

Wage Differentials and Ownership Structure in Chinese Enterprises^{*}

Yi Chen

CERDI, Université d'Auvergne

yi.chen@u-clermont1.fr

Sylvie Démurger

HIEBS, the University of Hong Kong and CNRS (France)

demurger@hku.hk

Martin Fournier

CEFC (Hong Kong) and Université d'Auvergne

mfournier@cefc.com.hk

This version: March 11, 2004

Abstract.

This paper analyses the determinants of wage differentials among different ownership enterprises in urban China in 1995, using an extended version of Oaxaca-Blinder decomposition methods. We find higher wages in state-owned and foreign-invested enterprises compared to urban collectives, but no significant difference in hourly wages between central state-owned and foreign-invested enterprises. Moreover, we find strong evidence for a multi-tiered labor market in China, the conjunction of pure ownership differences and differences in hours worked being the major determinants for observed gaps. We also show that, although foreign-invested enterprises allow for higher global annual income, it is at the cost of a longer working time.

Key words: labor market, wage differentials, enterprise ownership, China.

JEL classification: J31, J42, P23, O53.

^{*} The authors are grateful to Li Shi for providing access to the household income survey data used in the paper. We are also indebted to Marc Gurgand, Hu Yifan, Li Shi and Scott Rozelle, as well as to participants at the research seminars in Lingnan University (Hong Kong) and in the University of Hong Kong, and at the fourth International Conference on the Chinese Economy, CERDI (France, October 23-24, 2003) for useful comments on earlier drafts.

Corresponding author: Sylvie Démurger, HK Institute of Economics & Business Strategy, Room 903, K. K. Leung Building, University of Hong Kong, Pokfulam Road, Hong Kong. Tel: (852) 2859 1033 / Fax: (852) 2859 3223.

1. Introduction

Urban industrial reforms and the implied changes on China's labor market are one of the key elements in the process of China's transition toward a market economy, as well as a main challenge for coming reforms in order to sustain both economic growth and social stability. Rather than privatizing state-owned enterprises (SOEs) in the course of the reform process, the Chinese government decided to gradually reform the state sector, while encouraging at the same time the emergence of a competing non-state sector. The employment structure has thus been diversified with the development of a dynamic non-state sector composed of collective enterprises, private and individual enterprises and foreign enterprises. Meanwhile, despite reforms being gradually carried out, SOEs' performance kept deteriorating and SOEs had to face many difficulties, including financial losses and over-staffing that led to massive layoffs in recent years (Lin *et al.*, 2001).

The evolution of the state and non-state sectors has had important implications on changes in both employment and labor income structures. Indeed, reforms led to the coexistence of enterprises facing very different institutional and economic environments: on one hand, SOEs are still operating according to the central administration' plan or requirements, while on the other hand, urban collectives, private and individual enterprises, and foreign enterprises behaviors are gradually driven by market forces. Moreover, given the high heterogeneity in Chinese enterprise ownership and management, wage heterogeneity can be expected as a key feature of the Chinese labor market, since wages and employment are largely influenced by different institutional rules. In this paper, we thus intend to investigate the different aspects of the "multi-

tiered” Chinese urban labor market and their contribution to wage differentials between enterprises of different ownership structure.

A multi-tiered labor market in which wages are not only determined by skill differentials, but also by different institutional arrangements may have several implications in terms of labor allocation among sectors and income distribution among workers. In the case of China, Zhao (2002) pointed out that although earning differentials between state-owned and non-state enterprises are one of the major forces which should drive labor reallocation in China out of the state sector, the payment of higher non-wage benefits in SOEs prevents labor from moving to non-state enterprises. Moreover, as emphasized by Knight and Song (2003), labor market segmentation between enterprises of different ownership may be one of the potential sources for the observed growing income inequality in urban China.

Based on the existing literature, our paper aims at studying and analyzing the determinants of wage differentials between the different types of enterprises in China. Our analysis uses the household survey conducted by the Chinese Academy of Social Sciences (CASS), which provides detailed information on labor income as well as on individual and household characteristics for the year 1995. Available data for this particular year is used to analyze the structure of the labor market after 10 years of reforms in urban China and the extent to which labor market has become market forces-driven. Analyzing these issues might help shedding some light on the achievements of the reforms as well as the remaining difficulties. We thus examine whether the Chinese urban labor market is segmented by ownership structure and how much this segmentation contributes to wage differentials among workers. We first estimate Mincer wage equations by type of enterprises to explain the observed wage differentials among SOEs at central or provincial level, local publicly-owned enterprises, urban collective enterprises, and foreign-

invested enterprises. We then propose an extended form of Oaxaca-Blinder decompositions to distinguish in total wage differentials what is due to the distribution of individual characteristics from what is due to differences in working hours and from what can be imputed to a “pure ownership difference” in the labor market.

The paper is organized as follows. Section 2 briefly presents the evolution of the labor market in China over the last two decades, and proposes a literature review on labor segmentation issues in China. Section 3 provides some descriptive statistics on wage differentials by type of enterprise ownership structure in 1995. Section 4 presents the methodology used for analyzing wage differentials by ownership enterprise in urban China in 1995. Section 5 discusses econometric results on wage equations in the various categories of enterprise ownership and on the determinants of worked hours by enterprise, and presents decomposition results of the wage gaps between enterprises types. Section 6 summarizes the findings and concludes.

2. The evolution of the labor market in China

2.1. Labor market reforms in China

Before reforms were launched at the end of the 1970s, there was basically no labor market in China. Job allocation and wage-settings in state-owned enterprises (SOEs) were determined within the central plan and a key function held by SOEs was to give employment to the whole working-age population. The main features of this centrally-determined wage structure were the following¹. First, the rigid wage determination system was accompanied by both low level wages and a distribution of wages based on an egalitarian principle, promotion and wage increases being

¹ A detailed description of the pre-reform wage-setting system is given in Meng (2000, chapter 2). See also Lin *et al.* (2001).

mostly driven by seniority and qualification. In this context, SOEs were not only labor providers, but they also provided a number of social welfare benefits, including housing, medical care, pensions, etc., which were aimed at compensating for low base wages. Finally, due to the employment assignment system and the strictly controlled movement of the population (within the household registration system, *hukou*), labor mobility was very limited both between sectors and regions.

