Location, Market Segmentation, and Returns to Human Capital: The Privatization of China's Labor Markets

by

Yuming Fu and Stuart Gabriel

December 1999

Department of Real Estate and Urban Land Economics, University of Wisconsin, Madison, Wisconsin 53706 and Lusk Center for Real Estate, Marshall School of Business and School of Policy, Planning, and Development, University of Southern California, Los Angeles, California 90089-0626, respectively.

Paper presented at the Annual Meetings of the American Real Estate and Urban Economics Association, Boston, January 2000. The authors are indebted to David Tse and Nan Zhao for the data utilized in this study.

Location, Labor Market Segmentation, and Returns to Human Capital: The Privatization of China's Labor Market

Abstract

Recent years have witnessed significant evolution in the structure and organization of China's labor markets. While the majority of workers remain employed in public work units (state-owned enterprises and urban collectives), private sector employment in China has expanded significantly. Labor market mobility has increased as well, both between those labor market segments and across geographic areas. This study applies new micro-data from a unique survey of urban workers to assess returns to human capital and demographic characteristics among public and private labor market segments in China. The analysis controls as well for systematic variations in nominal earnings among metropolitan areas, which arise due to locational variations in nonpecuniary attributes and amenities as well as local cost of living. The analysis enables computation of quality-adjusted wage differentials between public and private labor market segments in China. Further, the study assesses the role of quality-adjusted earnings differentials, pecuniary and non-pecuniary worker benefits, worker demographic characteristics, and the like in the determination of expected worker mobility.

As expected, research findings indicate substantially higher returns to educational investment among workers in the private-sector, relative to those available to workers in the state-owned sector. Further, results indicate only limited returns to worker age and work experience among private-sector workers. Also, all things equal, female earnings remain significantly depressed relative to those of males, even in the socialized state-owned sector. The analysis also reveals the importance of controls for location-specific components of the worker compensation package.

Research findings further indicate substantial differentials in quality-adjusted earnings across labor market segments. Those differentials increase with worker educational attainment and serve to significantly elevate the prospects of worker job change. Results of the analysis suggest that damped adjustments in public sector wages and benefits would serve to promote the movement of workers to private employment, consistent with the goals of the newly-revised labor policy. As is apparent, however, such a policy would serve to advance the economic prospects of younger, highly educated, and mobile workers, at the expense of their older, less mobile counterparts.

I. Introduction

Recent years have witnessed significant evolution in the structure and organization of China's labor markets. In the wake of efforts to close numerous unprofitable state-owned enterprises, the People's Congress in 1999 passed a constitutional amendment recognizing the importance of private labor markets to Chinese economic growth.[1] Given ongoing and anticipated public sector layoffs, the government seeks to promote private job creation and with it the absorption of substantial numbers of displaced workers.

In fact, private sector employment in China has expanded rapidly over the course of recent years[2]. While over 70 percent of urban workers in China were employed in public-owned enterprises (including state-owned enterprises and urban collectives) in 1996, employment among foreign joint venture firms accounted for 6 percent, 8 percent, and 11 percent of employment in Beijing, Shanghai, and Guandong, respectively. As evidenced in Table 1, domestic private enterprises and self-employment together accounted for an additional of 10 percent of urban employment.[3] Private sector employment is expected to grow significantly in future years.

Continued privatization of urban employment faces enormous challenge. Regulatory reform is necessary in order to provide private sector access to the markets and savings essential to private job creation. Further, to facilitate labor mobility, the existing enterprise-based social security

---

[1] Premier Zhu's current three-year schedule for overhaul of the State-Owned Enterprise sector, calls for the reduction of excess capacity in a range of industries, including textiles, coal, metallurgy, petrochemicals, building materials and machine-building, the premier said. In 1999, the textile industry alone is scheduled to lay off another 12 million workers. Some 25,800 inefficient small coal mines are to be closed. Zhu has indicated that the government will also continue working to break up monopolies and encourage competition (see Lawrene [1999]).

[2] From 1990 to 1996, urban non-state sector employment growth was 5.3 percent per year, much higher than the total urban employment growth of 3 percent (China Yearbook of Labor Statistics, 1997).

[3] As of 1996, over 70% of urban workers in China were employed in public-owned work units (including state owned and urban collectives). This number was higher in Beijing (85%) and lower in Guangdong (66%). Employment was also significant among joint-stock companies; those entities were a product of state-owned enterprise (SOE) reform, and were typically large enterprises jointly owned by public entities (in our sample, 70% of the shares of the joint-stock companies were owned by SOEs and urban collective enterprises). Compared with SOEs, the joint-stock companies enjoy more discretion in their operating decisions (including wage decisions) and may be classified as semi-private sector employers.

system requires fundamental re-structuring. Analysts have focused on numerous policies to promote the transfer of surplus labor to the private sector, including government subsidization of worker retraining and separation of social welfare provision (pension, medical care and subsidized housing) from enterprise-based compensation packages (see Fan, Lunati, and O'Connor [1998] for a comprehensive review of these reforms and proposals). Despite the unmatched scope of China's labor market transition, few studies have examined the pricing of worker human capital and demographic characteristics among public and private labor market segments or prospects for labor mobility as derive therefrom. In that regard, a careful assessment of the factors governing labor compensation among public and private sectors in China would provide useful guidance in evaluating the labor market and worker mobility impacts of economic deregulation.

The dearth of analyses on labor compensation factors in China may owe in part to the limited availability of micro-data appropriate to assessment of wage variations. A number of studies seek to evaluate returns to worker educational investment in China (see, for example, Byron and Manaloto [1990], Knight and Song [1991], Meng and Kidd [1997], Johnson and Chow [1997], Liu [1998], and Sabin [1999]). For the most part, however, analyses of wage determination are limited to the use of aggregate or geographically circumscribed data. Of those studies, Liu's [1998] paper does succeed in estimating returns to education among a large, geographically diverse sample of Chinese workers; however, that analysis derives from 1980s vintage data and hence does not account for the recent emergence of private sector employment. Further, the analysis accounts only partially for spatial variation in wages without explicit attention to the theory of compensating wage variations.

This paper seeks to evaluate the determinants of returns to human capital among enterprise segments of the Chinese economy. In so doing, it focuses on four primary components of the labor market, including public-owned work units (state-owned enterprises [SOEs] and urban collective enterprises [UCEs]), mixed-ownership units (joint-stock companies [JSCs]), and private sector

firms (foreign joint ventures [FJVs]).[4] In general, we hypothesize that returns to human capital are depressed among public-owned work units (SOEs and UCEs) relative to those available in the private sector (FJVs), given the emphasis traditionally placed on equity and seniority in the Chinese communist system. We further anticipate that the estimated gap in human capital returns between the public and private sectors would be biased in the absence of controls for city level fixed effects. As shown in Gabriel and Rosenthal (1996, 1999), analyses of wage determination that omit those labor market specific attributes and cost-of-living differentials suffer from omitted variable bias, to the extent that observable worker characteristics influence both the worker's skill level and the worker's choice of city of residence. In China, a bias may also arise because of workers' choice between public and private sector employment. In particular, educated workers are more likely to switch from public to private work units in coastal cities relative to interior cities as foreign direct investment largely is concentrated in coastal cities.

These issues are explored using a unique individual-level survey of Chinese workers undertaken in 1997. Results of the analysis indicate substantially higher returns to educational investment among private-sector entities, relative to those in state-owned enterprises; the gaps remain significant after controlling for the locational fixed effects. Further, research findings suggest only limited returns to worker age and work experience among private-sector workers. Also, all things equal, female earnings remain significantly depressed relative to those of males, even in the socialized state-owned sector. Results of the analysis further indicate the importance of controls for nonpecuniary components of the worker compensation package.

The study further seeks to assess the effects of public-private earnings disparities on the likelihood of job change. To do so, we apply worker human capital characteristics and results of

[4] Joint-stock enterprises are a product of recent ownership reform experiments, whereby selected large SOEs were consolidated to form limited liability firms. In these cases, the state retains control of the entity through the state asset management bureaus; however, those enterprises are independent and autonomous in their operations in the hope that they will become more market oriented. Urban collectives traditionally were supplements to the planned economy that served to absorb urban workers not employed by state enterprises.

the earnings analyses to compute individual earnings differentials across public and private sectors and city locations. Research findings indicate substantial disparities in quality-adjusted earnings between public and private sectors; further, the earnings differential rises with worker educational attainment. Controlling for pecuniary and non-pecuniary employment benefits, worker demographic characteristics, and the like, the computed earnings differentials serve to significantly elevate the worker intention to change jobs. Results of the analysis suggest that the Chinese government—through a policy of damped adjustments to public employee compensation—may be able to accelerate the movement of workers to private employment. As indicated, however, the distributional effects of such a policy are non-neutral and would serve to advance the economic prospects of younger, highly educated workers at the expense of their older, less mobile counterparts.

