp per capita), and influence from the foreign sector (FDI).

We expect that an increased share of SOEs and UCs, holding all else equal, should be a demand shift favoring unskilled labor because of their institutional bias towards equalizing wages for all. A larger percent of the population employed in agriculture, a lower percent employed in industry, and a lower overall level of GDP per capita might be associated with lower wages for all workers but also a lower skill premium because it might indicate a less developed local economy that utilizes less advanced technology. A more extensive infrastructure (measured here by highway length) should be associated with higher wages for all workers if infrastructure is a factor of production, but the effect on the skill premium is theoretically ambiguous.

Conceptually, FDI can play multiple roles in influencing wages. If FDI serves as a conduit for the implementation of skill-biased technology, then increases in FDI would increase the demand for skilled workers and decrease the demand for unskilled workers, putting upward pressure on skilled wages and the skill premium. However, if FDI seeks inexpensive unskilled labor, then it could represent a demand shift in favor of unskilled labor and have the opposite effect. Zhao (2001) offers an alternative explanation for a correlation between the skill-premium and FDI in a transition economy like China. He argues that when the economy is segmented into a privileged and unprivileged sector and labor is sorted into these sectors by education (with higher skilled workers going to the privileged sector), foreign firms must pay even higher wages

to skilled workers to draw them from the privileged sector, generating a larger wage gap.

An increase in the stock of workers should be associated with a decrease in wages for those workers. Hare (2002) uses Chinese micro-level data to find evidence for this effect. In general, however, higher wages may also serve to attract more workers to an area, making the interpretation of the coefficient on the stock of workers difficult. Restrictions on labor mobility in China suggest that this reverse effect may be smaller in China than elsewhere.⁴

Equation 2 includes both time and province specific effects. While our goal is to explain some of the geographic variation in wages, it is not likely that the available data will allow us to explain all of it; and, thus, we must still include these effects to limit the problems caused by omitted variables. Time effects are also particularly important in this instance because of two important trends. The most important effect is likely the dramatic transition towards a market economy that occurred over this time period. Also important, however, is technological change that is probably not skill-neutral.

We estimate Equation 2 using a fixed-effects methodology. Ideally, a random effects specification is preferred because it allows us to comment more directly on skill premium differences across provinces, however, a Hausman test rejects the random effects model at p-values less than .05 for most of our specifications; and, therefore, we do not employ this technique. Later, when we present our results, we also examine a pooled cross-section that suggests that some of the within-province effects we identify with the fixed effects methodology

⁴One might try to address this issue with an instrumental variables estimation. The availability of panel data would allow us to use the lagged value of the stock of workers as an instrument. However, we do not follow this strategy because the stock of workers changes very slowly year-over-year, making the previous year's value an unsuitable instrument.

may be responsible for the across-province effects too.⁵

Our analysis uses panel data from 29 provinces across 16 years from 1986 to 2001.⁶ The data we use was compiled from two sources published by the National Bureau of Statistics of China: *Comprehensive Statistical Data and Materials on 50 Years of New China* and *China Statistical Yearbooks*. The first source, which provides comprehensive province-level data from 1950 to 1998, is the primary source for our independent variables from 1986 to 1998 while the *China Statistical Yearbooks* are annual publications that allow us to extend our sample to 2001 and are the source for the wage data that comprises our dependent variables.

Average wage data by skill group or education level is not available to us at the province level. However, average annual wages are reported by sector. Under reasonable assumptions, one can order the sectors by proportion of skilled and unskilled workers. We then interpret the average wage in the sector that has a high proportion of unskilled workers as the unskilled wage and the average wage in the sector that has a high proportion of skilled workers as the skilled wage. In other words, we take the wages in the sectors at the extreme end of the skill spectrums as proxies for skilled and unskilled wages. Specifically, we use real wages paid to workers in agriculture and construction as the unskilled wages and real wages paid to workers in banking, insurance, scientific research and polytechnical services as the skilled wage.

⁵The fixed-effects methodology also prevents us from examining time-invariant province characteristics such as geographic location (e.g. coastal vs. inland provinces).