Since China launched economic reforms at the end of the 1970s, the Chinese labor market experienced great changes. In particular, the emergence of the non-state sector led to a reallocation of the labor force out of the state sector (composed of firms under the direct control of the central or local governments). As indicated in Table 1, the share of the non-state sector in employment grew steadily since 1978 and accounted for 35% in 1995². The non-state sector is composed of collective enterprises, foreign-invested enterprises³, domestic private enterprises⁴, individual enterprises (*getihu*), domestic joint-ventures (*lianying qiye*), and share-holding companies (*gufenzhi qiye*). Collective enterprises have played an important role in offering additional employment at the early stage of the reforms (OECD, 2002). Otherwise, domestic private enterprises suffered from the restricting policies such as overtax, strict regulation, limited access to loans and skilled employees in the 1980s. During the 1990s, domestic private enterprises have experienced rapid development and gradually gained legitimacy, while the weight of collective

² In terms of industrial production, the growing importance of the non-state sector is even more remarkable: the non-state sector's share of manufacturing output increased from 22.4 per cent in 1978 to 62.8 per cent in 1995.

³ Firms with foreign ownership (*sanzhi qiye*) are of three types: joint ventures (*hezhi jingying qiye*), firms that have entered into co-operation agreements (*hezuo jingying qiye*) and wholly foreign-owned firms (*waizhi jingying qiye*) (Démurger, 2000).

⁴ In 1988, the State Council issued the Tentative Stipulations on Private Enterprises (TSPE) to govern the registration and management of private firms. This document defined a private firm as “a for-profit organization that is owned by individuals and employs more than eight people.” Firms that hired eight employees or less can be registered as individual enterprises (*getihu*). The TSPE identified three types of private firms: those under sole ownership, partnerships, and limited liability companies. However, it was only in March 1999 that private ownership and the rule of law were formally incorporated into the Chinese Constitution.

enterprises in the economy has been reducing. As can be seen from Table 1, within the non-state sector, collective enterprises saw their share going down while the “private” sector grew from less than 5% in 1988 to 13% in 1995. Non-state enterprises (other than collective enterprises) became the leading engine of reforms, introducing market forces into the Chinese economy. These enterprises being out of the central plan, their behavior is closer to profit-maximization objectives and they independently determine both their employment policy and salary scales.

In the meantime, the state-owned sector also experienced important reforms. In a first step, some autonomy in decision-making for employment and wages has been given to SOEs managers. They were authorized to retain part of their profit and share it with their employees in the form of bonus wage payments. Bonus wages were aimed at providing incentives to employees and increasing the overall productivity of SOEs. Their amount were also supposed to reflect both enterprise and individual performances (Coady and Wang, 2000; Meng, 2000). However, due to high supervision costs, the bonus has often been distributed on an egalitarian basis within working units, and its impact is controversial. From 1993 onwards, SOEs have been allowed to put workers in the situation of waiting for a job (*xiagang*) by giving them subsistence revenue. Nevertheless, State intervention continued to influence SOEs behaviors. Constrained by the inefficiency of their organization structure, and submitted to growing competition from the non-state sector, SOEs have been facing a difficult situation, leading to massive lay-offs in the second half of 1990s.

Both the evolution of the non-state sector and changes in the state-owned sector have had significant impacts on the allocation of the labor force as well as on income distribution among urban workers (Knight and Song, 2003; Park *et al.*, 2003). Analyses of these changes need

to account for the determinants of wage differentials among urban workers and in particular between different types of enterprises, claiming for a deeper analysis of the issue.

2.2. Labor market segmentation in China: literature review

A growing number of works has been studying changes in China's wage structure over the last decade. Recently, the larger availability of nation-wide household surveys has allowed for deeper statistical analyses of this issue, focusing on various complementary aspects. In particular, a large number of papers focus on rising returns to education, emphasizing the higher returns to education experienced by the non-state sector, including both private or individual enterprises and foreign-invested enterprises (Fu and Gabriel, 2000; Li, 2003; Maurer-Fazio, 1999; Zhang and Zhao, 2002). Another area of research focuses on the wage gap between different groups of workers, analyzing labor market segmentation between rural migrants and urban residents (Knight *et al.*, 1999; Maurer-Fazio and Dinh, 2002; Meng and Zhang, 2001) or discrimination against women in urban China (Gustafsson and Li, 2000; Liu *et al.*, 2000; Qian, 1996). Most of these studies find that ownership structure of enterprises is a significant explanatory factor for observed wage gaps.

Hence, the empirical literature on the Chinese wage structure shows the potentially important role of enterprises ownership in explaining wage-setting behaviors. Moreover, as mobility between enterprises is constrained, the urban labor market in China, characterized by the coexistence of very different types of enterprises, is more likely to be segmented by ownership type, and wage-setting behaviours may be varying as a result of differences in the market orientation of enterprises (Dong and Bowles, 2002). This question has been studied in various papers, including Putterman (1992), Howell (1997), Dong and Bowles (2002) and Zhao (2001,

2002). The literature usually claims that the Chinese labor market is segmented by ownership. However, only Dong and Bowles (2002) and Zhao (2001, 2002) have done econometric analysis and results differ depending on data and econometric methods used. Moreover, the magnitude of the phenomenon is usually not formally evaluated.

Dong and Bowles (2002) analyze the segmentation issue by ownership type, using survey data on SOEs, township and village enterprises, joint-ventures, and wholly foreign-invested enterprises in the light industrial goods sector in 1998. They find no significant differences in returns to education among firms of different ownership types, but significant differences appear in returns to experience, rewards to experience being significantly higher in foreign-invested enterprises than in the three other categories of ownership. They conclude in favor of a decreasing segmentation of the labor market by ownership, at least in the light industrial goods sector, and acknowledge that segmentation by firm or by regions might nevertheless be an important force in explaining wage differentials.

Closer to our approach are Zhao (2001, 2002)'s papers, which look at wage differentials among enterprises of four types of ownership (SOEs, urban collectives, domestic private enterprises and foreign-invested enterprises). Zhao finds that, after taking account of non-wage benefits, workers in SOEs earn significantly more than workers in urban collectives or domestic private enterprises. She claims that because of the duality of the Chinese economy, foreign-invested enterprises have to pay a higher salary to attract skilled workers. On the opposite, they have access to an abundant non-skilled labor force, to which they can offer relatively low wages.

Our paper differs from Zhao's works and extends the analysis on the following points. First, Zhao uses data that do not include direct information on hours worked, which we found to play a central role in explaining wage differentials across ownership structures. Second, her data

rely on “secondary data” composed of aggregate statistics concerning non-wage benefits (such as pensions, housing, and health care), which cannot directly match the wage data used and which represent a significant income source for SOEs employees. Third, Zhao treats SOEs as homogeneous entities while our paper shows that there are at least two very different types of SOEs as far as wage determination is concerned. Finally, we propose an extended version of Oaxaca-Blinder decomposition methodology with emphases on path dependence and robustness issues.