The plan of the paper is as follows. The following section provides the conceptual underpinnings to the analysis and in so doing presents the econometric model and estimation procedure. In Section III, the survey data is described and the variables defined. Section IV presents results of model estimation and Section V provides concluding remarks.

II. Location, Labor Market Segmentation, and Wages

The empirical model seeks to evaluate returns to human capital across labor markets segments (state-owned enterprises, urban collectives, joint-stock enterprises, foreign joint ventures) and metropolitan areas in China. In equilibrium, a worker's compensation package is comprised of real pecuniary and nonpecuniary earnings. Pecuniary earnings are given by nominal wage receipts deflated by the labor market specific price level, whereas nonpecuniary earnings are specified in the form of worker receipt of work-related benefits as well as by location specific amenities. In a model of compensating differentials, an increase in local cost of living, a decrease in non-wage

---

Typically, these collectives were largely under the auspices of urban governments and state enterprises but operated independently. Private enterprises are sometimes registered as urban collectives as well.

employment benefits, or a decrease in local amenities should be offset by higher nominal wages Y_{ijk}, ceteris paribus. Here nominal wages are subscripted in accordance with individual i, locational j, and labor market segment k characteristics.

As is common in the literature, we specify worker compensation as a function of individual human capital and demographic characteristics d_i, including, for example, information on worker age, education, seniority, and gender. The model also includes controls for work unit characteristics I_i, including the magnitude of the non-wage employment benefits provided as part of the worker compensation package. Our reduced form earnings equation is:

$$Y_{ijk} = g_{jk} + d_i'\beta_k + I_i'\alpha_k + e_{ijk} \quad (1)$$

where g_{jk} represents a vector of metropolitan-specific fixed effects estimated for each of the labor market segments, β_k a vector of returns to human capital, and α_k a vector of estimated compensating variations in nominal earnings due to the non-wage employment benefits. Those fixed effects account for locational amenities, cost-of-living, and other factors that vary systematically across the geographically stratified labor markets. The fixed effects approach is convenient, since one could never fully specify the complete vector of labor market specific amenities nor obtain perfectly accurate measures of the cost of living in a given labor market. By construction, those controls account for all relevant locational information, such that related omitted variable bias goes to zero.

In markets with mobile households, equilibrium differences in nominal earnings across similarly endowed workers should be offset by compensating variations in city-specific attributes and cost-of-living differentials. In recent work, Gabriel and Rosenthal (1999) demonstrate that returns to human capital are sensitive to the inclusion of metropolitan area locational controls. Analyses of wage determination that omit labor market specific amenities and cost-of-living

differentials will suffer from omitted variable bias, to the extent that observable worker characteristics influence both the worker's skill level and the worker's choice of city of residence.[5]

As is well-appreciated, however, the assumption of fully mobile workers and a long-run open city equilibrium framework may be more or less relevant to wage determination among labor market segments in China's transitional economy. In the state-owned enterprise sector, for instance, central planners may impose significant nominal wage variations across metropolitan areas for workers of similar skill levels (perhaps due to significant variations in local cost-of-living). Further, nominal wage differences may persist across cities due to variations in local labor market conditions in the presence of policy-related or other barriers to labor mobility (Sabin, 1999). In sum, human capital may be distributed unevenly across metropolitan areas owing to a combination of both individual selection (compensating variation) and planning effects. Accordingly, in the analysis below, locational fixed effects proxy a combination of both equilibrium and disequilibrium influences.[6] Further, the analysis is fully stratified across labor markets segments (state-owned enterprises, urban collectives, joint-stock enterprises, and foreign joint ventures) so as to test for homogeneity of returns to human capital across public, semi-private, and fully privatized segments in China's transitional economy.

Controlling for location-specific fixed effects is especially important to the objective of assessing differential returns to human capital across public and private sectors. In fact, in the

[5] These arguments derive from Rosen's (1986) theory of compensating differentials. In competitive sectors, wages should adjust for all non-pecuniary location specific attributes and amenities (see also Roback [1982, 1988]). Wage-related location effects have received limited attention in the literature (see, for example, Beeson and Eberts [1989]), however, perhaps owing to the enormous data requirements associated with the inclusion of the full vector of labor market specific attributes, amenities, and cost of living effects. Economic studies of the quality of life (see, for example, Blomquist, Berger, and Hoehn [1988], Gyourko and Tracy [1991], and Gabriel, Mattey, and Wascher [1999]) apply such approaches to extract the capitalized values of individual locational characteristics from quality-adjusted wages and property values. In a recent paper, Gabriel and Rosenthal (1999) control for locational amenities using fixed effects and show that such an approach yields consistent estimates of the impact of education and demographic traits on earnings.

[6] A potential weakness of the fixed-effect approach is that the estimated slope coefficients in the wage determination model may suffer from simultaneity bias arising from the endogenous choice of location. However, those simultaneity problems do not appear if workers do not sort themselves by income class across the locations specified by the fixed effects. At the metropolitan area level, model estimates are

absence of controls for locational fixed effects, estimates of returns to human capital are potentially biased in opposite directions. As shown in Table 1, private job growth has been especially robust in major coastal cities such as Shanghai and Guangzhou, and in Beijing. In those areas, educated workers in the private sector would be proportionally over-represented as the demand for skilled private-sector labor is high. At the same time, private wage rates also are higher in those cities due to a higher cost of living. Consequently, returns to education and other human capital characteristics could be overestimated for private sector workers in the absence of controls for cost of living differentials across cities. Put differently, more educated private sector workers earn more in part because they are more likely to reside in coastal cities or in Beijing. In contrast, educated workers in the state sector are likely to be underrepresented in coastal cities, owing in part to the imposed geographic dispersion of those workers by government planners as well as to the availability of private sector employment in coastal areas. As such, more educated public sector workers earn less in part because they are less likely to reside in coastal cities.

III. Data, Variables, and Empirical Specification

The data utilized in this study derive from a survey of individual workers undertaken by the City University of Hong Kong in 1997.[7] Survey participants included 3964 employees of manufacturing firms in nine major Chinese cities.[8] The firms surveyed represented the four primary ownership structures described above, including state-owned enterprises, urban collectives, joint-stock enterprises, and foreign joint venture firms.[9] Interviewed workers were divided equally among the 180 surveyed firms, which in turn were divided equally among the nine cities and the four types of ownership. The individual level survey instrument included a large

---

unlikely to suffer from simultaneity bias since each of the cities contains a range of different areas and environments over which a individual workers can choose.

[7] See Fu, Tse and Zhou (1999).

[8] Non-manufacturing work units were excluded from the survey owing to lack of diversity in ownership types in the non-manufacturing sector.

number of questions on worker employment status and earnings, household and human capital characteristics, housing status, and the like. A more detailed description of the sampling procedure and data collection process is provided in Appendix I.

The dependent variable in the earnings equation, *Y*, is the 1997 gross monthly worker earnings inclusive of salary, bonus, nominal salary add-ons, secondary employment income and investment income as reported in 10 income categories. The income categories range from *Y*=1 (300 yuan or about $36 or less per month) to *Y*=10 (3,001 yuan or greater). Summary data on income distribution among cities and labor market segments is contained in Table 2. Worker median income varies from about 600 yuan in state-owned and urban-collective enterprises to about 800 yuan for those in joint-stock and foreign-joint-venture enterprises. As is evident from the table, average worker income (unadjusted) is significantly higher in Beijing and among coastal cities (Shanghai, Guangzhou). The table further indicates significantly elevated earnings among foreign joint venture (private) sector workers in the cities of Beijing and Shanghai. Relatively higher earnings also are evident among joint-stock companies in Shanghai and Guangzhou; the latter city exhibits earnings across all labor market segments that are well in excess of most cities in the sample. As expected, the summary information indicates substantial variability across cities in returns to private sector employees, relative to that evidenced in the state-owned enterprise and urban collective sectors.

Regressors in the earnings model account for well-established determinants of earnings, including human capital and demographic variables (*d*) — age, gender, education and managerial status — and work-unit characteristics (*l*). As pertinent to labor compensation in China, the analysis includes work-unit characteristics to control for non-pecuniary job-related employment benefits (housing subsidies, medical benefits, and pensions). An indicator of a worker's stock ownership is also included to account for non-employment income. Further, the model includes

[9] On average, state-ownership of firm equity among sampled work units varied from about 97 percent among state-owned enterprises to 28 percent among foreign joint venture firms.

city-level locational fixed effects (γ_{jk}) to assess the robustness of estimated returns to human capital and demographic characteristics across metropolitan areas. As discussed above, the earnings regression is stratified by state-owned enterprises, joint venture foreign firms, collective-owned enterprises, and joint-stock enterprises so as to test for homogeneity of returns to human capital across these labor market segments.