⁶There are 31 provinces in China in 2003. As in most studies, Tibet is excluded from the analysis because of poor data availability for Tibet. Chongqing was granted province-level status in 1997, but we have adapted the methodology employed in Demurger, Sachs, Woo, Bao, and Chang (2002) and included it under Sichuan province. Hainan was granted province-level status in 1988, and its data are not included for 1986 and 1987.

This methodology requires us to make three assumptions that we should highlight. First, we assume that a large proportion of workers in agriculture and construction sectors are unskilled and that a large proportion of workers in banking, insurance, scientific research and polytechnical services are skilled. Second, we must assume that all workers work approximately the same number of hours because the data available to us is total annual wages. Finally, we assume that any across-province variation in the proportions of skilled and unskilled workers in each sector is relatively constant through time so that this effect is accounted for in our province-specific fixed effect. Under these assumptions, our methodology delivers reasonable proxies for the annual wage rates of skilled and unskilled workers. (Our conclusions are robust to a slight change in our methodology in which we consider skilled workers to be only those in the science and technology sector and unskilled workers to be only those in the agriculture sector.)

The resulting data for the skill premium is graphed in the box plot in Figure 1. As can be seen in this graph, the general pattern of the distribution of the skill premium confirms the increasing inequality across regions as well as between skilled and unskilled workers that has been found in numerous previous studies, lending credibility to our methodology. The graph shows both an increase in the median skill premium and an increase in the dispersion of the skill premium across provinces over time.

Summary statistics for all the data used in our analysis can be found in Table 1. As highlighted in figure 1, the wage gap is fairly large and has a wide dispersion. The minimum value of the wage gap is actually less than one, but observations less than one only occur prior to 1994, in the earlier phases of market reform. The dispersion of wages across provinces and time within skill groups is rather striking. The highest average real wage for skilled workers is 26,712

yuan, which is about 28 times the lowest average wage. Similarly, the highest average real wage for unskilled workers is 13,348 yuan, about 20 times the minimum average wage. Another striking feature of the data is the large employment share of agriculture and SOEs. Over the period 1986 - 2001, agriculture employed an average of 53 percent of the workers in each province while SOEs employed an average of 75 percent. It is noteworthy that the minimum value for SOE employment share over the entire period for every province is 50 percent, indicating that in spite of market reforms, the SOEs are still dominant. Wide spreads in real GDP per capita, highway per capita, and FDI per capita are also apparent, indicating that economic environments vary greatly by province.

In fact, a regression that includes only time and province dummies shows a strong relationship between location and wages and explains 93 percent of the variation in the wage premium.⁷ In the next section, we explore some of the characteristics of the provinces that may be contributing to these strong location-specific effects.

3 Results

3.1 Determinants of Skill Premium and Level of Wages

Table 2 presents the results of the estimation of Equation 1 using a panel of 29 provinces and 16 years. The first column of Table 2 reports the results of an estimation in which time and province specific effects are included, while the remaining columns explore further the relationship between FDI and the skill premium by allowing the slope of RFDIPC to vary by province. Focusing on the first column of Table 2, we can see that the relative stock of skilled

⁷We do not report detailed results from this exercise in the tables, however, the results of this exercise and all others discussed in the text but not reported in detail are available from the authors upon request.

workers is positively associated with wage premiums, as would be expected if skilled workers migrated to the provinces which paid higher wages. This effect is not reinforced with results from the remaining specifications reported in Table 2 and, therefore, we do not find strong evidence that changes in the relative stock of workers is correlated with changes in relative wages within provinces. One possible reason that we do not find strong effects associating increases in the stock of labor with decreases in wages may be due to the fact that labor mobility in China is still costly, in spite of recent reforms.

The results in column 1 of Table 2 also indicate that more developed provinces (higher RGDP) have larger skill premiums, but after controlling for the level of income, we find no evidence that industry structure (the share of workers in agriculture or industry) affects skill premiums. We find two additional surprising results in this initial estimation. First, we are unable to corroborate previous findings at the household level that suggests that FDI is responsible for higher skill premiums. Second, the share of workers employed by SOEs is associated with greater wage inequality within a province. Although the results discussed below show that these two issues are related, we begin by discussing them in turn.

