Foreign Direct Investment and Relative Wages: The Case of China*

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I. Introduction

Many studies using micro data from the 1980s have found that China's urban wage structure was extremely compressed (Byron and Manaloto, 1990, Knight and Song, 1991, Zhao 1997 and Liu, 1998). There is indication that returns to education have gone up in the 1990s compared to the 1980s (Zhao et al., 1999 and Li, 2000). The rise of skill premium paralleled the growth of foreign direct investment (FDI) in China. From 1979, the first year of legalizing foreign direct investment, to 1989, annual flow of FDI averaged 1.3 billion US dollars; from 1990 to 1998, the annual flow increased to 27.8 billion (calculated from SSB 1999, p594).

Could foreign investment influence wage structure in host countries? There is a small but growing literature on the relationship between FDI and host country wage structure. Aitken et al. (1996) and Feliciano and Lipsey (1998), using data from the United States, Mexico and Venezuela, find that foreign-owned establishments pay higher wages than domestic ones after controlling for other factors, which may potentially have the effect of bringing up the overall wage level in host countries. Using state-level data from Mexico, Feenstra and Hanson (1995) find empirical evidence that the growth of FDI

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is positively correlated with relative wages of skilled labor in Mexico. The authors attributed this effect to increased demand for skilled labor due to skill-biased technology brought in by foreign companies seeking outsourcing.

Instead of directly testing whether FDI has contributed to rising relative wages of skilled labor in China, this paper intends to provide an alternative explanation to the correlation between FDI and relative wages. We argue that, in an economy with institutional segmentation in the labor market, FDI could increase relative wages of skilled labor even without bringing in skill-biased technology. In economies characterized by "dual economy," the population is divided into a privileged sector and an unprivileged sector. While more educated people can easily join the privileged sector, less skilled workers stay behind, leaving the unprivileged sector with largely unskilled work force. As foreign investors come into a country, unskilled workers can easily be hired from the unprivileged sector at lower wages than in the privileged sector, but skilled workers have to come from the privileged sector. However, to entice skilled workers to leave the privileged sector, higher compensation must be offered. Thus foreign firms pay higher relative wages to skilled workers even though foreign firms face the same technological constraint as domestic firms in the privileged sector.

In the empirical part of the paper, we use micro data from urban China to examine relative wages in the state-owned enterprises (SOEs) and foreign-funded enterprises (FIEs) taking into consideration of employment choice between the two sectors by workers of different skill levels. Empirical results are consistent with the assumption that labor market is segmented in China and support our hypothesis that FIEs pay relatively more to skilled labor because skilled workers are more expensive for FIEs. Earnings differentials are then shown to be the most important determinant of sector choice, but mobility costs also play a role.

The paper is structured as follows. Sector II develops a simple-minded economic framework to illustrate the choice of employment of workers and the resulted static equilibrium of relative wages in SOEs and FIEs. Section III presents the empirical strategy and describes the data. Section IV presents estimation results of wage equations, focusing on returns to schooling in SOEs and FIEs. Section V presents structural and reduced form model of employment choice between SOEs and FIEs. Conclusions and discussions are presented in Section VI.

II. A simple analytical framework

Prior to the economic reform, China displayed a sharp feature of a dual economy characterized by large urban-rural sectoral income differentials and barriers to entry into the urban sector (Putterman 1992). The segmentation continued well into the 1990s. Workers in SOEs, the dominating sector of urban employment, enjoyed higher earnings over those in the non-state sector due to government support and protection (Putterman 1992).

To simply the discussion, let us suppose that there exist two types of workers, skilled and unskilled, and two sectors in the economy, state and non-state. The labor market segmentation is characterized as wage advantage for the state sector for both skilled and unskilled workers.

$$W_H^S > W_H^N$$

$$W_L^S > W_L^N$$

where superscripts S and N denote the state and the non-state sector respectively and subscripts H and L denote skilled and unskilled workers respectively.

Under sectoral labor market segregation, education, especially university education, served as a device overcoming the entry barriers (Zhao 1997). As a result of the education-selective labor mobility, coupled with under-investment in rural education, a large imbalance in education levels emerged between rural and urban areas (Knight and Song 1996). Almost all college graduates from rural families joined the urban sector. Within the urban sector, workers with advanced degrees faced much less entry barriers to SOE employment.

Equilibrium wage rates paid by FIEs in relation to those in SOEs can be illustrated by the choice of employment by unskilled and skilled workers given market supply of workers in each category.