3. Wage differentials in 1995: some descriptive statistics

3.1. Data set and variables definition

Our data come from the 1995 survey of the China Household Income Project (CHIP). These data were collected in 1996 by a team headed by the Institute of Economics, Chinese Academy of Social Sciences (Riskin *et al.*, 2001), and cover 6,931 households and 21,694 individuals in urban China⁵. The survey covers 11 provinces⁶, among which only 4 are located along the coast (Beijing, Liaoning, Jiangsu and Guangdong).

The sample we use in this study is composed of 11,238 workers. We chose to consider only individuals aged 16 to 60, who declared working at least part of the year and earning (positive) wages. Owners of private or individual enterprises are not included in the sample, since we cannot disentangle wages from profit in their case.

⁵ The Chinese Household Income Project is a joint research effort sponsored by the Institute of Economics, Chinese Academy of Social Sciences, the Asian Development Bank and the Ford Foundation. Additional support was provided by the East Asian Institute, Columbia University (Riskin *et al.*, 2000).

⁶ The sample includes the following provinces: Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Henan, Guangdong, Yunnan, Sichuan, Gansu and Hubei.

The wage variable is defined as the sum of the base salary, bonuses, allowances (except those allowances given while “waiting for a job”, *xiagang*) and subsidies (including housing, medical, child care and regional subsidies), other wages (including overtime wages and wages for special circumstances), other income from work unit (except hardship allowances) and income in kind. As a base for comparison in the descriptive part, we also use labor income. Labor income is thus composed of the wage variable, plus other income from labor (including from a second job) and private or individual enterprise proprietor’s pre-tax net income. Hourly wages are defined as the ratio between wages and the number of declared hours worked in a year.

We consider 5 types of enterprises ownership: SOEs at central or provincial level, local publicly-owned enterprises, urban collective enterprises, private or individual enterprises and foreign-invested enterprises (comprising both Sino-foreign joint ventures and foreign-owned enterprises). At the aggregate level, SOEs at central or provincial level account for 9.3% of the total number of SOEs, while local publicly-enterprises account for the remaining 90.7%. However, SOEs at central or provincial level have on average a larger size since they employ 37.7% of the total labor force in the state-owned sector⁷.

In a preliminary step, Table 2 provides descriptive statistics on workers characteristics, by enterprise ownership. On average, those working in SOEs at central or provincial level tend to be older and have a longer work experience than in any other enterprise type. They also tend to be more educated, and working in less non-qualified jobs. Although not very large, the difference in terms of the average number of years of education is even significant between SOEs at central or provincial level and foreign-invested enterprises. SOEs at central or provincial level also tend to employ relatively more male workers, with a communist membership, on long-term contracts,

⁷ Source: *China Labour Statistical Yearbook*, 1995.

but tend to be less predominantly situated in coastal provinces. The comparison between SOEs at central or provincial level and foreign-invested enterprises also reveals that, unsurprisingly, the latter tend to be much more concentrated in the secondary sector than in the tertiary sector, and are mostly located in coastal areas. Worker profiles in local publicly owned enterprises show that they are very close to the average, while there are much more non-qualified workers and female workers in urban collectives.

3.2. Wage differentials by ownership

As can be seen from Table 3, both wages and labor income are the highest in foreign-invested enterprises and the lowest in urban collectives. On average, wages in foreign-invested enterprises in 1995 are 71% higher than in urban collectives, 58% higher than in private or individual enterprises, 34% higher than in local SOEs, and 17% higher than in SOEs at central or provincial level. Mean tests confirm that workers from foreign-invested enterprises earn significantly more than workers from SOEs at central or provincial level, and the latter earn significantly more than workers from local publicly owned enterprises. Workers from urban collectives and private or individual enterprises come last, the difference between the two being not significant.

The decomposition of wages by components confirms that non-wage benefits are important when accounting for differences between the state and the non-state sectors (Zhao, 2002). Although our dataset might still not include all kind of non-wage benefits, Table 3 nevertheless shows that the highest bonuses and subsidies are indeed given in SOEs as compared to the non-state sector (both domestic and foreign). In particular, it shows that both central and local SOEs provide much more subsidies (such as housing, health care or child care subsidies)

than non-state enterprises, and in 1995, these subsidies accounted for nearly 20% of wages paid by SOEs.

These results are quite usual in the literature and seem to be common knowledge for Chinese workers. However, taking into account hours of work leads to quite different and rarely mentioned results. Indeed, as far as hourly wage is concerned (Table 4), employees from foreign-invested enterprises and SOEs at central or provincial level still earn significantly more than in the other types of enterprises, but the difference between the two categories is no longer significant. Thus, although employees from foreign-invested enterprises appear to be better paid in terms of total wage, they work significantly more than employees from the state sector, which reduces considerably the differences in wage rates among the two categories. Again, at the bottom of the hourly wage scale are workers in private or individual enterprises, since they also work the longest (56 hours a week on average).

Finally, Tables 5 and 6 show total wage and hourly wage comparisons by sex, educational level and region. On average, men tend to be better paid than women, wages tend to increase with the level of education, and workers living in coastal fast-growing provinces (Jiangsu and Guangdong) tend to earn more than those living in non-coastal provinces. However, concerning the level of education, a closer look at differences reveals that in private or individual enterprises, a college level of education does not imply a higher salary. On the other side of the wage scale, in foreign-invested enterprises, the most remarkable effect of education is to be found for higher levels of education (professional or college).

3.3. *Wage distribution by ownership*

Coefficients of variation given Table 4 reveal that the highest differences among workers happen to be in private or individual enterprises, while the lowest differences are observed in SOEs at central or provincial level. This result comes at no surprise since private enterprises include very different types of units, from tiny street shops to small-scale firms. These findings are corroborated by kernel density estimations for the distribution of income by ownership category, respectively for the logarithm of total wages (Figure 1) and of hourly wages (Figure 2). Each graph shows the distribution for the whole sample ($wage$, $hwage$) as well as for ownership category sub-samples.

Kernel densities show a more concentrated wage distribution for SOEs and urban collectives (UCEs) with thin distribution tails, whereas private or individual enterprises (PIEs) and foreign-invested enterprises (FIEs) have a much wider wage distribution. Figure 1 also tends to show a bimodal distribution for FIEs' wages, with a lower second mode for lower wages. This result is consistent with Zhao (2001)'s hypothesis of a segmented labor market between high and low-educated workers within FIEs. However, once working hours are taken into account, the distribution becomes unimodal (Figure 2). Once again, apparent high wages in FIEs for high educated workers are to be attributed to some extent to longer working days.