Effect of FDI

We first take up the issue of the relationship between FDI and skill premiums. Column 2 of Table 2 replicates the specification in Table 1, but allows the slope of the RFDIPC coefficient to vary by province. In doing so, we are motivated by results at the cross-country level that suggest that the impact of FDI depends on the characteristics of the country (See Carkovic and Levine, 2002 for example.) Wu (2001) applies this idea specifically to China and develops a model that emphasizes not the overall value of FDI, but the type of FDI. Thus, in column 2, we

allow the effect of FDI to vary by province, in accordance with the idea that the nature of the FDI may vary by province and therefore have differing effects. Although we do not report all of the province-specific slope coefficients in Table 2, we do find that the effect of FDI does vary by province, with 3 of the 29 provinces showing a positive net effect of FDI and 4 showing a negative net effect.

We would like to explore the idea that FDI has different effects in different provinces further by incorporating a proxy for the type of FDI. We attempt to measure the type of FDI by distinguishing between FDI that is export-oriented vs. import-oriented on the idea that export-oriented foreign firms are likely to be manufacturers in search of low-cost, unskilled labor. Thus, to obtain a proxy for the type of FDI in a province we calculate the ratio, value of exported goods of foreign funded enterprises/value of imported good of foreign funded enterprises, and call this ratio *FDITYPE*. Higher values of *FDITYPE* indicate that foreign firms in that province are more export-oriented. The mean value of *FDITYPE* is .86, but it varies widely, with a minimum of .08 and a maximum of 3.84.

Results for a specification that replicates the one in in column 2, but adds *FDITYPE* are reported in Column 3. The coefficient on *FDITYPE* is negative and significant, consistent with the idea that export-oriented foreign firms have a greater demand for unskilled labor, lowering the skill premium. The magnitude of the effect is notable. The coefficients in column 3 indicate that a one standard deviation increase in *FDITYPE* (.64) reduces the ratio of skilled wages to unskilled wages by 1. It is also interesting that after including *FDITYPE*, FDI affects the skill premium in all provinces. After incorporating the effect of the province-specific slope coefficients, we find that FDI is associated with higher skill premiums in about 2/3 of the

provinces and with lower skill premiums in about 1/3.

Due to the lack of data availability to calculate FDITYPE in the years prior to 1995, the estimation in Column 3 uses a smaller sample, with observations only from 1995 to 2001. In order to determine if the results regarding the overall effect of FDI are driven by sample selection, the specification in column 4 replicates that in column 2 except it uses the smaller sample utilized in column 3. This exercise indicates that the changes in the significance of the coefficients on RFDIPC are largely the result of using the later time period rather than the inclusion of FDITYPE. The results in column 5 confirm this conclusion as the coefficient on RFDIPC becomes insignificant when we examine the time period 1986 - 1994. Furthermore, the number of statistically significant province-specific slopes reduces to 8 (all positive), indicating that the wage effects of FDI not only vary across provinces, but also across time.

We obtain further insight into the relationship between FDI and wages by examining how FDI affects the level of wages to skilled and unskilled workers. In Tables 3 and 4, we present the results of estimations that essentially replicate the specification in Table 2 except we use the level of wages as the dependent variable. Focusing first on the determinants of skilled wages, we see that RFDIPC enters with a positive and significant sign, however, when we allow the effect of FDI to vary by province, about half of the provinces show a negative effect of greater FDI on skilled wages. The coefficient on FDITYPE in column 3 corroborates the earlier finding that export-oriented FDI is likely to be biased towards unskilled labor. The effect of FDI on skilled wages in the earlier time period (column 5) is not strong, with only 5 provinces having a statistically significant effect (all positive).

Table 4 shows the effects of FDI on unskilled wages. The results are not quite as strong

as those for skilled wages, however, focusing on Column 3, we see that FDITYPE has the expected positive relationship on the wages of unskilled workers. Significant province-specific slopes are less common in these estimations, with the specification in column 3 resulting in only six significant coefficients (all negative).