Unskilled workers

The supply of unskilled workers is plentiful in China, not only in rural areas, but also in urban areas. Although the majority of workers with urban resident status work for the state sector, rural migrants have increasingly become available to non-state sector employment since the mid-1980s. Rural migrants are predominantly junior high school or primary school graduates (Zhao 1999). Reservation wages are low for migrant workers because income levels in rural areas are much lower than in urban areas. Urban discrimination toward migrant workers makes the higher paying SOE employment inaccessible to rural migrants. Existing SOE institutions make it impossible for SOEs to replace high cost incumbent workers by cheaper migrant labor. SOE workers themselves, while receiving higher payments in SOEs, certainly do not have an incentive to shift to lower-paying employment in FIEs. As a result, the wage gap between SOEs and FIEs prevails for unskilled workers:

$$W_L^F < W_L^S \tag{2.1}$$

Skilled workers

Because skilled workers are concentrated in SOEs, foreign investors must recruit skilled workers mainly from SOEs or compete for new workers with SOEs. A skilled worker chooses to work in a foreign firm only if the earnings premium in the foreign sector outweighs the cost of shifting employment (C), with earnings including both wages and non-wage benefits and the cost being zero for new labor market entrants:

$$W_H^F > W_H^S + C$$

The mobility cost may include non-portable pension and housing benefits promised to SOE workers redeemable in a future date. There may also be other costs of shifting employment imposed on skilled workers by SOEs. For example, SOEs often request university graduates to sign contracts agreeing to serve a certain number of years.[1] Even after the expiration of the contracts, SOEs often use other administrative means to stop skilled workers from departing.

The concentration of skilled workers in SOEs and the existence of mobility cost together make skilled workers more expensive to FIEs than SOEs:

$$W_H^F > W_H^S \tag{2.2}$$

[1] The leverage often used is the promise of urban resident status. Generally speaking, only state units have access to urban resident quotas assigned by the government. This benefit is especially attractive to new college graduates whose parents live in other cities.

Inequalities (1) and (2) can be combined to become

$$\frac{W_H^F}{W_L^F} > \frac{W_H^S}{W_L^S}, \tag{2.3}$$

or, relative wages for skilled workers are higher in foreign funded firms than in SOEs. Notice that this inequality is derived without invoking assumptions on technological differences between SOEs and foreign firms.

If skill-biased technological change is the sole explanation of rising relative wages in a host country, then we are expected to observe an overall increase in relative wages because the technological change results in a larger relative demand for skilled labor in the country. Our segmentation hypothesis also predicts rising relative wages in the host country in the presence of foreign investment simply because higher wages for skilled workers in the foreign sector raise the average wages of skilled labor. One thing that our hypothesis predicts but the skill-biased technology theory does not is a wider skill wage gap in the foreign invested sector than in the privileged sector of the domestic economy. The empirical part of the paper will use household survey data to provide support to this hypothesis.

III. Empirical model and data

Following Lee (1978), we assume that wages in the two sectors of interest are determined as follows:

$$\ln W_{si} = \theta_{s0} + \theta_{s1} X_{si} + \theta_{s2} R_{si} + \theta_{s3} Z_{si} + \varepsilon_{si} \tag{3.1}$$

$$\ln W_{fi} = \theta_{f0} + \theta_{f1} X_{fi} + \theta_{f2} R_{si} + \theta_{s3} Z_{fi} + \varepsilon_{fi} \tag{3.2}$$

where subscripts s and f denote the state and foreign-invested sectors, respectively, W_i

denotes total wages from working in the corresponding sector for individual i, including bonuses, subsidies and non-wage benefits, X_i is a vector of personal characteristics including gender, education and work experiences, R_i is a vector of regional dummy variables controlling for regional differences in wage levels, Z_i is a vector of dummy variables controlling for industry wage differences, and ε_s, ε_f are random residuals which are assumed to be normally distributed with zero means.

Equations (3.1) and (3.2) may be estimated independently using OLS regression method if the assignment of sector of employment is random. However, as the analytical framework outlined in Section II shows, such may not be the case. In general, there is a two-way selection process involved in any employment outcome. First of all, a worker makes a choice based on his or her preferences and personal constraints. In our case, we assume that a worker prefers to work in the foreign firms if the expected wage gain is higher than the cost of shifting employment. The transition costs vary by individuals. A younger worker may face less transition cost because the accumulated future benefits from SOEs are less—She has contributed fewer years into the pension program and work unit housing is generally allocated according to seniority. Given other things, more educated people may face higher transition cost because SOEs are less willing to let them go. If a worker does not expect to receive work unit housing, then he is less constrained by SOE employment. On the other hand, employment in SOEs may provide the benefit of a flexible work schedule, so parents with young children may value SOE employment more given wage differences. The second part of the selection involves the selection by employers. When there is excess demand for employment in one sector, the sector may use non-price rationing and rely on personal and family characteristics to determine admission into the sector. The availability of the preferred sector employment may also differ across geographical regions.