Education is measured by a series of dichotomous variables coded 1 or 0 based on whether or not the highest educational degree attained by the worker is high school (*EDHS*, 1 if yes), college (*EDCOL*, 1 if yes), or university (*EDUNIV*, 1 if yes); less than a high school diploma comprises the omitted category. The age control is defined as the worker age (*AGE*) in years. Worker gender is coded as 1 if *MALE*; worker managerial status is coded as 1 if a *MANAGER* and 0 otherwise. Work-unit characteristics include firm size (*SIZE* as defined as log of number of employees) and firm spending on employee benefits as percentage of total wage (*BENEFIT*). Finally, worker ownership of stocks and bonds (*INVEST*) is coded as 1 if yes. Table 3 contains variable definitions and summary statistics.

Similar to Liu (1998), our initial model specification focuses on returns to schooling. Further, our analysis seeks to assess the robustness of those results to the inclusion of the locational fixed effects. We estimate equation (1) for each type of ownership type with and without γ_{jk} constrained to be zero. We hypothesize that the b_k will be biased upward in the private employment sector but downward in the state-owned enterprises in the absence of controls for locational effects.

Subsequent iterations of the model broaden the specification of earnings determination to control of additional worker demographic and human capital (gender, age, managerial status) as well as firm specific and other effects. Similarly, we assess the robustness of the results of the expanded model to the inclusion of city-specific fixed effects. Also, we augment equation (1) with the interaction of schooling dummies and the categorical variables *MALE*, *TECH*, and *COAST*,

respectively. *MALE* equals 1 for male workers, *TECH* equals 1 if the work unit is in a technology intensive industry; and *COAST* equals 1 if the worker is in a coastal city (Shanghai and Guangzhou) or Beijing. Work units were classified as technologically intensive based on their SIC codes; see Appendix II for SIC codes of firms included in the survey. In general, the interacted education and *MALE* terms seek to assess whether returns to human capital investment vary systematically with worker gender. Similarly, other specifications of the empirical model evaluate whether returns to human capital investment vary systematically with industry technological intensity and city coastal location. Wages for high skill workers in technologically demanding industries may be elevated due to unmeasured labor productivity or human capital characteristics. In the case of coastal cities, higher returns to schooling might arise due to a combination of strong localized demand and unmeasured labor productivity.

Probability of Job Change

Finally, our empirical analysis investigates the determinants of individual workers' intention to change jobs. The dataset reports the individual worker's intention of changing jobs in the near future by way of five-level categorical variable. The data do not specify whether the intended job change would be to the private sector. Nonetheless, to the extent the potential earnings improvement associated with movement to a private sector job correlates well with the intention to change jobs, we obtain some indication of labor mobility as may derive from private-public sector differentials in labor compensation. To undertake this analysis, we utilize estimates of the earnings effects of worker human capital, demographic, and locational characteristics to compute a measure of the earnings differential, *GAP*, between workers in the private and non-private sectors. We take labor compensation in foreign-joint-venture enterprises as the private-sector benchmark. Using the notation of equation (1), the *GAP* for worker *i* in city *j* and sector *k* (state owned, urban collective, and joint stock) is defined as:

$$GAP_{ijk} = (g_{j0} - g_{jk}) + d_i^{\chi}(b_0 - b_k) - e_{ijk} = g_{j0} + d_j^{\chi}b_0 - (Y_{ijk} - I_i^{\chi}a_k), \qquad (2)$$

where g_{j0} and b_0 represent estimates pertaining to the private sector, d_i is a vector of variables including *EDHS*, *EDCOL*, *EDUIV*, *AGE*, *MALE*, and *MANAGER*, and I_i includes the variables *SIZE*, *BENEFIT*, and *INVEST*, which proxy non-wage incomes.

The dependent variable *M*, measuring individual workers' perceived prospects of changing jobs in the near future, is a five-level categorical variable, with *M*=1 indicating very low likelihood of job change and *M*=5 indicating a relatively high likelihood of job change. Although a linear regression model could be used to estimate the determinants of the dependent variable *M*, the qualitative nature of the dependent variable makes an ordered probit model the best specification for testing the worker's intention to change jobs[10]. We hypothesize that the workers' inclination to change jobs, denoted by m^*, is a linear function of earnings differential, *GAP*, other personal and firm specific characteristics Z, including education and demographic characteristics, non-wage employment benefits and workers' attitude towards job security and confidence in the performance of their work unit. Thus $m^* = a_m + b_m \times GAP + Z \times Q_m + h$, where h is a normal random variable. The worker's inclination to change jobs, m^*, is not observable but influences the response *M* according to the following probit equation:

$$\begin{aligned}(\text{Probability of } M=k) &= \text{prob}(d_{k-1} \le m^* \le d_k) \\ &= \text{prob}(d_{k-1} - a_m - b_m \times GAP - Z \times Q_m \le h \le d_k - a_m - b_m \times GAP - Z \times Q_m), \end{aligned} \quad (3)$$

for $k = 1 \ldots 5$, with $d_0 = -\infty$ and $d_5 = +\infty$ respectively, where d_{k-1} is the threshold motivation level for a response to be in category k. The parameters $d_k - a_m$, $k = 1 \ldots 4$, and b_m and Q_m can be estimated by maximizing the joint probability of the responses in a given sample.

We hypothesize that workers' intention to change jobs is positively affected by the earnings differential, *GAP*, as defined in equation (2). In addition to incentives provided by quality-adjusted private-public sector earnings differentials, we hypothesize that job mobility is affected by worker educational status, age and gender. Educated workers are likely better informed

of job opportunities and hence are more likely to change jobs, regardless of labor compensation incentives. Older workers are hypothesized to be less mobile, all things equal, given the relatively limited time frame over which to compute the discounted cumulative earnings gains of such a move. Similarly, we expect that married female workers (*MARRDF*, 1 if yes) are less mobile, given their dual role as family caregivers. We also expect that higher levels of non-pecuniary worker compensation, as proxied by firm size (*SIZE*), firm spending on worker welfare (*BENEFIT*), and worker occupancy of employer-provided housings (*HOUSING*, 1 if yes) serve to reduce worker incentives to change jobs. Finally, we hypothesize that workers' concerns about job security as well as perception of future firm profitability affect their inclination to change jobs. The preference for job security is measured by a five-level categorical variable *SECURITY*, with a value of 1 indicating indifference to job security. Confidence in firm's future performance is also measured by a five-level categorical variable, *CONFDNC*, with a value of 1 indicating the most negative future outlook.

IV. Estimation Results

Models of Wage Determination

Results of the estimation of the earnings equation are contained in tables 4 – 6. Tables 4 and 5 present estimating equations with and without the locational controls; thereafter, earnings models include metropolitan area fixed effects. In all cases, the earnings analyses are fully stratified by labor market segment. As is evident in Table 4, returns to educational investment are positive regardless of segment of labor force participation; in all cases, the estimated coefficients increase monotonically with educational attainment.[11] As expected, however, there exists little variation in returns to human capital investment among workers in the SOE sector; further, the

[10] Maddala (1983) presents the statistical methodology and applications of econometric models involving qualitative dependent variables.

[11] See Kosters (1990), O'Neill (1990), and Murphy and Welch (1992) for evidence on returns to schooling in U.S. labor markets.

estimated wage effects of high school and college completion are quite small in magnitude and not statistically significant. Those findings stand in marked contrast to the sizable and highly significant wage rewards of human capital investment in the FJV sector; as evidenced in the top panel, the estimated wage effects of college and university degree attainment are about 10 times those of the SOE sector. Note as well that the wage markup to a university education in the FJV sector is about twice that of a technical college education. Moreover, as indicated in the upper panel of table 4, the difference in schooling alone explains 14 percent of the earnings variance among individual workers in the foreign-joint-venture enterprises, compared with only 0.5 percent of earnings variations in the state-owned enterprise sector. The results in table 4 suggest that the greater standard deviation in individual income in the FJVs, as reported in the last row of table 2, reflects the linkage of compensation to individual productivity; in marked contrast, labor compensation the SOEs emphasizes equity over individual output. Also, the greater standard deviation in individual income in JSCs relative to that in SOEs reflects the greater wage discretion given to the JSCs as part of the reform initiatives.