To summarize our conclusions regarding the effects of FDI on the level of wages and wage inequality, we find that FDI has different effects in different provinces. We found that one of the reasons why the effect of FDI may differ is that the nature of the FDI varies widely. More export-oriented FDI reduces the skill premium, reduces the wages to skilled workers, and increases the wages to unskilled workers. Nonetheless, even after controlling for the type of FDI, there is still significant variation in the effect of FDI by province.

Effect of employment share of SOEs

We now take up the issue of the relationship between the employment share of SOEs and wage inequality. Estimations of the determinants of the level of wages to the skilled and unskilled in Tables 3 and 4 can also help to explore this somewhat surprising result that increases in SOE employment share are associated with greater wage inequality. Focusing first on skilled wages, we see that the employment share of SOEs is negatively associated with wages to skilled workers in three out of the five specifications in Table 3. While this result may have been expected a priori and is consistent with findings at the household level, the results in Table 4 suggest that a higher share of workers in SOEs is also associated with even larger decreases in wages to unskilled workers. Taken together, these two results explain mechanically why a larger employment share of SOEs is associated with greater wage inequality.

While our results do not tell us why unskilled workers are disproportionately

disadvantaged by a greater share of SOEs, results from other studies may shed some light on this finding. First, several studies find that SOEs in China have low efficiency. (See, for example, Zheng, Liu, and Bigsten, 2003; Kong, Marks and Wan, 1999; or Liu and Liu, 1996). Low efficiency would generate lower wages for all groups of workers. Unskilled workers, however, may bear the highest costs for the inefficiency if skilled workers have more opportunities available in the non-state sector. Gordon and Li (1999) find that SOEs face increasing competition for labor from the non-state sector and disproportionately lose skilled and younger workers. Zhao (2001) finds a corroborating result that when the presence of foreign firms is low, there is little competition for skilled workers and SOEs pay the skilled workers less. Thus, our result is likely due to two interacting factors: 1) the overall inefficiency of SOEs, and 2) the unique nature of a transition economy in which the state enterprises must compete, particularly for skilled labor, with a non-state sector. Interestingly, when we add an interaction term, $SOESHARE * RFDIPC$ to the specification in the first column of Table 2, we find that it enters positively and significantly into the regression and the coefficient on $SOESHARE$ becomes insignificant. This finding is consistent with the idea that SOEs may cause increased wage inequality only when they face greater competition from foreign firms. Unfortunately, however, we are unable to find similar statistically significant effects on the level of wages to either skilled or unskilled workers for this interaction term and we interpret the result cautiously. (The positive coefficient on the interaction term in the skilled wage regression is almost statistically significant with a p-value of .14.)

We should point out that this result is not in conflict with the work of Xu and Zou (2000) who find that an decrease in the output share of SOEs is associated with greater income

inequality. These two results can be reconciled with the fact that provinces with a larger employment share of SOEs also have a larger share of unskilled workers. Thus, changes in SOE shares can affect income inequality through a combination of 1) the effect on wage inequality which we identify and 2) an effect on the skill distribution within the province. Income inequality can decrease as SOE shares increase even if the skill premium increases if the increase in SOE share is also associated with a greater proportion of unskilled labor.⁸

A final point about the results in Tables 3 and 4 is that, similar to the effect of SOE employment share, the share of employment for Urban Collectives (UCs) also is associated with lower wages to both skilled and unskilled workers, even though Table 2 does not indicate a statistically significant effect on the skill premium.

Across Province Effects

In interpreting our results, it is important to keep in mind that the fixed effects estimation presents within province results and does not allow us to comment on across province differences. Ideally, a random effects estimation would have been implemented in order to enable us to comment on both the within and between province effects. However, as we mentioned earlier, Hausman tests soundly reject this methodology. Instead, we present a pooled cross-section analysis in Table 5 to allow us to ascertain how various provincial characteristics are associated with wages and wage inequality. (Table 5 includes time specific effects, but not province-specific effects.) We present these results cautiously as they are more likely to be

⁸The apparent discrepancy can also be reconciled by the fact that Xu and Zou (2000) use a different time period, 1985 - 1995. If the effect we identify is actually an interaction of the state sector and the foreign sector as we argue above, it may not be strongly present during this time period. Our earlier results suggest that the overall effect of FDI on wages is strongest in the years since 1995.

subject to omitted variable bias; the fixed effects estimations are more reliable for inferring causality. Nonetheless, because one of our objectives was to explain the dispersion of wages and wage inequality, it is useful to see if our within province conclusions can be validated with this across province approach.