The selection process described above can be summarized as follows. A worker will join a foreign firm if the expected percentage wage differential is higher than a function of the individual, household and community characteristics:[2]

$$\frac{W_{fi}-W_{si}}{W_{si}} \approx \ln W_{fi} - \ln W_{si} > \gamma_1 + \gamma_2 X_i + \gamma_3 D_i + \gamma_4 R_i + \varepsilon_i \tag{3.3}$$

where X_i is a vector of individual characteristics (gender, education and work experiences) influencing receptivity of the worker in the preferred sector as well as costs of employment transition, R_i is a vector of regional dummy variables that control for the availability of FIE employment, D_i is a vector of variables that do not affect wages but affect employment choice (including whether the worker is eligible for work unit housing and whether the worker needs flexible work schedule for the care of children), and ε_i is a random residual assumed to be normally distributed with zero mean.

Following Lee (1978) and write this criterion in Inequality (3.3) in the form of a probit model: if $I_i^* > 0$ worker i is in the foreign sector, otherwise not, where

$$I_i^* = \delta_0 + \delta_1(\ln W_{fi} - \ln W_{si}) + \delta_2 X_i + \delta_3 D_i + \delta_4 R_i - \varepsilon_i\,. \tag{3.4}$$

Equations (3.1), (3.2) and (3.4) constitute a simultaneous equation system. In this model, estimating wage equations (3.1) and (3.2) by conventional OLS regression method may lead to estimation bias because, conditional on the selection rule in (3.4), the expected values of error terms in (3.1) and (3.2) may not be zero:

[2] We will construct the empirical model under the assumption that foreign firms are the preferred sector, but this assumption does not affect empirical results.

$$E(\varepsilon_f \mid I_i = 1) \neq 0 \text{ and } E(\varepsilon_s \mid I_i = 0) \neq 0$$

Wages equations (3.1) and (3.2) can be consistently estimated by a two-step procedure described in Lee (1978) and Heckman (1979). The first step is to substitute wage equations (3.1) and (3.2) into (3.3) to obtain a reduced form probit model:

$$I_i^* = \alpha_0 + \alpha_1 X_i + \alpha_2 D_i + \alpha_3 R_i + \alpha_4 Z_i - \varepsilon_i^* \tag{3.4}$$

where $\varepsilon_i^* = \varepsilon_i - \delta_1(\varepsilon_{si} - \varepsilon_{fi})$ is assumed to be normally distributed (XXX check Rosen and Willis).

Conditional on FIE employment, the FIE wage equation is written as (XXX check Heckman)

$$\ln W_{fi} = \theta_{f0} + \theta_{f1} X_{fi} + \theta_{f2} R_{si} + \theta_{s3} Z_{fi} + \theta_{f4}\left(\frac{f(\Psi\ )}{1 - F(\Psi_i)}\right) + \eta_{fi} \tag{3.5}$$

where $E(\eta_f \mid I_i = 1) = 0$, Y= (XXX), F is the cumulative distribution function of a standard normal random variable and f is its density function. Conditional on FIE employment, the FIE wage equation is

$$\ln W_{si} = \theta_{s0} + \theta_{s1} X_{si} + \theta_{s2} R_{si} + \theta_{s3} Z_{si} + \theta_{s4}\left(\frac{f(\Psi\ )}{F(\Psi_i)}\right) + \eta_{si} \tag{3.6}$$

where $E(\eta_s \mid I_i = 0) = 0$.

Empirical work is based on a 1996 household survey of 4,798 urban registered households in six provinces.[3] For our purpose, we selected all workers in the state sector and foreign-funded enterprises (including funds from Hong Kong, Macao and Taiwan) but excluded those in the government. We call the state employees SOEs although some

[3] The six provinces are Liaoning, Zhejiang, Hubei, Guangdong, Sichuan and Gansu.

of them may not be for-profit enterprises. The total number of valid observations is 5533, of which 3.5% are employed in FIEs.[4]