Kernel density estimations for hourly wages further illustrate our previous findings on differences in mean wages for SOEs and FIEs. Indeed, the difference between SOEs at central or provincial level and FIEs wage distributions observed for total wages (Figure 1) is much reduced for hourly wages. Figure 2 actually shows that the difference between the two distributions mostly comes from a greater variance for FIEs. Indeed, FIEs hire more workers at lower as well as at higher hourly wages than SOEs at central and provincial level, the modes for both

distributions being quite similar. It is thus true that FIEs provide higher wages, especially for high educated workers. However, FIEs also present a wider wage scale and offer more below-average wages than SOEs.

4. Methodology for analyzing wage differentials by enterprise ownership

Our objective is to explain observed wage disparities between enterprises of different ownership structure using an extended version of Oaxaca-Blinder decomposition method (Blinder, 1973; Oaxaca, 1973)⁸. We intend here to isolate what is due to structural socio-economical differences between workers of different types of enterprises, and what is due to a “pure ownership” difference⁹. The basic idea of this decomposition technique is to propose counterfactual situations corresponding to income that would be earned by workers observed in one type of enterprise, had they been faced with the income generating model observed for another type of enterprise. By “income generating model” we understand the mechanisms through which individual income is determined by economic mechanisms given his/her socio-economic characteristics. Comparing observed and counter-factual incomes thus allows for an evaluation of the “pure ownership” difference. For example, a difference between observed income for SOEs’ workers and the counterfactual income that they would obtain under the “foreign enterprises model” provides an evaluation of the segmentation that occurs between these two types of enterprises. Indeed, if there was no “pure ownership” difference, income

⁸ Extensions of this type of decomposition have recently been largely developed (see Bourguignon *et al.*, 2001).

⁹ We prefer to use the “pure ownership difference” terminology instead of “segmentation” since, as we will see below, it might also include mechanisms not strictly related to segmentation.

under the SOEs' model (observed income) should be equal to income under the FIEs' model (counterfactual) for any given socio-economic characteristics.

As mentioned above, another dimension of particular importance concerns the number of hours worked. Indeed, strong differences can be noticed in working times across enterprises types. Our decomposition thus distinguishes three different effects: differences in characteristics, differences in hours worked and a “pure ownership” difference.

4.1. Decomposing hourly wages differences across enterprise types

Formally, let w_s^i represent hourly income of individual i belonging to enterprise type s . w_s^i may be assumed to depend on three sets of arguments:

- i) Individual observable socio-demographic characteristics or those of his/her household (x),
- ii) Unobservable characteristics (ε),
- iii) A set of parameters corresponding to the wage model linking socio-demographic characteristics to observed income (β).

The hourly wage generating process can thus be expressed as a function W of these three sets of arguments¹⁰:

$$w_s^i = W(x_s^i, \varepsilon_s^i; \beta_s) \quad (1)$$

Within this framework, observed differences in average hourly wages between two given types of enterprises may come from two different potential sources:

- i) A difference in average socio-demographic characteristics of workers in the two types of enterprises,

¹⁰ W thus represents the specification chosen for the “wage generating model”.

ii) A difference in the wage generating models between the two types of enterprises.

The first source of difference in average hourly wages between enterprises (i) corresponds to market-based differences in wages, differences in socio-demographic characteristics such as education or age leading to differences in average wage. Different types of enterprises being specialized in different sectors, the socio-demographic structure of workers naturally differs. The latter source of differences in average hourly wages between enterprises (ii) reveals a segmentation process since two individuals with the same socio-demographic characteristics have different wages depending on which type of enterprises they are working for.

It is thus possible to decompose observed hourly wage differences into these two components as follows (2 enterprise types: s and f):

$$\text{Pure difference-in-characteristics effect: } E_{sf}^i = W(x_s^i, \varepsilon_s^i; \beta_s) - W(x_f^i, \varepsilon_f^i; \beta_s) \quad (2)$$

$$\text{Pure ownership difference: } S_{sf}^i = W(x_s^i, \varepsilon_s^i; \beta_s) - W(x_s^i, \varepsilon_s^i; \beta_f) \quad (3)$$

The “pure difference-in-characteristics effect” E_{sf}^i corresponds to the difference in income between workers of enterprise type s and workers of enterprise type f due to differences in the structure of individual characteristics x , controlling for differences in remuneration of those characteristics (since all individuals are given the same remuneration vector β_s). Symmetrically, the “pure ownership difference” S_{sf}^i corresponds to the difference in hourly wages due to differences in remuneration of individual characteristics between enterprise types s and f , for a given structure of characteristics x (namely, that observed for workers in enterprise type s). The formulation can then be averaged to evaluate the overall mean effect.

4.2. Introducing the impact of differences in hours worked

As shown earlier, the Chinese labor market shows strong differences in the number of hours worked by enterprise type. This dimension can in turn be included in the approach presented above. Indeed the total wage income of individual i working in enterprise s (I_s^i) is the product of the hourly wage obtained in enterprise type s (w_s^i) by the number of hours worked in enterprise type s (h_s^i):

$$I_s^i = h_s^i \cdot w_s^i \quad (4)$$

where h_s^i can be modeled for each enterprise type s as a function H of individual observable and unobservable characteristics (z_s^i and η_s^i) with parameters γ_s :

$$h_s^i = H(z_s^i, \eta_s^i; \gamma_s) \quad (5)$$

Observed differences in total wages between two given types of enterprises (s and f) may thus be decomposed into three components as follows:

Pure difference-in-characteristics effect:

$$IE_{sf}^i = H(z_s^i, \eta_s^i; \gamma_s) \cdot W(x_s^i, \varepsilon_s^i; \beta_s) - H(z_f^i, \eta_f^i; \gamma_f) \cdot W(x_f^i, \varepsilon_f^i; \beta_f) \quad (6)$$

Pure ownership difference:

$$IO_{sf}^i = H(z_s^i, \eta_s^i; \gamma_s) \cdot W(x_s^i, \varepsilon_s^i; \beta_s) - H(z_s^i, \eta_s^i; \gamma_s) \cdot W(x_s^i, \varepsilon_s^i; \beta_f) \quad (7)$$

Pure difference-in-hours-worked effect:

$$IH_{sf}^i = H(z_s^i, \eta_s^i; \gamma_s) \cdot W(x_s^i, \varepsilon_s^i; \beta_s) - H(z_s^i, \eta_s^i; \gamma_f) \cdot W(x_s^i, \varepsilon_s^i; \beta_s) \quad (8)$$

In the same line as for hourly wages, this decomposition corresponds to the evaluation of what would be the difference in average total wage income between workers in enterprises type s and f under the following three hypothetical conditions:

i) If workers were working in the same enterprise type (i.e. facing the same model in terms of income determinants and hours worked)? $\Rightarrow IE$: Pure difference-in-characteristics effect.

ii) If workers were endowed with the same socio-demographic characteristics and if they were facing the same model in terms of hours worked? $\Rightarrow IO$: Pure ownership-difference effect.

ii) If workers were endowed with the same socio-demographic characteristics and if they were facing the same model in terms of income determinants? $\Rightarrow IH$: Pure difference-in-hours worked effect.