The first three columns of Table 5 show the determinants of the skill premium, the level of skilled wages and the level of unskilled wages and are comparable to the results in column 1 of Tables 2, 3, and 4. The last three columns of Table 6 include `FDITYPE` and are comparable to column 3 of the earlier tables. Comparing these results to those presented earlier reveals several interesting conclusions. First, the supply of labor variables are negative and strongly significant in all the estimations in Table 5, suggesting that provinces that have large stocks of skilled or unskilled labor have lower wages for skilled or unskilled workers respectively. However, the fixed effects results presented earlier do not support a causal role within provinces—as the stock of one type of labor rises, we did not find strong evidence that the wages to those types of workers decreased. Another interesting conclusion is that higher levels of GDP per capita are associated with higher wages to both the skilled and unskilled workers, but not an increase in the skill premium. In contrast, the fixed effects estimation suggests that increases in the level of development are associated with higher skill premiums. The pooled OLS results also allow us to observe a relationship between the employment share of agriculture and industry and wage inequality that we did not see in earlier results, with higher shares of these two sectors being associated with lower skill premiums.

The pooled OLS results confirm some of the earlier results about FDI and employment share of SOEs, but not all of them. For example, the pooled OLS results indicate that provinces

that receive more export-oriented FDI have higher wages to unskilled labor and low skill premiums as was reported earlier, but there is no evidence that this type of FDI is correlated with wages to skilled workers in the cross section. The pooled OLS results also seem to suggest that FDI is associated with higher skill premiums by generating lower wages to unskilled workers whereas the fixed effects results find evidence of this type of effect in only a few provinces. Finally, the SOE employment share is associated with lower wages for both skilled and unskilled workers in the pooled OLS results, but the fixed effects methodology is necessary to uncover the interesting result that increases in the employment share of SOEs are associated with higher wage inequality.

In general, the pooled OLS estimation gives us information about the characteristics of provinces that have higher skill premiums and wages, but these results must be viewed together with the fixed effects estimation results in order to be interpreted properly. One example of this is the interpretation of the impact of FDI on wages to the unskilled. While the pooled results suggest that provinces that receive more FDI have lower wages for unskilled workers, the fixed effects results suggest, if anything, that more FDI increases wages for unskilled workers in most provinces. These two apparently contradictory results can be reconciled if FDI flows to areas with lower labor costs, but increases the demand for labor and therefore increases wages above the level that they would have been without the increase in FDI.

A few results are evident with both methodologies suggesting that these relationships may explain cross-province variations through a causal relationship. An example of this type of relationship is the finding that higher levels of export-oriented FDI are associated with lower skill premiums and higher wages to unskilled workers. In addition, higher GDP per capita and a

lower employment share of SOEs and of Urban Collectives are associated with higher wages to both skilled and unskilled workers, indicating that some of the differences in the level of wages across provinces can be attributed to differences in these factors. Interestingly, however, the fixed-effects methodology is necessary to identify a relationship between increases in SOESHARE and increases in wage inequality.

4 Conclusion

We have explored the provincial characteristics that influence the level and inequality of real wages in China. In doing so, we find evidence that the amount of foreign investment received by a province influences wages both directly and indirectly. It affects wages directly by creating a demand for labor, but this demand may be disproportionately for skilled labor or for unskilled labor, depending on the type of FDI. It affects wages indirectly by influencing the economic environment in which other enterprises exist. Specifically, we find evidence that a larger employment share of SOEs is associated with greater wage inequality in provinces that receive more FDI, suggesting that SOEs are responding to competitive pressure to attract skilled labor by paying higher wages than they otherwise would. In doing so, the inefficiency of the SOEs forces unskilled workers to earn even less.