Table 1 presents basic statistics of the sample. As is shown, workers in FIEs are about five years younger than in SOEs. Total years of work experience among FIE workers are also five years fewer, which means that two groups of workers entered the work force at about the same age. However, FIE workers have about seven years fewer years of work experience in the current industry, implying that many workers in FIEs probably shifted employment from SOEs. We also notice that there are more male workers in SOEs than in FIEs (53.3% vs. 47.9%). Looking at education, we see that years of schooling are nearly identical between the two sectors: 11.4 years for SOEs and 11.5 for FIEs. There is some difference in levels of education. SOEs have more junior high school graduates (29.6% vs. 20.7% in FIEs) and college graduates (8.7% vs. 6.4% in FIEs), but FIEs hire more senior high school graduates (34.6% vs. 28.6% in SOEs) and graduates of advanced technical schools (20.2% vs. 15.6% in SOEs). The last row of the table presents crude averages of annual wages in the two sectors. It is shown that average wages in FIEs are more than in SOEs.[5]

Table 2 gives an idea of the industry structure of workers in SOEs and FIEs. As is shown, manufacturing and commerce are the two largest industries in our sample. The concentration is more profound for FIE workers with the two industries totaling 82.3% of all workers than for SOE workers where the share was 56.2%. The reason for the industry

[4] According to national statistics (SSB 1999, p136), of all urban workers in the state sector (including government) and foreign-funded enterprises (including those from Hong Kong, Macao and Taiwan), the share of foreign sector employment was 5.6%, higher than the share in our sample. This is probably because coastal provinces are under-represented in our sample. This problem does not hurt our analysis, however, as we do not claim that the results represent the whole country.

concentration in FIEs is probably because of state monopoly over industries such as education, news media, transportation, communication, health care, etc. as well as the existence of non-profit organizations such as social welfare, education and research.

IV. Wage equations estimates

Estimation results of wage equations for workers in SOEs are presented in Tables 3. Table 4 presents results for workers in FIEs. Two sets of equations are presented—one with sample selectivity adjusted and one unadjusted. In each case, two models are estimated: one with schooling as continuous variable and the other discrete levels of schooling are used.

We first look at the issue of selectivity. In Table 3 we find that the selectivity term is not statistically significant in the model with schooling as a continuous variable (Model III); it is, however, significant at 10 percent significance level in the regression model with discrete schooling variables (Model IV). Therefore, we reject the null hypotheses that there is selection bias in Model III but not in Model IV. When there is selection bias, selectivity corrected OLS estimates are unbiased but inefficient due to heteroscedasticity, thus heteroscedasticity-consistent standard errors are presented in Model IV following a procedure proposed in Heckman (1979). The selectivity does not seem to bias estimation of wage equation for workers FIEs—the selectivity term is statistically insignificant in both models of continuous and discrete schooling variables.

Because selectivity does not bias OLS results in wage equations with continuous schooling variable for workers in both SOEs and FIEs, we look at Model I of Tables 3 and 4 for a discussion of returns to schooling. As is shown, the schooling coefficient is

[5] Wages include bonuses and cash subsidies.

0.042 in Table 3, meaning that an additional year of schooling increases wages in SOEs by 4.1%. But Model I of Table 4 shows that an additional year of schooling increases wages in FIEs by 7.9%, nearly doubling the rate in SOEs.

Because sample selection biases OLS estimated for regression with discrete schooling variables in SOEs but not in FIEs, we look at Model IV in Table 3 and Model II in Table 4 to compare returns to different levels of schooling in the two sectors. We observe that education at the levels of senior high school and advanced technical school receives much higher returns in FIEs than in SOEs. Compared to the reference group of illiterate and primary school graduates and given other things, high school graduates receive 33.4% higher wages in FIEs and 13.5% in SOEs; advanced technical school graduates received 44.8% higher wages in FIEs and only 30.0% in SOEs. As is expected, university education is much better rewarded in FIEs than in SOEs. Compared to the illiterate and primary school graduates, those with college degree or higher receive 86.0% more wages in FIEs, near doubling the returns to college education of 43.2% in SOEs.

Table 5 presents projected wage differential between FIEs and SOEs for all workers and by gender and education levels. Wage equations with discrete education levels are used for the wage projection. Because of the existence of selection bias in SOEs, we use Model IV of Table 3 for the SOE sector. Because selection does not bias wage estimation in FIEs, we use Model II of Table 4 for the FIE sector. The projected wage for a certain worker is derived by plugging back values of the worker's individual characteristics back into the regression models of choice. These are hypothetical earnings representing what a worker would earn if he or she worked in each sector. Mean values are then taken of all workers in the sample to obtain estimates of all workers. Mean values by gender are averaged by gender, and those by educational levels averaged by levels of education. Projected wages in each sector and wage differential between the two sectors are presented in Table 5.