4.3. Path dependence and robustness tests

This approach falls in the line of the well-known Blinder-Oaxaca decomposition methodology. A common problem with this methodology is path dependence. Indeed, effects are likely to depend on the reference population that is used to evaluate them. In other words, it is generally the case that:

$$IE^{sf} \neq IE^{fs} \quad \text{and} \quad IO^{sf} \neq IO^{fs} \quad \text{and} \quad IH^{sf} \neq IH^{fs}$$

Moreover, decompositions presented above can be run in sequence, every order leading to a potential difference in evaluation since evaluations are based on different reference populations. Overall, each of the three effects can be evaluated in four different ways depending on the base population chosen and the sequence chosen. In the application that follows, we take into account each alternative evaluation of the various effects and use them as a robustness test for our decomposition results.

4.4. Practical implementation

The implementation of the decomposition methodology includes three phases. First, we estimate the remuneration structure of all types of enterprises correcting for potential selection biases as well as equations of the number of hours worked. Second, we simulate counter-factual

incomes for all observed workers, each enterprises types and each potential model for hours worked. Finally, we compute average counter-factual incomes under all combinations.

5. Explaining wage differentials by ownership structure in urban China

5.1. Income functions

Since the choice of the type of enterprise and expected remuneration are closely linked mechanisms, estimating wage functions for various enterprises types implies to deal with the selection bias issue. Here, we model the enterprise type choice through a multinomial Logit model (see Appendix 1) and we estimate Mincerian earning functions correcting for selection biases through the procedure proposed by Dubin and McFadden (1984)¹¹. Table 7 thus presents results of Mincer-type wage regressions by enterprise ownership¹². As previously stated, the dependent variable is hourly wage in 1995. The specification includes human capital characteristics (education and experience), the economic sector and geographical residence variables¹³.

We chose not to estimate income functions for private or individual enterprises, and thus drop them from the subsequent analysis for the following reasons. First, since we restrict our

¹¹ See Bourguignon *et al.* (2004) for a discussion of Dubin and McFadden (1984) advantage over Lee (1983) and Dahl (2002) approaches to selection bias correction with a multinomial Logit model.

¹² Chow tests performed to test the null hypothesis that the β -coefficients in wage equations between two different enterprise ownerships are the same, all indicate that the null hypothesis can be rejected at the 1 percent level.

¹³ The reference categories for the regional location and the economic sector are respectively non-coastal region and secondary sector (industry and construction). Most of the studies on the wage structure in China also include Communist Party membership to account for a potential premium paid to Communist Party members (among others, see Gustafsson and Li, 2000; Knight and Song, 2003; Li, 2003; Yueh, 2004). The corresponding earning estimates, on pooled data for all types of enterprises, usually indicate that the wage premium for Party membership ranges between 7 to 10%. In our estimations, however, being a Communist Party member does not significantly raise wages, which might indicate that findings on pooled data are strongly correlated with enterprise ownership choices.

analysis to workers earning a salary, and due to the fact that most of the private or individual enterprises are of a very small size, we had too few observations to estimate consistent earning functions for this category. Second, private or individual enterprises include very different economic situations, which are difficult to account for in the estimation, without further splitting the sample.

Wage equation regressions reported in Table 7 show higher returns to education in foreign-invested enterprises. In terms of gender differences, returns to education appear to be higher for women, especially in SOEs at central or provincial level. For men, returns to education are higher in local publicly-owned enterprises than in SOEs at central or provincial level, while for women, they are not significantly different. For both men and women, we do not find any significant returns to education in urban collectives, indicating that in this type of enterprises, education is not a decisive criterion for wage setting. Indeed, as seen in the descriptive part, workers in urban collectives tend to be less educated than the average of the sample. Compared to Dong and Bowles (2002)¹⁴, we find higher returns to education, ranging from 2% to 7% for one additional year of schooling depending on enterprise ownership. Our results are however consistent with Li (2003), Yueh (2004) and Zhao (2002)¹⁵.

The usual concave form for actual work experience¹⁶ is found for SOEs and urban collectives but returns to experience are not significant for foreign-invested enterprises. The

¹⁴ Their estimation is based on 1998 enterprise survey data from Dalian and Xiamen. Their estimated rate of returns to education is 2.3% and they find none of the interactive ownership dummies on human capital variables to be statistically significant.

¹⁵ Using the same data base (CHIP) for 1995, Li (2003) gets an overall return to education of 5.3% for hourly wages. Moreover, taking together private or individual enterprises and foreign-invested enterprises as the private sector, he finds that the private sector rewards the highly educated more, while the state-owned sector rewards the less educated more. Yueh (2004) also finds that in 1995, an additional year of education is associated with a 4% increase in income. Using a 1996 urban household survey, Zhao (2002) finds the returns to education to be 4.2% for SOEs, 3.2% for collective enterprises, and 7.9% for foreign-invested enterprises.