Although we have identified some of the characteristics of provinces that have higher skill premiums and wages, it certainly must be the case that limited labor mobility plays a role in allowing the large regional variations in wages to persist. The fact that we did not find a strong causal link between the stock of labor and wages emphasizes this point. Finally, while it is notable that we explain some of the regional variation with location specific economic environment characteristics, we do not explain all of it as many of our regressions still found a

significant role for unidentified province-specific effects.

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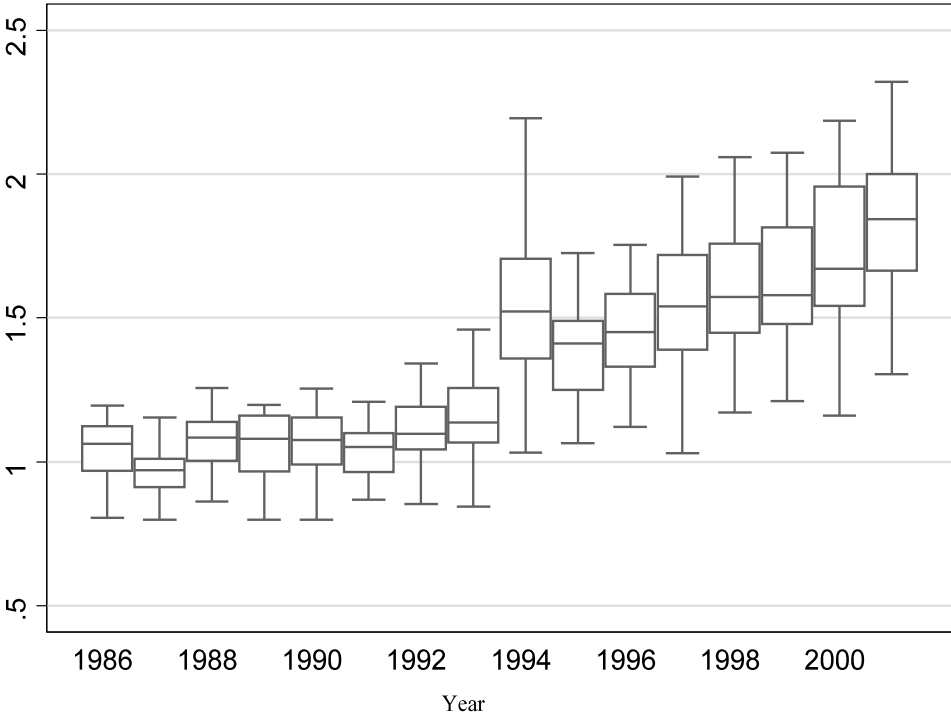
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Figure 1: Distribution of Skill Premium over Time (1986 - 2001)



Note: Skill premium is defined as Skilled Wages/Unskilled Wages. Graph excludes outside values.

Table 1
Descriptive Statistics

Variable	Mean	S.D.	Min	Max	Definition
WP	1.364	.409	.757	3.301	Skilled Wage/Unskilled Wage
WS	2,290	1,904	948	26,712	Real Skilled Wage, yuan/year
WU	1,653	1,099	660	13,348	Real Unskilled Wage, yuan/year
S/U	.283	.172	.043	1.59	Number of Skilled Workers/Number of Unskilled Workers
S/Y	.032	.028	.009	.291	Number of Skilled Workers/ Real GDP, people per 100 million yuan
S/U	.283	.172	.043	1.60	Number of Unskilled Workers/Real GDP, people per 100 million yuan
RGDPPC	1,730	1,850	438	19,880	Real GDP per capita, yuan
RFDIPC	.002	.004	.000	.025	Real FDI per capita, dollars
AGRSHARE	.529	.168	.096	.800	Agricultural Workers/Total Workers
INDSHARE	.239	.111	.090	.593	Industrial Workers/Total Workers
SOESHARE	.751	.085	.502	.905	SOE Workers/Total Workers
UCSHARE	.191	.074	.047	.426	Urban Collective Workers/Total Workers
HWPC	.0012	.0007	.0002	.0045	Highway length per capita, kilometers

Note: To construct real variables in yuan, nominal variables were deflated by province-specific CPI. The base year is 1985. Real FDI in dollars is constructed using the U.S. CPI.