Before examining the figures it should be pointed out that due to the existence of non-wage benefits, wages do not equal total earnings and thus wage differentials do not equal earnings differentials. Using the same data set supplemented with aggregate statistics in 1996, Zhao and Xu (2000) estimate that annualized difference in non-wage benefits including pension, housing and medical care were equivalent to 5985.3 yuan in favor of SOEs for an unskilled worker who had been assigned or expected to receive public housing. According to Table 5, for workers of equal characteristics in both sectors, the average wage differential was 4456.4 yuan in favor of FIEs, but the differentials vary widely among people of different characteristics.

We first note that given other characteristics, the average wage for male workers is 5009.1 yuan higher in FIEs than in SOEs; the differential is only 3829.7 yuan for female, 23.5% less than for male. Looking at wage differential by education, we see that the higher the education is, the higher the wage differential. The illiterate would earn a wage that is 3219.2 yuan more in FIEs than in SOEs. Primary school graduates would earn 2732.8 yuan more; junior high school graduates 2511.0 yuan. Taking into account of the aforementioned non-wage benefits that SOEs workers uniformly enjoy but unskilled workers in FIEs usually do not, total earnings for workers with junior high school education or less are certainly lower in FIEs than in SOEs, thus giving low skilled workers overall earnings premium in SOEs.

FIEs seem to be more attractive for workers who graduated from senior high school or advanced technical schools. The wage advantage for workers with senior high school is 5238.0 yuan and for advanced technical school is 5213.6 yuan. However, the wage advantage may have been largely, if not all, offset by differences in non-wage benefits. Middle technical school graduates seem to get better deals in SOEs than in FIEs because the wage advantage in FIEs (2528.3 yuan) is certainly less than non-wage disadvantage in FIEs.

The most striking earnings differential is for people with college degree or above. The wage premium is 10844.4 yuan in favor of FIEs. We do not have an estimation of SOE advantage in non-wage benefits for college graduates, but it is likely to be much smaller than the aforementioned figure for unskilled workers. Skilled workers in FIEs are usually offered with more generous benefits than unskilled workers.

To summarize, empirical results confirms that total earnings for college graduates are much more in FIEs than in SOEs, and the reverse if true for unskilled workers.

V. Estimation results of employment choice

Given projected earning differentials we can now estimate the structural form sector selection model specified in Equation (1) of Section III. Such estimation would tell us whether earnings differentials are indeed an important consideration in the choice of employment as we have assumed it to be. To prepare for interpretation of estimation results of sector selection models, we first present means of variables used in the models (Table 6).

Maximum likelihood estimates of the structural form probit model of employment status in foreign-funded firms are presented in Table 7. Two models are presented. Model

I uses discrete schooling variables whereas Model II uses a continuous schooling variable. Wage differential is represented as ($\ln \hat{W}_f - \ln \hat{W}_s$), an approximation of percentage wage advantage of FIEs over SOEs, $(\hat{W}_f - \hat{W}_s)/\hat{W}_s$. It is clear that wage differential between FIEs and SOEs is the most powerful determinant of employment status. Increasing the percentage wage advantage by 1 percentage point increases the probability of employment in FIEs by 1.36 percentage points according to Model I and 1.63 percentage points according to Model II. Since average probability of employment in FIEs is only 3.5 percent in the sample, this effect represents a near doubling of the probability.

Given expected earnings differential, gender does not seem to be important in determining the sector of work. Age is important: younger workers are more likely to work in FIEs. This may be due to two reasons: First, institutional constraints in SOEs make dismissing workers more difficult than in FIEs, thus more older workers are accumulated in SOEs. Second, the phenomenon is consistent with our hypothesis that younger workers face less mobility cost. Younger workers have relatively less to lose facing non-portable social security benefits.

Table 7 also tells us that given earnings differentials, more educated workers are less likely to select to work in FIEs or be selected into FIEs. Evaluating the effect at mean values, one additional year of schooling reduces the probability of FIE employment by 0.06 percentage points. If we compare the probability of being selected into FIEs with people with primary school education or less, the probability for a senior high school to be selected into FIE is 0.86 percentage points lower; 0.66 percentage points lower for advanced technical schools and 1.11 percentage points lower for college graduates. The negative effect of schooling may also be due to a few factors: One, it is possible that more educated people are more likely to take important positions in SOEs than less educated ones and receive more non-wage and non-pecuniary earnings. Second, more educated workers may face higher mobility cost than less educated workers because SOEs are less willing to let more educated workers leave.

In Table 8, the net effects of various factors on employment status are presented as reduced form probit model. The results summarize cost-benefit considerations of individual workers and selectiveness of firms. According to estimation results from wage equations (Tables 3 and 4), returns to education are higher in FIEs than in SOEs. The higher returns will induce workers in to FIEs. However, selectivity results (Tables 7) show that controlling for earnings difference, SOEs select more educated workers. The net effect is that the more educated workers work in the SOEs, but the effect is statistically insignificant. While SOEs select older workers given earnings differential and work experience has higher returns in FIEs, the net effect is that older workers tend to be in SOEs.