As evidenced in the bottom panel of table 4, the estimated coefficients of the locational fixed effects are statistically significant throughout; overall, those effects indicate depressed earnings among workers in interior cities, relative to Beijing and cities on China's southern coast. As is evidenced in the table, research findings suggest that locational wage effects are most sizable among workers in the FJV sector; however, even among workers in the SOE sector, there exists limited but significant variation in quality-adjusted wages across places.

Findings further indicate that estimated returns to human capital are sensitive to the inclusion of locational controls. Exclusion of locational controls serves to upward bias the estimated effects of educational investment among FJV, JSC, and UCE workers; in contrast, failure to account for metropolitan level fixed effects serves to downward bias returns to human capital among SOE workers. Whether owing to unaccounted for metropolitan area cost-of-living,

amenity, or other non-pecuniary effects, a failure to account for locational effects imparts notable omitted variable bias into the analysis.

As shown in the lower panel of table 4, controlling for locational fixed effects, there remains a significant gap in returns to schooling between the foreign-joint-venture and the state-owned sectors. In the foreign-joint-venture sector, the markup on a university degree relative to college training is about 300 yuan (from income scale 6 to 7, or about a 20% marginal return), well in excess of the 80 yuan markup (from income scale 3.8 to 4.2, or about a 10% marginal return) in the SOE sector. Moreover, worker schooling and locational fixed effects together explain 53 percent of the income variance among workers in the foreign-joint-venture sector; in contrast, those controls explain only 32 percent of the income variation in the state-owned sector.

In Table 5, the earnings specification is broadened to account for worker demographic, seniority, and other personal and firm-specific characteristics. As is evident, the primary results are largely robust to the inclusion of those additional characteristics. For the most part, the added controls are statistically significant and add appreciably to the explanation of variance in worker earnings. Results indicate that males earn more than females; the estimated coefficient is statistically significant throughout. The gender gap in earnings is about one-half the increment of the income measure, or about 100 yuan per month. While the gap is higher in the foreign-joint-venture sector, it does suggest significant gender related earnings disparities even among the SOEs. The earnings disparity may reflect unfair gender-related employment practices in China; however, given definition of the earnings measure, it is also plausible that results reflect the additional time spent pursuing over-time or secondary employment by males, whereas women likely spend more after-work time in family-related and household tasks.[12]

Worker experience and seniority, as proxied in part by the age variable, similarly imparts a positive and significant effect on wages. As expected, however, worker age yields substantially

[12] See Montgomery and Wascher (1987) and Blau and Beller (1992) for evidence on gender-related earnings differentials in U.S. labor markets.

lower wage returns in the foreign joint venture sector than among other segments of Chinese labor markets. The FJV enterprises operate in newly developed markets; among those firms, seniority and experience gained in public employment are often of little benefit. Another proxy for seniority and experience, worker managerial status, is similarly positive and significant throughout. All things equal, managerial status provides a wage markup of about 100 yuan in the state-owned and urban collective sectors and about a 200 yuan wage increment in joint-stock and FJV enterprises. Firm size (natural logarithm of the number of employees) and employee benefits (firm's spending on employee benefits as a percentage of wage) are both negatively related to individual workers' nominal earnings (panel B). Holding nonpecuniary employee benefits constant, size of firm has a significant depressive effect on earnings in both the SOE and FJV sectors. In China, employment at larger firms may impart numerous benefits; that variable is taken to proxy those effects not captured directly in the employee benefits computation. Coefficient estimates for the firm size and employee benefit variables are then consistent with the theory of compensating variations in nominal income. As evidenced in panel B, the estimated wage effects of firm size and employee benefits are sensitive to the inclusion of locational fixed effects.

Tables 6a – 6c report on a series of robustness checks as pertain to the returns to schooling results. Table 6a reports on the effects of gender on estimated wage markups associated with human capital investment, whereas tables 6b and 6c report on the sensitivity of those results to employment in technology sectors and location in a coastal city.[13] As shown in table 6a, results of the analysis provide little evidence of gender-related effects in returns to education. Further, other estimated coefficients are robust to the inclusion of the interacted educational attainment and gender variables.

In contrast, employment in a higher technology sector does impart a further positive effect on returns to human capital investment in the FJV sector (table 6b). The estimated coefficients of the interacted educational attainment and *TECH* variables are positive and monotonically

increasing in educational attainment in the FJV sector but not in other sectors.[14] Similarly, results in table 6c indicate that coastal city location has a positive influence on the returns to education only in the foreign-joint-venture sector.[15] Studies of market economies (see Schultz [1975] and Foster and Rosenzweig [1996]) find that returns to educational investment rise during periods of rapid technological change, in turn motivating increased worker educational investment. The results in table 6b and 6c similarly indicate the greater private sector rewards to Chinese worker educational investment in the wake of rapid private sector foreign investment and technological upgrading.

The Public-Private Earnings Gap and the Intention to Change Jobs

Based on findings of the reduced form wage analyses (table 5, penal B), table 7 indicates the pattern of the earnings differential between labor market segments in China due to differential returns to schooling and differential local labor market conditions, as defined by equation (2). As the estimates in table 5 would predict, the private-public earnings differential, *GAP*, is higher for more educated workers, males, and workers of managerial status. In contrast, private-public sector earnings *GAP* is depressed among older workers and those living in interior cities where private sector employment is not well developed. As is evident from the table, the earnings mark-up associated with private sector employment varies substantially among sample cities.

To assess the effects of private-public disparities in quality-adjusted earnings on labor mobility, table 8 provides ordered-probit estimates of worker's intention to change jobs. The dependent variable here is a five-level categorical variable *M*, with *M*=1 indicating a very low likelihood of job change in the near future and *M*=5 indicating a relatively high likelihood of job

---

[13] Although not shown, all regressions include the locational fixed effects.

[14] We experimented with alternative measures of technology intensity. Similar resutls are obtained when *TECH* is calculated as sales revenue relative total wage, where a higher ratio is taken to reflect greater value added from capital relative to labor.

[15] Coastal cities are defined as Beijing, Shanghai, and Guangzhou. In those areas, the market economy is more highly developed relative to other cities in the sample. Additional experimentation (not reported here) shows that the coastal city location effect does not occur exclusively in among technology intensive industries.

change. Some 11 percent of workers in state-owned enterprises reported an *M* value of 4 (likely) or 5 (very likely), compared with 6 percent for workers in urban-collective enterprises and joint-stock companies and 8 percent in foreign-joint-venture enterprises. As suggested above, we hypothesize that a worker's intention to change jobs is a linear function of her earnings' *GAP* and other personal and firm specific characteristics.[16]

Column 1 in table 8 reports on the results of the ordered-probit analysis of intended job change using the sample as a whole and including city-level fixed effects. As is evident, the estimated coefficients are generally of appropriate sign and significant. Specifically, the likelihood of a job change rises with education attainment, but declines with worker age, married status, and among female workers. Similarly as expected, intended job mobility is damped by employer provision of social security benefits (measured by variables *SIZE*, *BENEFIT*, and *HOUSING*)[17]. Furthermore, workers are less likely to consider leaving their current position if they have a stronger preference for job security (*SECURITY*) and higher levels of confidence in their firm's profitability (*CONFDNC*). Finally, the estimates of the threshold motivation levels, d_k-a_m, $k=1,\ldots4$, are all statistically significant and distinctly ordered, indicating our model's ability to capture the underlying motivation for individual workers' qualitative response. The bottom part of table 8 provides measures of goodness-of- fit. As is evident, the log likelihood value is statistically significant; further, the mean predicted value of the dependent variable rises monotonically with successive levels of the observed value.

---

[16] The sample is largely comprised of immobile workers (over 90 percent of the workers do not expect to change their job in the near future); as such, job mobility should be relatively insensitive to variations in employment compensation. For this reason, we weigh each observation roughly in reverse proportion to the frequency of its value in the overall sample, so that the frequency distribution of the predicted response is close to the observed distribution.

[17] Total welfare expenditure by enterprises in 1996 varies from 34 percent of total wage bill for state-owned enterprises, 26 percent for urban-collective enterprises, and 15 percent for other types of enterprises (China Yearbook of Labor Statistics, 1997). Fleisher, Yin, and Hills (1997) find employer-provided housing is not reflected by a compensating variation in nominal wages in China. Our finding indicates that employer-provided housing does affect workers' mobility. See Wong, Heady and Woo (1995) and Fu, Tse, and Nan (forthcoming) for discussions on housing reform and privatization in China.