Table 2: Dependent Variable ln(WP)

	(1)	(2)	(3)	(4)	(5)
ln(S/U)	0.034	0.013	-0.012	0.046	-0.027
	(1.71)*	(0.69)	(0.16)	(0.56)	(1.51)
RGDPPC	.00002	.00003	.00002	.00003	.00000
	(5.12)**	(6.00)**	(4.06)**	(4.42)**	(0.43)
RFDIPC	-2.046	11.121	378.525	324.403	-216.859
	(0.99)	(0.13)	(2.32)**	(1.89)*	(1.41)
HWPC	-33.629	-30.146	-18.272	-0.998	-25.291
	(1.58)	(1.51)	(0.82)	(0.04)	(0.19)
AGRSHARE	0.024	-0.187	-0.365	-0.399	-0.594
	(0.12)	(0.93)	(1.31)	(1.35)	(1.20)
INDSHARE	-0.187	-0.437	-0.153	-0.257	-0.346
	(0.78)	(1.82)*	(0.54)	(0.87)	(0.51)
SOESHARE	0.447	0.338	0.067	0.057	-0.101
	(2.80)**	(2.04)**	(0.27)	(0.22)	(0.23)
UCSHARE	-0.289	-0.264	-0.299	-0.325	-0.411
	(1.62)	(1.17)	(1.15)	(1.18)	(0.73)
FDITYPE			-0.047		
			(3.93)**		
Province Specific Slopes	None	RFDIPC	RFDIPC	RFDIPC	RFDIPC
Sample Period	1986-2001	1986-2001	1995-2001	1995-2001	1986-1994
Observations	430	430	185	185	238
R-squared	0.94	0.96	0.97	0.96	0.96

All estimations include province and year specific fixed effects.

Absolute value of t-statistics in parentheses

** significant at 5% level; * significant at 10% level

Table 3
Dependent Variable: ln(WS)

	(1)	(2)	(3)	(4)	(5)
ln(S/Y)	-0.004	-0.009	-0.060	-0.025	-0.001
	(0.18)	(0.48)	(0.67)	(0.28)	(0.09)
RGDPPC	.00013	.00011	.00009	.00009	.00019
	(27.68)**	(20.26)**	(8.66)**	(9.15)**	(9.59)**
RFDIPC	3.611	155.395	695.664	677.564	-94.615
	(1.91)*	(1.89)*	(4.69)**	(4.52)**	(0.69)
HWPC	-1.290	-20.201	-14.818	-5.658	322.715
	(0.07)	(1.07)	(0.72)	(0.28)	(2.76)**
AGRSHARE	-0.367	-0.436	-0.520	-0.513	-0.840
	(2.05)**	(2.27)**	(2.07)**	(2.02)**	(1.91)
INDSHARE	-0.111	-0.552	-0.302	-0.366	0.470
	(0.50)	(2.42)**	(1.20)	(1.45)	(0.78)
SOESHARE	-0.276	-0.400	-0.167	-0.148	-0.812
	(1.86)*	(2.55)**	(0.72)	(0.63)	(2.08)**
UCSHARE	-1.257	-0.642	-0.419	-0.443	-1.601
	(7.64)**	(2.98)**	(1.81)*	(1.89)*	(3.16)**
FDITYPE			-0.022		
			(1.96)		
Province Specific Slopes	None	RFDIPC	RFDIPC	RFDIPC	RFDIPC
Sample Period	1986-2001	1986-2001	1995-2001	1995-2001	1986-1994
Observations	430	430	185	185	238
R-squared	0.98	0.99	0.99	0.99	0.97

All estimations include province and year specific fixed effects. Absolute value of t-statistics in parentheses

** significant at 5% level; * significant at 10% level

Table 4
Dependent Variable: ln(WU)