VI. Conclusions and discussions

In this paper we investigate a mechanism through which foreign direct investment may affect relative wages in host countries. Feenstra and Hanson (1997) suggest that FDI can raise relative wages in host countries by bringing in skill-biased technology. Here we propose an alternative explanation that applies to countries with segmented labor market. Since labor markets in many developing countries receiving FDI display features of segmentation, the explanation may be relevant outside of China as well.

Under labor market segmentation in China, education is used to access the privileged sector—the state-sector. As a result, unskilled workers are abundant in unprivileged or informal sector, but skilled workers are concentrated in the privileged or formal sector. Consequently, as the third sector in the economy, foreign firms can readily hire unskilled labor from the unprivileged sector at lower cost, but have to offer skilled labor better deals than in the privileged sector, thus raising relative wages of skilled labor.

Using micro data from urban household survey, we are able to estimate relative wages of skilled workers in both foreign sector and the privileged sector—SOEs in China. We do so by examining the interaction between sector choice and wage determination using simultaneous equations model with limited dependent variables proposed in Lee (1978) and Heckman (1979). Empirical results support our hypothesis. The proportion of skilled to unskilled workers is similar between FIEs and SOEs, implying that FIEs do not necessarily employ more skilled labor than domestic firms, as skill-biased technology theory would suggest. While FIEs seem to pay higher enumeration than domestic firms, which is consistent with the findings of Aitken et al. (1996) in Mexico and Venezuela, the premiums are unevenly distributed among workers of different educational levels. Less educated workers earn significantly less in FIEs than in SOEs but more educated workers earn significantly more in FIEs than in SOEs. These results indicate that significant labor market segmentation exists in China, at least in 1996, our year of data, and the mere entry of foreign firms automatically raises returns to schooling regardless of whether technology is skill-biased or not.

Our results also indicate that skilled workers are very expensive for non-state firms in China. Facing high cost of skilled labor, domestic private enterprises of China often choose a technology to minimize the use of college graduates.[6] Thus in the absence of competition for skilled labor from foreign firms, the state sector is monopsony of skilled labor and is able to practice the compression of wage so that education receives low returns. In the absence of competition for skilled workers, as long as the absolute earnings are higher in SOEs, skilled workers have no choice but to stay in the sector. The market entry of the foreign sector brings competition for skilled labor. Results from sector choice model show that earnings differential does act as an important incentive drawing skilled workers away from SOEs into FIEs. This implies that SOEs may eventually be forced to raise returns to schooling to retain skilled work force. This may have already occurred, but to confirm it would require panel data and is beyond the scope of this paper. Our results also show that at least in 1996, the year of the survey, given wage differential, more educated workers are selected into the state sector. This may imply the existence of significant mobility costs for skilled workers, or that there are unaccounted non-wage benefits favoring more educated workers. Further empirical research is needed before an answer can be given.

Finally, our study implies that FDI may induce more investment in education in China. Under state monopsony of skilled labor force, monetary incentive for schooling mainly comes from the improved access to state-sector employment. By paying substantial premium for education, foreign-funded firms inject new incentives for skills upgrading. Although the foreign sector may still be too small in the Chinese economy to have significant impact on education attainment, the effect is expected to be much more significant after China joins WTO.

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[6] In our data, only 2 percent of workers in domestic private enterprises have college education.

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Table 1. Descriptive statistics

	SOEs	FIEs
Sample distribution	3268	178
Age	39.3	35.2
	(8.8)	(10.5)
Male (%)	52.8	46.1
Years of schooling (year)	10.9	11.4
	(2.2)	(2.4)
Illiterate (%)	0.1	1.1
Primary school (%)	4.7	3.4
Junior high school (%)	35.8	21.3
Senior high school (%)	31.7	34.8
Middle technical school (%)	10.3	140
Advanced technical school (%)	13.2	19.7
College or above	4.1	5.6
Work experience (year)	20.6	15.3
	(9.5)	(11.2)
Tenure at current industry (year)	17.9	10.9
	(9.7)	(10.3)
Annual wages (yuan)	7626.4	11649.3
	(4570.7)	(8108.2)

In the parentheses are standard deviations.
Source: survey.