In column 2, the reported specification substitutes the measures of the earnings GAP for the city-level fixed effects. The goodness-of-fit measure there suggests that the earnings *GAP* variables well capture the inter-city differences in workers' incentive for job change. Moreover, results reveal some sensitivity of the vector of estimated coefficients to the inclusion of the *GAP* variables. Estimates of the *GAP* effects indicate that the expected mobility of workers in state-owned and urban-collective enterprises is sensitive to earnings opportunities in the private sector. The estimates are largely robust to sample stratification, although the standard error of the estimates tend to rise as sample size decreases. The pattern of the interactive *GAP* estimates further suggests that compensation among joint-stock enterprises (prototypes of SOE reform) is not significantly different from that in the private sector, whereas SOEs offer substantially damped level of quality-adjusted compensation. Furthermore, upon controlling for compensation opportunities in the private sector, results of the analysis indicate that worker educational attainment, age, status as a married female, employer-provided social welfare, preference for job security and the like remain significant determinants of intended job change.

Based on the above (table 8) results, table 9 indicates the simulated impact of select variables on the predicted probability of a "likely" or "very likely" job change among workers in the state-owned enterprise sector. The estimated boost in quality-adjusted earnings associated with a move to the private sector (for a typical SOE worker with a *GAP* of 1.18) is sufficiently large so as to offset any disincentive effect stemming from SOE housing provision. In this case, all things equal, the estimated private sector boost to quality-adjusted earnings would increase the predicted probability of a job change by 0.064 to about 27 percent (a full 31 percent increase over base case probability). The estimated earnings effect also appears to be larger than a one-standard-error reduction in either the preference for job security or the expectation of firm performance, both of which would raise the predicted probability of a "likely" job change by about 20 percent. These results suggest that the persistence of an earnings gap — coupled with continued job creation in the private sector — should result in ongoing and sizable movement of workers to the private sector

employment. As is evident, however, certain worker classes benefit more from private sector employment opportunities than do others. Specifically, workers with little schooling, older workers, and female workers have less financial incentive to move to private employment. On the other hand, results indicate that a worsening financial condition in the SOEs, as reflected in a widening *GAP* between private and public sector compensation rates for equally qualified workers, should work to further increase the job mobility of Chinese urban workers.

VI. Conclusions

This study applies new micro-data from a unique survey of urban workers to assess returns to human capital and demographic characteristics among public and private labor market segments in China. The analysis controls as well for systematic variations in nominal earnings among metropolitan areas, which arise due to variations across cities in nonpecuniary attributes and amenities as well as local cost of living. The analysis enables computation of quality-adjusted wage differentials among labor market segments in China. Further, the study assesses the role of quality-adjusted earnings differentials, pecuniary and non-pecuniary worker benefits, worker demographic characteristics, and the like in the determination of worker intention to change jobs.

As expected, research findings indicate substantially higher returns to educational investment among private-sector entities, relative to those in state-owned enterprises. Further, results indicate only limited returns to worker age and work experience among private-sector workers. Also, all things equal, female earnings remain significantly depressed relative to those of males, even in the socialized state-owned sector. Findings of the analysis further indicate the importance of proxies for location-specific components of the worker compensation package. Research findings indicate substantial differentials in quality-adjusted earnings across public and private labor market segments. Those differentials rise substantially with worker educational attainment and serve to significantly elevate the prospects of worker job change, all things equal.

Results of the analysis suggest the efficacy of quality-adjusted wage disparities in promoting the movement of Chinese workers to private employment. Indeed, a government policy of limiting adjustments in wages and benefits among public sector workers should aid in the achievement of sizable reductions in public employment. Such an outcome, however, is predicted on easing of government regulation surrounding foreign investment and private job creation in China, so as to assure the continued growth in private job opportunities. As is well appreciated, however, the combination of such policies will have adverse implications for income distribution in China. Some provision is then required for older, less skilled, and other low mobility workers in the context of China's ongoing transition to a decentralized market-based economy.

References

Beeson, Patricia and Randall Eberts, "Identifying Productivity and Amenity Effects in Interurban Wage Differentials", *The Review of Economics and Statistics*, 443-461 (1989).

Blau, Francine and Andrea Beller, "Black-White Earnings over the 1970s and 1980s: Gender Differences in Trends", *Review of Economics and Statistics*, LXXIV, 276-286, (1992).

Blomquist, Glenn, Mark Berger, and John Hoehn, "New Estimates of the Quality of Life in Urban Areas", *American Economic Review*, March, 78, 89-107 (1988).

Byron, Raymond and Evelyn Manaloto. Returns to Education in China. *Economic Development and Cultural Change* 38, 783-96 (1990).

"China Statistics Yearbook", State Statistical Bureau, Chinese Statistics Publishing House, Beijing (1997)

Fan, Gang, Maria-Rosa Lunati, and David O'Connor. Labour Market Aspects of State Enterprise Reform in China. *OECD Development Centre Technical Papers*, No.141 (1998).

Fleisher, Belton M., Yong Yin and Stephen M. Hills. The Role of Housing Privatization and Labor-Market Reform in China's Dual Economy. *China Economic Review* 8:1, Spring 1997: 1-17

Foster, Andrew and Mark Rosenzweig. Technical Change and Human-Capital Returns and Investments: Evidence from the Green Revolution. *American Economic Review* 84:4, September 1996: 931-53

Fu, Yuming, David Tse, and Nan Zhou, "Housing Choice Behavior of Urban Workers in China's Transitional Housing Market", *Journal of Urban Economics* (forthcoming).

Gabriel, Stuart, Mattey, Joe, and William Wascher, "Compensating Differentials and Evolution in theQuality-of-Life Among U.S. States". Working Paper 99-106, USC Lusk Center for Real Estate, 1999.

Gabriel, Stuart and Stuart Rosenthal, "Commute Times, Neighborhood Effects, and Earnings: An Analysis of Compensating Differentials and Racial Discrimination." *Journal of Urban Economics*, 40, 61-83 (1996).

Gabriel, Stuart and Stuart Rosenthal, "Location and the Effect of Demographic Traits on Earnings", *Regional Science and Urban Economics*, 29, 445-461 (1999).

Gyourko, Joseph and Joseph Tracy, "The Structure of Local Public Finance and the Quality of Life", *Journal of Political Economy*, 99, 775 – 806 (1991).

Johnson, Emily-N. and Gregory C. Chow. Rates of Return to Schooling in China. *Pacific-Economic-Review* 2(2), 101-13 (1997).

Kosters, Marvin, "Schooling, Work Experience, and Wage Trends", American Economics Association Papers and Proceedings, 80, 308-312 (1990).

Knight, John and Lina Song. The Determinants of Urban Income Inquality in China. *Oxford Bulletin of Economics and Statistics* 53, 123-54 (1991).

Lawrence, S., "True Colours", *Far Eastern Economic Review*, March 26, Vol. 162, No. 12 (1999).

Liu, Zhiqiang. Earnings, Education, and Economic Reforms in Urban China. *Economic Development and Cultural Change* 46:4, 697-725 (1998).

Maddala, G.S., "Limited-Dependent and Qualitative Variables in Econometrics", Cambridge University Press, Cambridge UK (1983)

Meng, Xin and Michael P. Kidd. Labor Market Reform and the Changing Structure of Wage Determination in China's State Sector during the 1980s. *Journal of Comparative Economics* 25:3, 403-421 (1997)

Montgomery, Edward and William Wascher, "Race and Gender Wage Inequality in Services and Manufacturing", *Industrial Relations*, 26, 284-290 (1987).

Murphy, Kevin and Finis Welch, "The Structure of Wages", *Quarterly Journal of Economics*, 285-326 (1992).

O'Neill, June, "The Role of Human Capital in Earnings Differences Between Black and White Men", *Journal of Economic Perspectives*, 4, 25-45 (1990).

Roback, Jennifer, "Wages, Rents, and Amenities: Differences Among Workers and Regions", *Economic Inquiry*, 26 (1988).

Roback, Jennifer, "Wages, Rents, and the Quality of Life", *Journal of Political Economy*, 90 (1982)

Rosen, Sherwin, "The Theory of Equalizing Differences", Handbook of Labor Economics, Vol. 1, Chapter 12, 641-692, Orley C. Ashenfelter and Richard Layard (eds.), Elsevier Science Publishers B.V., Amsterdam (1986).

Schultz, Theodore W., "The Value of the Ability to Deal with Disequilibria," *Journal of Economic Literature*, 13, 827-846 (1975).

Sabin, Lora. The Development of Urban Labour Markets: China's Urban Wage Curve, 1980-92. *The Journal of Development Studies* 35:3, 134-52 (1999).