¹⁶ We use the actual number of years of work experience given by the 1995 CHIP survey.

estimation of separate earning functions by ownership shows that wage peaks are not uniform across ownership and gender (see the bottom line of Table 7). First, differences between men and women can be observed with steeper but more concave returns to experience for women in all enterprise types. Women thus reach their wage peak on average 3 to 13 years earlier than men, depending on enterprise type. The same order of difference between men and women has been found on pooled data for all types of enterprises by Li (2003). Moreover, differences in wage peaks between SOEs and urban collectives show that in the former, returns to experience do not show any decreasing pattern for men since the maximum earning is at 40 to 44 years of experience. This result is consistent with Meng and Kidd (1997), who found that the experience profile rises continuously until retirement in the state-owned sector¹⁷. Lower wage peaks found by Knight and Song (2003), Li (2003) and Yueh (2004)¹⁸ are more in line with wage peaks in urban collectives. The observed difference in experience earning profile between SOEs and urban collectives can be interpreted in terms of market forces at work in the determination of wages. It suggests that in 1995, market forces were playing a bigger role in wage setting in urban collectives than in SOEs, where the resistance to changes in wage determination (particularly concerning seniority rewarding) is stronger. Finally, the absence of significant returns to experience in foreign-invested enterprises stresses the fact that, as shown in descriptive statistics (Table 2), workers in foreign-invested enterprises are relatively much younger and have less experience. Moreover, it also highlights the specificity of this newly developed form of ownership, in which

¹⁷ They use data from a firm-based employee survey for the period 1981-87, and estimate total wage equations for 1981 and 1987.

¹⁸ They all use the same data base (CHIP) for 1995 and provide estimation on pooled data for all types of enterprises. Li (2003) estimates an hourly wage function, while both Knight and Song (2003) and Yueh (2004) estimate total earning functions.

experience accumulated on former SOEs positions does not correspond to strong efficiency gains.

When we look at wage differentials by geographical location, we find that workers in coastal provinces earn on average 30 to 60% more than workers in western provinces. This result holds for any kind of ownership and the gap is the highest for men in foreign-invested enterprises. Finally, concerning the economic sector of the job, those working in the tertiary sector in local SOEs tend to be better paid than those working in the secondary sector. On the contrary, male workers in urban collectives employed in the tertiary sector earn significantly lower wages than those employed in industry or construction. For both central SOEs and foreign-invested enterprises, wage differences among economic sectors are less clear-cut, which indicates a lower degree of segmentation between economic sectors in these enterprises.

To summarize, income function estimations provide a first insight of the multi-tiered nature of the Chinese labor market. Indeed, all estimation results are significantly different for the four types of enterprises studied, with large differences observed for returns to education (higher in foreign-invested enterprises), as well as for returns to experience (higher in SOEs and urban collectives).

5.2. The determinants of working hours by enterprise

As shown by Table 4, the average number of hours worked per week differs strongly by enterprise ownership, the highest being in foreign-invested enterprises and the lowest in SOEs at central or provincial level. To take account of these differences, we estimated equations of working hours controlling for both differences in the population structure and differences between ownership. We thus included individual and households characteristics, provincial

location and ownership dummy variables as determinants of the number of hours worked in a week. Differences between ownership dummies are assumed to represent mean differences between enterprises, once individual characteristics have been taken into account¹⁹.

Table 8 presents estimated coefficients of ownership dummy variables for both men and women (the full estimation is given in Appendix 2). The reference category is “SOEs at central or provincial level”. As can be seen from these estimates, there are strong differences in the number of hours worked a week between different ownership, after controlling for individual characteristics²⁰. As suggested before, those working in foreign-invested enterprises have a much longer working week than workers in any other enterprises. Moreover, among domestic enterprises, central SOEs, which offer higher average overall wages, are also shown to provide significantly shorter working hours than local SOEs and urban collectives.

5.3. Decomposition of observed wage differences

Following the methodology presented above, we can now use income functions estimation results to decompose wage differentials into what comes from structural socio-economical differences between workers in the various types of enterprises (Pure difference-in-characteristics effects), what comes from the number of hours worked a week (Pure difference-in-hours-worked effect) and what comes from a “Pure ownership effect”²¹. Decomposition results are shown Table 9 for the whole population of workers (male and female). As discussed in

¹⁹ Estimating different equations for each type of enterprise, as done for wage equations, represents an undertaking which goes far beyond the scope of this paper. Indeed, no instruments can be conceptually thought of to explain the choice of enterprise type without affecting working time choices.

²⁰ All differences are statistically significant at the one percent level except between local SOEs and urban collectives for which the difference is only significant at the ten percent level for men and at the five percent level for women.

²¹ Correction terms for selection biases are treated as individual characteristics and estimated coefficients for the correction terms are included in the “ownership effect” (Dubin and McFadden (1984) does not require any “inversion” of correction terms). Most results hold if correction terms are considered as part of the residual.

Section 4.3, each “couple” of ownership leads to different simulations depending on the simulation base, which provides robustness checks for the results. The range of simulated effects for each component is thus represented by a corresponding “min-max interval” in Table 9, measuring the extent to which the simulated effects are sensitive to the choice of the reference ownership and the sequence used for the simulation²².

Our results can be summarized as follows. First, Table 9 shows that total wage gaps between the different types of enterprise ownership in urban China come from both difference-in-ownership and difference-in-hours-worked effects, rather than from differences in characteristics. Indeed, except for urban collectives whose characteristics appear to be much lower than that of other enterprise types, most of the observed wage gaps can be attributed to the conjunction of differences in ownership and in worked hours. This result confirms that segmentation²³ in the Chinese labor market is an important explanation for wages differentials among workers in different types of enterprises.

Interestingly, our results also show that the importance of the number of hours worked is crucial when explaining wage differentials between foreign-invested firms on one hand, and domestic firms, on the other hand, while it is of a much smaller importance in explaining wage differences among domestic firms (central SOEs, local SOEs and urban collectives). In terms of the “pure ownership effect”, our results show an overall effect in favor of foreign-invested firms against all domestic firms (whatever their ownership structure), and among domestic firms, a strong “pure ownership effect” in favor of both central and local SOEs against urban collectives.

²² Moreover, our results appeared to be robust to changes in both specifications (with different sets of explanatory variables in the wage equations) and methods for selection bias correction (Lee, 1983; Bourguignon et al., 2004), which have not been reported here.

²³ As pointed out above and discussed in more details below, the term “segmentation” is to be understood here in a very broad sense.

More precisely, concerning wage differentials between domestic and foreign enterprises, the observed average wage gap, in favor of the latter, ranges from 1300 Yuan per year (central SOEs) to 3300 Yuan per year (urban collectives). As indicated by the “min-max interval” reported in Table 9, the evaluated effect of differences in characteristics for both central and local SOEs as compared to foreign-invested enterprises is very small and sensitive to the choice of the reference ownership. This effect is thus ambiguous and of minor magnitude in explaining wage differentials with both central and local SOEs, which in turn implies that ownership difference and the number of hours worked are the main explanations. Moreover, although for both local SOEs and urban collectives, the observed wage gap with foreign-invested enterprises mainly results from the “pure ownership effect” (between 60 to 80% of the global “ownership and hours” effect), the decomposition of the wage differential with central SOEs reveals that two-third of the gap can be accounted for by differences in hours worked, and only one-third results from a “pure ownership effect” in favor of foreign-invested firms. Our results thus confirm that foreign-invested enterprises tend to pay on average higher wages than domestic enterprises, although they also tend to ask their employees to work more. Higher total annual wages in foreign-invested enterprises are thus mostly obtained at the cost of higher working hours. Indeed, concerning the specific case of comparison between FIEs and SOEs at central or provincial level, the “pure ownership effect” leads to a yearly pay premium ranging only between 2.7% and 6.4%.