Table 2. Industry structure of workers (%)

	Original sample		Adjusted sample	
Industry	SOEs	FIEs	SOEs	FIEs
Agriculture and water conservancy	1.0	0.5	0.0	0.0
Manufacture	40.8	55.7		
Geological survey	1.1	0.0	0.0	0.0
Construction	5.0	0.0	0.0	0.0
Transportation and communication	7.7	1.6	0.0	0.0
Commerce	15.4	26.6		
Real estate	4.7	7.3		
Health, sport and social welfare	5.9	0.0	0.0	0.0
Education, arts and news media	11.1	1.6	0.0	0.0
Research	4.5	0.0	0.0	0.0
Finance	2.3	2.1	0.0	0.0
Other	0.5	4.7		
All	100	100		

Source: survey.

Table 3. Wage equations for Workers in State-Owned Enterprises
Dependent variable: ln(annual wage)

	Selectivity unadjusted				Selectivity adjusted			
	Model I: Continuous Schooling		Model II: Discrete Schooling		Model III: Continuous Schooling		Model IV: Discrete Schooling	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error[a]	Coefficient	Standard Error[a]
Intercept	7.727*	0.097	8.109 *	0.090	7.485*	0.652	8.300*	0.557
Male	0.121*	0.014	0.123*	0.014	0.144**	0.073	0.166**	0.071
Work experience	0.049*	0.003	0.049*	0.003	0.059*	0.013	0.056*	0.013
Work experience squared	-0.001*	0.000	-0.001*	0.000	-0.001	0.012	-0.001	0.013
Tenure at current industry	0.006*	0.001	0.006*	0.001	0.001	0.020	0.007	0.100
Years of schooling	0.042*	0.003	-	-	0.086	0.136	-	-
Senior high school	-	-	0.063 *	0.017	-	-	0.329**	0.170
Middle technical school	-	-	0.167 *	0.022	-	-	0.193	0.152
Advanced technical school or above	-	-	0.270*	0.019	-	-	0.551*	0.134
Province dummies	Yes		Yes		Yes		Yes	
Industry dummies	yes		Yes		Yes		Yes	
Selectivity	-	-	-	-	-0.230	0.441	-0.095	0.453
Obs	5345		5345		5345		5345	
Adj R-sq	0.382		0.385		0.290		0.289	

a: Standard errors adjusted for heteroscedasticity.
*, **, ***: Coefficient different from zero at 1, 5 and 10 percent significance levels, respectively.

Table 4. Wage equations for Workers in Foreign-Invested Enterprises
Dependent variable: ln(annual wage)

	Selectivity unadjusted				Selectivity adjusted			
	Model I: Continuous Schooling		Model II: Discrete Schooling		Model III: Continuous Schooling		Model IV: Discrete Schooling	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error[a]	Coefficient	Standard Error[a]
Intercept	7.791*	0.289	8.408*	0.226	6.937*	0.689	7.762*	0.712
Male	0.152**	0.074	0.169**	0.073	0.139***	0.074	0.145**	0.074
Work experience	0.062*	0.012	0.057*	0.012	0.052*	0.014	0.050*	0.014
Work experience squared	-0.001*	0.000	-0.001*	0.000	-0.001*	0.000	-0.001*	0.000
Industry experience	0.007	0.005	0.010***	0.006	0.007	0.005	0.011***	0.006
Years of schooling	0.079*	0.016	-	-	0.080*	0.016		
Senior high school	-	-	0.321*	0.097	-	-	0.328***	0.177
Middle technical school	-	-	0.167	0.126	-	-	0.193	0.199
Advanced technical school	-	-	0.527*	0.106	-	-	0.461*	0.185
Province dummies	Yes		Yes		Yes		Yes	
Industry dummies	Yes		yes		yes		Yes	
Selectivity	-	-	-	-	-0.424	0.310	-0.342	0.334
Obs	188		188		188		188	
Adj R-sq	0.294		0.292		0.297		0.294	

a: Standard errors adjusted for heteroscedasticity.
*, **, ***: Coefficient different from zero at 1, 5 and 10 percent significance levels, respectively.

Table 5. Projected annual wages and wage differentials in the sample, 1996. Unit: yuan

	Selectivity unadjusted			Selectivity adjusted		
	SOE	FIE	FIE-SOE	SOE	FIE	FIE-SOE
All	7351.6	11167.6	3816.0.7	7326.1	9064.3	1738.3
By sex						
Male	7910.4	12215.6	4305.6	7884.4	9871.2	1986.8
Female	6718.0	9978.9	3260.9	6693.1	8149.5	1456.4
By education						
Junior high school or less	6747.7	9259.0	2511.4	6726.4	7187.1	460.7
Senior high school	6569.9	11865.3	5295.4	6542.5	9328.5	2786.0
Middle technical school	7907.0	10554.0	2647.0	7880.5	8211.9	331.4
Advanced technical school or above	8794.2	15231.5	5437.2	8765.7	11784.3	3018.7

Table 6. Variables used in probit models.