Wong, C., C. Heady and W. Woo, "Fiscal Management and Economic Reform in the People's Republic of China", Asian Development Bank, Oxford University Press, Hong Kong (1995)

Table 1: Urban Employment by Type of Enterprise (Percent, 1996)

Region	State-owned	Urban Collec-tive	Joint Stock	Foreign Joint Venture	Domestic Private Enterpris	Self-employ-ment	Other	Total
All urban areas	56.74	15.22	1.83	2.73	3.13	8.62	11.73	100
Beijing	71.49	13.81	2.98	6.2	1.39	3.4	0.73	100
Shanghai	61.06	16.01	5.32	7.59	7.61	1.43	0.98	100
Guangdong (Guangzhou)	49.54	16.92	2.2	11.38	7.83	11.56	0.57	100
Jiansu (Nanjing)	58.77	26.34	1.98	4.2	2.63	4.73	1.35	100
Shanxi (Xi'an)	73.96	11.75	1.01	0.52	3.34	9.27	0.15	100
Hubei (Wuhan)	64.47	14.92	2.97	1.12	2.82	13.49	0.21	100
Jilin (Changchun)	62.35	17.28	1.62	1.42	2.77	14.48	0.08	100
Shichuan (Chengdu)	65.59	17.77	3.67	0.83	3.33	8.7	0.11	100

Source: Yearbook of China, Real Estate Markets, 1997

Table 2: Average Monthly Income of Workers by Enterprise Type and City

(Calculated based on a total of 3964 workers in the sample, which are distributed about equally among the cities and enterprise types. The average value represents the income scale as defined in the last two columns of the table.)

CITY	SOE	UCE	JSC	FJV	Income Scale	Total Income (yuan /month)
Beijing	3.65	3.64	3.60	5.68	1	300 or less
Shanghai	2.98	2.63	5.29	5.63	2	301 – 600
Guangzhou	4.26	4.15	5.12	4.65	3	601 – 800
Nanjing	2.44	1.76	2.56	3.57	4	801 – 1000
Xi'an	2.47	1.72	4.02	3.17	5	1001 – 1200
Guiyang	2.01	2.16	2.66	2.85	6	1201 – 1500
Wuhan	2.25	3.89	2.38	1.81	7	1501 – 2000
Chanchung	2.51	2.56	3.01	2.84	8	2001 – 2500
Chengdu	2.60	2.04	3.05	2.38	9	2501 – 3000
Std Dev.	1.24	1.51	1.66	1.98	10	3001 or more

Table 3: Variable Definitions and Summary Statistics

Variable	Description	Value	Sample mean (standard deviation)			
			SOE	UCE	JSC	FJV
EDHS	Completed high school	1 if yes; 0 no	0.485 (0.50)	0.424 (0.49)	0.399 (0.49)	0.409 (0.49)
EDCOL	Completed technical college	1 if yes; 0 no	0.214 (0.41)	0.202 (0.40)	0.184 (0.39)	0.226 (0.42)
EDUINV	Completed university	1 if yes; 0 no	0.069 (0.25)	0.108 (0.31)	0.047 (0.21)	0.114 (0.32)
EDCU	College or university	1 if yes; 0 no	0.283 (0.45)	0.310 (0.46)	0.232 (0.42)	0.340 (0.47)
AGE	Age	Year	38.598 (9.23)	36.454 (9.01)	38.914 (8.94)	37.536 (9.65)
MALE	Male	1 if yes; 0 no	0.548 (0.50)	0.489 (0.50)	0.464 (0.50)	0.499 (0.50)
MRRDF	Married female	1 if yes; 0 no	0.386 (0.49)	0.423 (0.49)	0.470 (0.50)	0.421 (0.49)
MANAGER	Manager	1 if yes; 0 no	0.091 (0.29)	0.091 (0.29)	0.090 (0.29)	0.091 (0.29)
INVEST	Owning stocks and bonds	1 if yes; 0 no	0.238 (0.43)	0.238 (0.43)	0.231 (0.42)	0.381 (0.49)
SIZE	Size of the work unit	Ln (number of employees)	6.315 (1.11)	5.666 (1.04)	5.308 (0.78)	6.989 (1.20)
BENEFIT	Employment benefit	Welfare expenditure /Total wage	0.189 (0.16)	0.133 (0.11)	0.184 (0.24)	0.136 (0.13)
HOUSING	Occupying employer-provided housing	1 if yes; 0 no	0.366 (0.48)	0.277 (0.45)	0.285 (0.45)	0.393 (0.49)
SECURITY	Preference for job security	1,2,3,4,5; 1=unimportant, 5=very important	4.190 (0.63)	4.212 (0.64)	4.245 (0.62)	4.120 (0.64)
CONFDNC	Outlook of firm performance in the next 6 months to 5 years	1,2,3,4,5; 1=very negative, 5= very positive	2.947 (0.73)	3.241 (0.72)	3.060 (0.84)	3.373 (0.73)
TECH	Technology-intensive industry	1 if yes; 0 no	0.556 (0.50)	0.556 (0.50)	0.690 (0.46)	0.756 (0.43)

Table 4: OLS Earnings Models

Dependent variable is income level Y (t-statistics are in parentheses.)

Ownership Type	State Owned	Urban Collectives	Joint Stock	Foreign Joint Venture
Panel A: without controls for locational fixed effects				
Constant	2.7783(33.97)	2.3497(31.60)	3.0281(29.52)	3.0228(26.64)
EDHS	-0.0444 (0.45)	0.2488 (2.41)	0.4065 (3.12)	0.2510 (1.73)
EDCOL	0.1132 (0.96)	1.0109 (7.85)	0.9183 (6.16)	1.1672 (6.76)
EDUNIV	0.2512 (1.47)	1.9269 (8.74)	1.0604 (5.77)	2.3604(11.19)
R squared	0.005	0.109	0.052	0.140
Panel B: controlling for locational fixed effects				
Constant	3.6123 (31.37)	3.3217 26.74)	3.1545(22.82)	4.9382(32.28)
EDHS	-0.0366 (0.43)	0.2400 (2.74)	0.2389 (2.31)	0.1736 (1.61)
EDCOL	0.1864 (1.86)	0.7113 (6.49)	0.8604 (7.25)	0.9822 (7.52)
EDUNIV	0.5454 (3.76)	1.2444 (6.57)	1.1304 (7.76)	1.9840(12.25)
Shanghai	-0.6336 (4.55)	-0.8653 (5.40)	1.7103(10.00)	0.2281 (1.23)
Guangzhou	0.6154 (4.43)	0.4444 (2.77)	1.6552 (9.69)	-0.6773 (3.66)
Nanjing	-1.2336 (8.87)	-1.7338(10.78)	-1.1245 (6.58)	-1.7932 (9.66)
Xi'an	-1.2118 (8.67)	-1.8427(11.47)	0.3127 (1.83)	-2.4708(13.46)
Guiyan	-1.6850(12.07)	-1.4212 (8.87)	-0.8997 (5.27)	-2.5775(13.95)
Wuhan	-1.4149(10.17)	0.0962 (0.60)	-1.0486 (6.13)	-3.3228(17.71)
Changchun	-1.1966 (8.57)	-1.0486 (6.55)	-0.6153 (3.62)	-2.7838(15.06)
Chengdu	-1.1052 (7.90)	-1.5574 (9.70)	-0.4817 (2.82)	-2.8437(15.23)
R squared	0.318	0.386	0.433	0.534
No. of observations	991	992	991	990

Table 5: OLS Earnings Models: Controlling for Personal and Firm Characteristics

Dependent variable is income level Y (t-statistics are in parentheses).