Observed wage gaps are much lower among domestic firms, ranging from 760 Yuan per year (between central and local SOEs) to 2000 Yuan per year (between central SOEs and urban collectives). Table 9 shows that observed wages gaps between SOEs (both central and local) and urban collectives result from the combination of differences in ownership and differences in workers’ socio-economic characteristics, with a much greater importance of the first effect

(between two-third and 90% of the overall observed gap). On the opposite, differences in the number of hours worked do not appear to be an important factor in explaining the gap between SOEs and urban collectives. Indeed, for both central and local SOEs, the difference would even result in higher wages in urban collectives of 2 to 5% per year. These results highlight the much protected situation of workers in SOEs at central or provincial level, which are offered higher wages than workers in other types of domestic (as opposed to foreign) enterprises.

Finally, Table 9 also shows that higher wages in central SOEs compared to local SOEs are entirely due to segmentation forces since differences in individual characteristics of workers would even predict a (small) gap in favor of local SOEs, as would the difference in working hours²⁴. Hence, workers in central SOEs appear to be even more protected than workers in local SOEs, which is not surprising since central SOEs tend to be considered as the pillar of the economy, and are thus highly protected.

We thus find evidence of a hierarchical multi-tiered labor market in China. Controlling for differences in workers socio-economic characteristics, foreign-invested enterprises are the highest paying enterprises before SOEs at central or provincial level, local SOEs, and urban collectives. This ranking mostly corresponds to the ranking of observed total wages. “Pure ownership effect” is a key factor explaining wage gaps between enterprises of different ownership. However, wage differences between foreign-invested enterprises and SOEs at central or provincial level are mostly due to differences in hours worked.

²⁴ For the latter, the increase would be of 125-150 Yuan per year, that is to say an increase in total wage about 2% for workers in local SOEs.

6. Summary and conclusions

This paper analyzes the determinants of wage differentials between four categories of enterprises (SOEs at central or provincial level, local publicly-owned enterprises, urban collective enterprises, and foreign-invested enterprises) in urban China in 1995. We find strong evidence for a multi-tiered labor market in China in 1995, the conjunction of pure ownership differences and differences in hours worked being the major determinants for observed differences in average wages between enterprises' types. More specifically, we find evidence of different paying schemes both among domestic enterprises and between domestic and foreign enterprises. Depending on the category of enterprises considered, different interpretations can be given to these results.

First, as mentioned earlier, the strong magnitude of the “pure difference in ownership effect” emphasized in our decomposition results can be related to segmentation phenomena. Indeed, as far as domestic enterprises are concerned, our results provide evidence for a strong segmentation of the Chinese labor market in 1995. Within domestic enterprises, we find that the observed wage gaps between both central and local SOEs and urban collectives come from the combination of a strong “ownership effect” and differences in workers' characteristics, while the difference between central SOEs and local SOEs is entirely due to the “ownership effect”. These findings stress the dual nature of the domestic production structure in China, with highly protected enterprises still operating under the rules of the planned economy on one hand (central SOEs), and enterprises operating under a mix of market-oriented and planned economy norms on the other hand (urban collectives and in some respect local SOEs). Hence, it can be argued from our results that the over-protected SOEs at central or provincial level were still providing above-market wages to their employees in 1995, as compared to other domestic firms. In this

respect, the payment of huge subsidies, accounting for nearly 20% of total wages in SOEs is certainly of crucial importance in accounting for differences among domestic enterprises. In particular, whatever their economic performance, central SOEs were benefiting from particular institutional factors such as the soft budget constraint, which certainly allowed them to provide higher labor compensations. This interpretation falls in the line of discussions on over-employment in SOEs and on the slow pace at which other enterprises have been absorbing this excess labor. Indeed, since SOEs at central or provincial level were providing better payment than any other (domestic) alternatives, it comes at no surprise that local SOEs and urban collectives failed to drive workers out of large SOEs. Following this line of analysis, it can be expected that further reforms of the state sector undertaken since 1995 should have resulted in decreasing segmentation (market forces playing a greater role in wage determination) and increasing incentives for turning out of large SOEs.

Second, our results also show important wage differentials between domestic and foreign enterprises in 1995, FIEs offering much higher total wages than any domestic enterprise. Pure-ownership differences and differences in hours worked are the main explanations for these differentials, the contribution of each component varying with enterprises. Indeed, for both local SOEs and urban collectives, the observed wage gap with foreign-invested enterprises mainly results from the pure-ownership effect. However, the decomposition of the wage gap with central SOEs reveals that differences in hours worked explain two-third of the wage differential, while the pure-ownership effect only leads to an annual wage premium ranging from 2.7% to 6.4%. Hence, foreign-invested enterprises are offering higher total annual wages than central SOEs at the cost of higher working hours. Indeed, as shown in the descriptive part of the paper, hourly wages are not statistically different between central SOEs and foreign-invested enterprises, and

the difference may even turn in favor of central SOEs if all unobserved non-wage benefits offered by SOEs could be taken into account.

Here again, our results highlight the central role played by the “pure difference in ownership effect” in wage differentials. However, the issue of the segmentation of the labor market is more complex in this case since different mechanisms are at stake, some of which are not to be interpreted in terms of segmentation. Hence, higher total wages paid in foreign-invested enterprises as compared to domestic enterprises in China can be interpreted according to different lines. First, the higher wages paid in FIEs can be interpreted in terms of the efficiency wage model, where profit-maximizing FIEs have incentives to pay higher wages in order to “buy” workers’ cooperation, boost their effort-intensity, and more generally, improve the average quality of the pool of job applicants. This is certainly all the more important in the Chinese case since FIEs have to face greater difficulties in employee supervision due to language barriers, cultural differences, etc.