	(1)	(2)	(3)	(4)	(5)
Ln(U/Y)	0.005	-0.070	-0.254	-0.250	-0.062
	(0.14)	(1.98)**	(3.64)**	(3.52)**	(1.18)
RGDPPC	.00010	.00007	.00005	.00005	.00016
	(21.85)**	(13.07)**	(6.93)**	(6.72)**	(7.72)**
RFDIPC	5.209	114.427	257.778	283.183	146.413
	(2.49)**	(1.36)	(1.49)	(1.62)	(1.14)
HWPC	33.145	13.066	-4.518	-15.243	338.823
	(1.58)	(0.68)	(0.19)	(0.65)	(3.05)**
AGRSHARE	-0.364	-0.224	-0.338	-0.338	-0.237
	(1.89)*	(1.14)	(1.14)	(1.12)	(0.58)
INDSHARE	0.139	-0.033	0.009	0.096	0.680
	(0.59)	(0.14)	(0.03)	(0.32)	(1.17)
SOESHARE	-0.718	-0.709	-0.375	-0.369	-0.746
	(4.55)**	(4.45)**	(1.40)	(1.36)	(2.04)**
UCSHARE	-0.939	-0.326	0.024	0.066	-1.013
	(5.34)**	(1.48)	(0.09)	(0.24)	(2.10)**
FDITYPE			0.028		
			(2.22)**		
Province Specific Slopes	None	RFDIPC	RFDIPC	RFDIPC	RFDIPC
Sample Period	1986-2001	1986-2001	1995-2001	1995-2001	1986-1994
Observations	430	430	185	185	238
R-squared	0.97	0.98	0.99	0.99	0.97

All estimations include province and year specific fixed effects. Absolute value of t-statistics in parentheses

** significant at 5% level; * significant at 10% level

Table 5
Pooled OLS Estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(WP)	ln(WS)	ln(WU)	ln(WP)	ln(WS)	ln(WU)
ln(S/U)	-0.232			-0.333		
	(17.06)**			(14.06)**		
ln(S/Y)		-0.022			-0.049	
		(1.20)			(1.61)	
ln(U/Y)			-0.248			-0.246
			(15.03)**			(8.48)**
RGDPPC	-0.00000	.00013	.00012	-0.00000	.00013	.00012
	(0.47)	(26.98)**	(19.34)**	(0.34)	(22.33)**	(16.52)**
RFDIPC	10.168	1.317	-9.937	10.990	5.307	-8.506
	(3.86)**	(0.59)	(3.61)**	(3.33)**	(1.85)*	(2.34)**
HWPC	-4.724	70.734	98.904	-35.480	35.129	58.691
	(0.41)	(7.46)**	(7.82)**	(1.65)*	(2.08)**	(2.22)**
AGRSHARE	-0.432	-0.026	-0.173	-0.417	-0.102	0.132
	(2.60)**	(0.18)	(0.93)	(1.84)*	(0.51)	(0.49)
INDSHARE	-0.894	-0.193	0.118	-0.898	-0.583	0.470
	(3.68)**	(0.93)	(0.44)	(2.56)**	(1.97)**	(1.18)
SOESHARE	0.167	-0.936	-0.515	0.064	-0.771	-0.397
	(1.02)	(6.35)**	(2.88)**	(0.34)	(4.21)**	(1.70)*
UCSHARE	0.015	-1.103	-1.226	0.045	-0.584	-0.977
	(0.07)	(5.85)**	(5.30)**	(0.13)	(2.00)**	(2.62)**
FDITYPE				-0.058	0.018	0.066
				(3.62)**	(1.31)	(3.72)**
Constant	-0.048	7.919	7.261	0.099	7.903	6.796
	(0.19)	(36.36)**	(28.32)**	(0.32)	(26.62)**	(19.70)**
Sample Period	1986-2001	1986-2001	1986-2001	1995-2001	1995-2001	1995-2001
Observations	430	430	430	236	236	236
R-squared	0.82	0.96	0.89	0.73	0.94	0.90

Time dummies are included in each estimation. Absolute value of t-statistics in parentheses

** significant at 5% level; * significant at 10% level