Ownership type	State Owned	Urban Collectives	Joint Stock	Foreign Joint venture
Panel A: without controls for locational fixed effects				
Constant	0.9660 (3.56)	2.0554 (6.08)	0.3647 (1.07)	-1.0403 (2.68)
EDHS	0.0679 (0.71)	0.2429 (2.39)	0.4764 (3.90)	0.2964 (2.23)
EDCOL	0.1879 (1.62)	0.8439 (6.50)	0.8851 (6.23)	1.0282 (6.18)
EDUNIV	0.2073 (1.26)	1.6903 (7.82)	1.0804 (6.17)	2.0669(10.30)
MALE	0.5408 (7.11)	0.4952 (5.58)	0.3951 (4.15)	1.0845(10.16)
AGE	0.0286 (6.79)	0.0129 (2.50)	0.0454 (8.76)	0.0154 (2.43)
MANAGER	0.4538 (3.43)	0.4402 (2.85)	0.7530 (4.44)	0.7866 (4.19)
SIZE	0.0610 (1.80)	-0.1059 (1.86)	0.0816 (2.06)	0.4955 (9.88)
BENEFIT	-0.6550 (2.78)	-0.0543 (0.30)	-1.0015 (2.64)	0.3636 (0.79)
INVEST	0.1802 (2.05)	0.6068 (5.73)	0.6211 (6.30)	0.3528 (2.85)
R squared	0.140	0.18	0.215	0.325
Panel B: controlling for locational fixed effects				
Constant	2.8814 (9.64)	2.7171 (8.43)	2.2148 (5.33)	5.2082(12.23)
EDHS	0.0626 (0.79)	0.2652 (3.14)	0.2569 (2.61)	0.2280 (2.21)
EDCOL	0.2610 (2.71)	0.6108 (5.64)	0.7423 (6.42)	0.8677 (6.67)
EDUNIV	0.4685 (3.43)	1.0667 (5.87)	1.0258 (7.21)	1.8374(11.65)
MALE	0.4640 (7.32)	0.5243 (7.14)	0.3256 (4.31)	0.7645 (9.13)
AGE	0.0256 (7.20)	0.0184 (4.21)	0.0234 (5.48)	0.0097 (1.93)
MANAGER	0.4514 (4.16)	0.5083 (4.02)	0.9049 (6.74)	0.9016 (6.25)
SIZE	-0.1021 (3.13)	-0.0805 (1.61)	-0.0009 (0.02)	-0.1815 (3.56)
BENEFIT	-0.5283 (2.36)	-0.3338 (2.04)	-1.9396 (5.81)	-0.4128 (1.01)
INVEST	0.2328 (3.07)	0.3615 (4.03)	0.2128 (2.60)	0.2379 (2.45)
Shanghai	-0.7021 (5.12)	-0.8858 (5.81)	1.6132 (9.91)	0.1899 (1.05)
Guangzhou	0.7431 (5.70)	0.5067 (3.21)	1.6226 (9.95)	-0.5174 (2.94)
Nanjing	-1.1012 (8.21)	-1.7656(11.55)	-0.8932 (5.45)	-1.9151(10.19)
Xi'an	-1.1568 (8.86)	-1.7625(11.23)	0.4175 (2.12)	-2.5025(14.01)
Guiyan	-1.6335(11.82)	-1.3813 (8.93)	-0.8991 (5.14)	-2.7139(13.86)
Wuhan	-1.3707 (9.97)	0.0792 (0.50)	-0.9410 (5.23)	-3.3632(18.17)
Changchun	-0.8925 (6.61)	-0.8688 (5.55)	-0.4205 (2.45)	-2.8036(13.76)
Chengdu	-1.0491 (7.24)	-1.6490(10.70)	-0.6402 (3.74)	-2.9468(14.81)
R squared	0.427	0.454	0.515	0.606
No. of observations	991	992	991	990

Table 6a: OLS Earnings Models: The Effect of Gender on Returns to Eductation

Dependent variable is income level Y (t-statistics in parentheses).
All regressions include locational fixed effects (not shown)

Ownership type	State Owned	Urban Collectives	Joint Stock	Foreign Joint venture
Constant	2.8026 (9.10)	2.7500 (8.47)	2.2484 (5.36)	5.1821 (11.93)
EDHS	0.1796 (1.51)	0.2510 (2.26)	0.2066 (1.52)	0.2751 (1.97)
EDCOL	0.3132 (2.22)	0.4116 (2.71)	0.7671 (4.94)	0.8634 (4.81)
EDUNIV	0.6024 (2.29)	0.5628 (2.02)	0.9123 (4.20)	1.8384 (7.46)
MALE	0.5965 (4.60)	0.3997 (3.36)	0.2779 (1.86)	0.8107 (5.08)
AGE	0.0254 (7.11)	0.0188 (4.31)	0.0230 (5.35)	0.0096 (1.91)
MANAGER	0.4522 (4.16)	0.5104 (4.03)	0.9085 (6.74)	0.9038 (6.24)
SIZE	-0.1014 (3.10)	-0.0793 (1.59)	-0.0000 (0.00)	-0.1800 (3.52)
BENEFIT	-0.5430 (2.42)	-0.3641 (2.23)	-1.9362 (5.79)	-0.4283 (1.04)
INVEST	0.2306 (3.04)	0.3685 (4.12)	0.2114 (2.58)	0.2379 (2.44)
EDHS *MALE	-0.2071 (1.34)	0.0266 (0.16)	0.0992 (0.52)	-0.1047 (0.52)
EDCOL *MALE	-0.0810 (0.44)	0.3903 (1.90)	-0.0581 (0.26)	0.0029 (0.01)
EDUNIV *MALE	-0.2051 (0.68)	0.8611 (2.41)	0.1890 (0.69)	-0.0166 (0.05)
R squared	0.428	0.459	0.515	0.606
No. of observations	991	992	991	990

Table 6b: OLS Earnings Models: Industry Technology and Returns to Education

Dependent variable is income level Y (t-statistics in parentheses).
All regressions include locational fixed effects (not shown)

Ownership type	State Owned	Urban Collectives	Joint Stock	Foreign Joint Venture
Constant	3.0675 (9.81)	2.8680 (8.30)	2.8180 (6.30)	5.2357(11.73)
EDHS	0.0118 (0.10)	-0.0079 (0.05)	-0.0452 (0.23)	0.0404 (0.27)
EDCOL	0.1500 (1.05)	0.5571 (3.06)	0.3710 (1.64)	0.5890 (3.08)
EDUNIV	0.3488 (1.67)	0.9118 (3.01)	1.0011 (3.74)	1.1906 (5.30)
MALE	0.4679 (7.38)	0.5269 (7.18)	0.3419 (4.53)	0.7750 (9.30)
AGE	0.0256 (7.21)	0.0184 (4.20)	0.0240 (5.63)	0.0105 (2.11)
MANAGER	0.4504 (4.14)	0.5137 (4.06)	0.9204 (6.87)	0.9265 (6.46)
SIZE	-0.1151 (3.46)	-0.0893 (1.78)	-0.0249 (0.59)	-0.1859 (3.62)
BENEFIT	-0.5096 (2.27)	-0.3415 (2.08)	-1.9237 (5.78)	-0.1101 (0.26)
INVEST	0.2217 (2.92)	0.3631 (4.05)	0.2003 (2.45)	0.2251 (2.33)
TECH	-0.2181 (1.69)	-0.1339 (0.93)	-0.5395 (3.07)	-0.2992 (1.88)
EDHS *TECH	0.0870 (0.57)	0.3948 (2.18)	0.3852 (1.74)	0.3762 (1.89)
EDCOL *TECH	0.2052 (1.11)	0.0592 (0.27)	0.4828 (1.91)	0.5026 (2.07)
EDUNIV *TECH	0.2216 (0.82)	0.2073 (0.56)	0.0016 (0.00)	1.2012 (4.03)
R squared	0.429	0.457	0.522	0.613
No. of observations	991	992	991	990

Table 6c: OLS Earnings Models: Coastal City and Returns to Education

Dependent variable is income level Y (t-statistics in parentheses).
All regressions include location fixed effects (not shown)

Ownership type	State Owned	Urban Collectives	Joint Stock	Foreign Joint Venture
Constant	2.8168 (9.24)	2.6338 (7.99)	2.1581 (5.08)	4.6083(10.86)
EDHS	0.0290 (0.28)	0.1952 (1.96)	0.2216 (1.81)	0.2620 (2.18)
EDCOL	0.1583 (1.34)	0.6100 (4.56)	0.6561 (4.79)	0.5766 (3.85)
EDUNIV	0.4199 (2.76)	1.0075 (4.45)	0.9775 (5.67)	1.0591 (5.58)
MALE	0.4692 (7.40)	0.5220 (7.09)	0.3301 (4.35)	0.7674 (9.43)
AGE	0.0253 (7.08)	0.0189 (4.29)	0.0233 (5.45)	0.0126 (2.58)
MANAGER	0.4447 (4.09)	0.5135 (4.04)	0.8995 (6.68)	0.9139 (6.53)
SIZE	-0.1011 (3.09)	-0.0807 (1.61)	-0.0016 (0.04)	-0.1781 (3.58)
BENEFIT	-0.5350 (2.38)	-0.3375 (2.06)	-1.9517 (5.83)	-0.1104 (0.28)
INVEST	0.2368 (3.12)	0.3595 (4.00)	0.2112 (2.58)	0.2662 (2.82)
EDHS *COAST	0.0727 (0.46)	0.2247 (1.27)	0.0998 (0.50)	-0.0378 (0.18)
EDCOL *COAST	0.3171 (1.61)	0.0101 (0.05)	0.2880 (1.20)	0.8960 (3.57)
EDUNIV *COAST	0.1294 (0.34)	0.1734 (0.46)	0.1281 (0.45)	2.0084 (6.69)
R squared	0.428	0.455	0.515	0.631
No. of observations	991	992	991	990

Table 7: The Earnings Differential, *GAP*
(OLS regression with GAP as the dependent variable)

Variables	Coefficients
EDCU	0.3516
AGE	-0.0140
MRRDF	0.3249
MANAGER	0.3070
Shanghai	0.1289
Guangzhou	-1.5124
Nanjing	-0.6822
Xi'an	-1.6818
Guiyan	-1.4260
Wuhan	-2.6447
Changchun	-2.0848
Chengdu	-1.8363
UCE dummy	2.7155
JSC dummy	2.9748
FJV dummy	2.5006

Table 8: Ordered-Probit Estimates of the Prospects of Changing Jobs

The dependent variable, *M*, represents the intention to change jobs in near future. The observations are weighted with proportion of 0.3, 0.26, .56, 1.12, and 2.2, respectively, for *M*=1(very unlikely). 2 (unlikely), 3 (not sure), 4 (likely) and 5 (very likely).