	Definition	Mean
FIE	Dependent variable: 1 if FIE employment; 0 if SOE employment	0.034
Male	Dummy variable. Reference group: female workers	0.531
Work experience	Total years of work experience	20.396
Tenure at current industry	Total years working at the current industry	17.626
Senior high school	Dummy variable. Reference: illiterate or primary school	0.288
Middle technical school	Dummy variable. Reference: illiterate or primary school	0.134
Advanced technical school or above	Dummy variable. Reference: illiterate or primary school	0.244
Spouse Housing	Dummy variable: 1 if spouse has public housing. Reference: Spouse does not have pubic housing	0.299
Number of children	Number of children under 18	0.622
$\ln \hat{W}_f - \ln \hat{W}_s$	Difference of logarithm of fitted wages projected from regression equations with selectivity adjusted	0.230

Table 7. The structural form probit estimates of foreign firm employment status equation
Dependent variable: employment in foreign firm=1; else=0

	Model I: Discrete Schooling			Model II: Continuous Schooling			
Independent variable	Coefficients Estimate	Standard error	Marginal Effect on probability	Coefficients Estimate	Standard error	Marginal Effect on probability	Definition of marginal effect
Intercept	-3.872	0.586	-	-7.781*	0.794	-	
Male	-0.165***	0.089	-0.0009	-0.048	0.122	-0.0013	Reference: female
Work experience	0.220*	0.006	0.0017	0.047*	0.009	-0.0032	Ten years above mean vs. mean
Tenure at current industry	-0.052*	0.007	-0.0014	-0.038*	0.009	0.0026	Ten years above mean vs. mean
Years of schooling	-	-	-	-0.274*	0.031	-0.0011	One year above mean vs. mean
Senior high school	-1.193*	0.137	-0.0089	-	-	-	Reference: junior high or less
Middle technical school	0.271***	0.142	0.0092	-	-	-	Reference: junior high or less
Advanced technical school or above	-1.049*	0.140	-0.0088	-	-	-	Reference: junior high or less
Spouse Housing	0.264*	0.095	0.0044	0.456*	0.131	0.0028	Reference: no spouse or spouse has no work unit housing
Number of children	-0.361*	0.085	-0.0024	-0.649*	0.122	-0.0046	One child vs. no child
$\ln \hat{W}_f - \ln \hat{W}_s$	4.933 *	0.279	0.0003	7.158*	0.373	0.0004	One percentage point above mean vs. mean
Provincial dummy variables	Yes			Yes			
Industry dummy variables	No			No			
Log likelihood	-506.877			-273.180			
Number of obs.	5533			5533			
Number in FIEs	188			188			

*, **: Coefficient different from zero at 1, 5 and 10 percent significance levels, respectively.

Table 8. The reduced form probit estimates of foreign firm employment status equation
Dependent variable: employment in foreign firm=1; else=0

	Model I: Discrete Schooling			Model II: Continuous Schooling			
Independent variable	Coefficients Estimate	Standard error	Marginal Effect on probability	Coefficients Estimate	Standard error	Marginal Effect on probability	Definition of marginal effect
Intercept	-38.909	33276.28	-	39.544	33364.14	-	-
Male	-0.017	0.078	-0.0000	-0.014	0.078	-0.0000	Reference: female
Work experience	-0.005	0.005	-0.0000	-0.005	0.005	-0.0000	Ten years above mean vs. mean
Tenure at current industry	-0.030*	0.006	-0.0001	-0.030*	0.006	-0.0001	Ten years above mean vs. mean
Years of schooling	-	-	-	0.032***	0.018	0.0000	One year above mean vs. mean
Senior high school	0.121**	0.099	0.0001	-	-	-	Reference: junior high or less
Middle technical school	0.299*	0.126	0.0001	-	-	-	Reference: junior high or less
Advanced technical school or above	0.297	0.108	0.0000	-	-	-	Reference: junior high or less
Spouse Housing	0.092	0.085	0.0001	0.082	0.084	0.0001	Reference: no spouse or spouse has no work unit housing
Number of children	-0.156**	0.074	-0.0001	-0.169**	0.074	-0.0001	One child vs. no child
Provincial dummy variables	Yes			Yes			
Industry dummy variables	yes			Yes			
Log likelihood	-650.129			-653.470			
Number of obs.	5533			5533			
Number in FIEs	188			188			

*, **: Coefficient different from zero at 1, 5 and 10 percent significance levels, respectively.