Sample:	All firms	All firms	Excluding FJVs	SOEs only
Explanatory variables	Column 1[=]	Column 2	Column 3	Column 4
GAP*SOE		0.1946 (8.97)	0.1806 (7.95)	0.1764 (6.39)
GAP*UCE		0.0690 (3.44)	0.0619 (3.00)	
GAP*JSC		0.0150 (0.65)	0.0079 (0.33)	
EDCU	0.1842 (4.68)	0.1649 (4.21)	0.1758 (3.89)	0.0882 (1.08)
AGE	-0.0335 (17.12)	-0.0322 (17.33)	-0.0300 (14.33)	-0.0308 (7.46)
MRRDF	-0.2245 (6.09)	-0.1960 (5.28)	-0.2390 (5.51)	-0.1974 (2.45)
MANAGER	-0.0612 (0.98)	-0.1117 (1.79)	-0.0282 (0.41)	0.0943 (0.81)
SIZE	-0.0771 (3.91)	-0.0617 (3.31)	-0.0392 (1.79)	-0.0483 (1.33)
BENEFIT	-0.2570 (2.46)	-0.1500 (1.54)	-0.0589 (0.56)	-0.4820 (2.45)
HOUSING	-0.1015 (2.64)	-0.1030 (2.70)	-0.1389 (3.21)	-0.1175 (1.51)
SECURITY	-0.2547 (9.62)	-0.2747 (10.47)	-0.2293 (7.53)	-0.2376 (4.55)
CONFDNC	-0.1873 (8.28)	-0.1556 (7.08)	-0.1342 (5.31)	-0.1859 (4.00)
UCE dummy	-0.1887 (3.67)	-0.0469 (0.69)	-0.0329 (0.47)	
JSC dummy	-0.2368 (4.54)	-0.0315 (0.50)	-0.0483 (0.75)	
FJV dummy	-0.1718 (3.29)	0.0737 (1.24)		
$\delta_1-\alpha_m$	-4.5111 (20.93)	-3.9622 (21.04)	-3.4723 (16.25)	-3.7737 (10.40)
$\delta_2-\alpha_m$	-3.6541 (17.11)	-3.1072 (16.65)	-2.6380 (12.44)	-2.9629 (8.26)
$\delta_3-\alpha_m$	-2.9516 (13.90)	-2.4055 (12.96)	-1.9624 (9.29)	-2.3684 (6.67)
$\delta_4-\alpha_m$	-2.1574 (10.14)	-1.6075 (8.61)	-1.2209 (5.71)	-1.5955 (4.47)
No. of observations	3964	3964	2974	991
Log Likelihood Ratio	813	812.3	576.5	214.1
d.f. (probabilityχ^2 >LLR)	20 (0.000)	15 (0.000)	14 (0.000)	10 (0.000)
Dependent variable *M*	Observed frequency (mean, standard error of predicted value)			
1 (Very unlikely)	0.32	0.32	0.34	0.31
	(1.67, 0.73)	(1.70, 0.75)	(1.63, 0.74)	(1.80, 0.95)
2 (Unlikely)	0.43	0.43	0.43	0.42
	(1.97, 0.85)	(1.96, 0.87)	(1.88, 0.88)	(2.14, 1.14)
3 (Not sure)	0.17	0.17	0.16	0.16
	(2.47, 0.97)	(2.47, 0.94)	(2.40, 0.96)	(2.81, 1.27)
4 (Likely)	0.06	0.06	0.06	0.08
	(2.68, 0.99)	(2.67, 1.00)	(2.53, 1.07)	(2.96, 1.26)
5 (Very likely)	0.02	0.02	0.02	0.03
	(2.77, 1.15)	(2.85, 1.10)	(2.73, 1.15)	(3.32, 1.25)

[=] Estimation includes city-level fixed effects, not shown.

Table 9: Effects of Selected Variables on the Intention of SOE Workers to Change Jobs
(Based on estimates in column 4 of table 8)

	Predicted probability of "likely" or "very likely" job change[2]	Incremental probability over base case	Percent difference in probability over base case
Base case[1]	0.20488		
Variation from base case:			
GAP = 1.18	0.26888	0.064	31%
HOUSING = 0	0.23983	0.035	17%
SECURITY = mean–0.63	0.24996	0.045	22%
CONFDNC = mean–0.73	0.24554	0.041	20%

[1] Base case: all independent variables are set to their (weighted) sample mean except i) *GAP=0 and HOUSING=1.*

[2] The predicted probability equals $\Phi(\delta_3-\alpha_m-b_m \times GAP - Z \times Q_m)$, where Φ is the cumulative distribution of standard normal.

Appendix I: Survey Method

Sampling

3964 respondents from 180 firms in nine cities participated in the survey. They were recruited through a multi-stage sampling procedure. The sampling frame of the first stage consisted of all Chinese mainland cities of provincial capital or with provincial status. They were grouped into three tiers based on their per capita income in 1996. Three cities were selected from each tier; they were: Beijing, Shanghai, and Guangzhou (high income); Nanjing, Wuhan, and Chengdu (medium income); and Changchun, Guiyang, Xi'an (low income).

In the second stage, the manufacturing firms with 100 or more employees in each of the nine cities were classified into four types by ownership structure – state-owned, collective-owned, joint-stock, and Chinese-foreign joint venture – according to the 1996 national industrial statistical data bank supplied by the Chinese Statistical Bureau. 20 firms were randomly selected among each type. Only the manufacturing sector is covered because in other sectors fewer types of ownership existed. After eliminating the firms that declined survey, went out of business, located too far away from the city center to be reached by our field interviewers, or did not have a large enough number of the middle level managers required by our sample criteria, 78.3% of the randomly selected firms were included in the final sample. The remaining number of the firms in the final sample were selected by the field interviewing firm, with the balance in enterprise types, industrial sectors, and location distribution taken into account.

In the final stage, 22 employees were selected from the employee list supplied by the personnel department of each firm, excluding the employees from such "side-line" departments as firm-run kindergarten or hotel who had little to do with the firm's main line of business. Among the 22 interviewees, one was a personnel manager, one marketing manager, 10 randomly selected middle-level managers, and 10 randomly selected non-managerial employees. The total sample also include four extra employees from different firms interviewed in Shanghai

Data Collection

The data were collected in a 6-week time period from November 17 to December 26, 1997.

Firm Level Data. Firm level data were first obtained from a questionnaire completed by the personnel manager. They were then verified according to the data available from the previously mentioned national industrial statistical data bank. In the few cases where discrepancies were found, we use the data from the data bank because it had been officially audited.

Individual Level Data. Individual data were collected through face-to-face interviews. A major market research company in Beijing with branches in all of the nine cities studied was commissioned to carry out the interviews.

Appendix II: SIC Codes for the Firms in the Sample

13 Food processing
14 Food products
15 Baverages
17 Textile
18 Garment
19 Leather and fur products
20 Wood and bamboo products
21 Furniture
22 Paper and paper products
23 Printing and printing materials
24 Stationary and sports goods
26 Chemical material and products
27 Pharmaceutical products
28 Synthetic materials
29 Rubber products
30 Plastic products
31 Non-metal mineral products
32 Ferrous smelting and processing
33 Non-ferrous smelting and processing
34 Metal fabrication
35 General machinary
36 Specialized machinary
37 Transportation equipment
40 Electrical and electric products
41 Electronic and communication products
42 Scientific and office equipments
43 Other manufacturing
44 Electricity and heated water production

Technology intensive industries include industry 26 through 28 and 31 through 42.