A second major line of interpretation for higher wages paid in FIEs can be given in terms of insurance. Indeed, while SOEs, and to a lesser extent urban collectives, were offering better fringe benefits (such as housing), insurance mechanisms (including medical care and pensions) as well as job security in 1995, workers in FIEs were facing strong disadvantages both in terms of compensation and job security. Therefore, FIEs can be expected to offer higher total wages to compensate for these disadvantages and it is thus quite likely that most workers in foreign-invested enterprises would be attracted by higher total annual wages rather than higher hourly wages. Thus, the small magnitude of the “pure difference in ownership effect” between central SOEs and foreign-invested enterprises should not be considered as a segmentation phenomenon and might even vanish or change sign if all non-wage benefits and insurance mechanisms

provided by central SOEs could be taken into account. Here again, our results stress the difficulty for FIEs, and more generally for the whole private sector, to drive workers out of large SOEs.

Of course, as mentioned above, the empirical analysis and interpretations provided in this paper only rely on one specific year (1995). It is thus difficult to draw inferences for the most recent period during which labor market conditions have changed dramatically, especially since the SOEs reforms were launched from 1997 onwards. Unfortunately, access to more recent quality data is still very much restricted.

References

- Blinder, A. S., 1973. Wage Discrimination: Reduced Form and Structural Estimates. *Journal of Human Resources* 8, 436--455.
- Bourguignon, F., Fournier, M., Gurgand, M., 2001. Fast Development with a Stable Income Distribution: Taiwan, 1979-94. *The Review of Income and Wealth* 47(2), 139--163.
- Bourguignon, F., Fournier, M., Gurgand, M., 2004. Selection Bias Corrections Based on the Multinomial Logit Model: Monte-Carlo Comparisons. Mimeo.
- Coady, D. P., Wang, L., 2000. Equity, efficiency, and labor-market reforms in urban China: the impact of bonus wages on the distribution of earnings. *China Economic Review* 11(3), 213--231.
- Dahl, G. B., 2002. Mobility and the Returns to Education: Testing a Roy Model with Multiple Markets. *Econometrica* 70(6), 2367--2420.
- Démurger, S., 2000. Economic Opening and Growth in China. *Development Centre Studies*, OECD, Paris.

- Dong, X., Bowles, P., 2002. Segmentation and discrimination in China's emerging industrial labor market. *China Economic Review* 13(2-3), 170--196.
- Dubin, J. A., McFadden, D. L., 1984. An econometric analysis of residential electric appliance holdings and consumption. *Econometrica* 52(2), 345--362.
- Fu, Y., Gabriel, S., 2000. Location, Market Segmentation, and Returns to Human Capital: The Privatization of China's Labor Markets. Annual Meeting of the American Real Estate and Urban Economics Association, Boston.
- Gustafsson, B., Li, S., 2000. Economic transformation and the gender earnings gap in urban China. *Journal of Population Economics* 13(2), 305--329.
- Howell, J., 1997. The Chinese economic miracle and urban workers. *European Journal of Development Research* 9(2), 148--175.
- Knight, J., Song, L., Jia, H., 1999. Chinese Rural Migrants in Urban Enterprises: Three Perspectives, in: Cook, S., Maurer-Fazio, M., (Eds.), *The Workers' State Meets the Market: Labor in China's Transition*. Frank Cass, London.
- Knight, J., Song, L., 2003. Increasing urban wage inequality in China: Extent, elements and evaluation. *Economics of Transition* 11(4), 597--619.
- Lee, L. F., 1983. Generalized Econometric Models with Selectivity. *Econometrica* 51, 507--512.
- Li, H., 2003. Economic transition and returns to education in China. *Economics of Education Review* 22(3), 317--328.
- Li, S., Zhao Y., 2003. The Decline of In-kind Wage Payments in Urban China. *Journal of Chinese Economics and Business Studies* 1(2), 245--258.
- Lin, J. Y., Cai, F., Li, Z., 2001. *State-owned enterprise reform in China*. Hong Kong: Chinese University Press.

- Liu, P. W., Meng, X., Zhang, J., 2000. Sectoral gender wage differentials and discrimination in the transitional Chinese economy. *Journal of Population Economics* 13(2), 331--352.
- Maurer-Fazio, M., Dinh, H., 2002. Differential rewards to, and contributions of, education in urban China's segmented labor markets. William Davidson Working Paper No. 508, June.
- Maurer-Fazio, M., 1999. Earnings and education in China's transition to a market economy: survey evidence from 1989 and 1992. *China Economic Review* 10(1), 17--40.
- Meng, X., 2000. *Labour market reform in China*. Cambridge University Press, Cambridge, UK; New York.
- Meng, X., Kidd, M. P., 1997. Labor Market Reform and the Changing Structure of Wage Determination in China's State Sector during the 1980s. *Journal of Comparative Economics* 25, 403--421.
- Meng, X., Zhang, J., 2001. Two-tier labor markets in Urban China: Occupational segregation and wage differentials between urban residents and rural migrants in Shanghai. *Journal of Comparative Economics* 29(3), 485-504.
- Mincer, J., 1974. *Schooling, experience, and earnings*. New York: Columbia University Press for the National Bureau of Economic Research.
- Oaxaca, R., 1973. Male-Female Wage Differentials in Urban Labor Markets. *International Economic Review* 14, 693--709.
- OECD, 2002. *China in the World Economy: The Domestic Policy Challenges*. Paris.
- Park, A., Song, X., Zhang J., Zhao, Y., 2003. *The Growth of Wage Inequality in Urban China, 1988 to 1999*. Unpublished paper.
- Putterman, L., 1992. Dualism and economic reform in China. *Economic Development and Cultural Change* 40(3), 467--93.

- Qian, J, 1996. Gender Wage Differentials in Urban China in the 1990s. PhD. Dissertation, State University of New York at Binghamton.
- Riskin, C., Zhao, R., Li, S., 2000. Chinese Household Income Project, 1995 [Computer file]. ICPSR version. Amherst, MA: University of Massachusetts, Political Economy Research Institute [producer], 2000. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor].
- Riskin, C., Zhao, R., Li, S., 2001. China's Retreat from Equality – Income Distribution and Economic Transition. M.E. Sharpe, London, England.
- Zhang, J., Zhao, Y., 2002. Economic returns to schooling in urban China, 1988-1999. Mimeo.
- Zhao, Y., 2001. Foreign direct investment and relative wages: The case of China. *China Economic Review* 12(1), 40--57.
- Zhao, Y., 2002. Earnings differentials between State and Non-State Enterprises in Urban China. *Pacific Economic Review* 7(1), 181--197.

Table 1 - Employees by ownership – 1978-95 (%)

	State-Owned enterprises	Collective enterprises	Foreign-invested enterprises	Private enterprises	Individual enterprises
1978	78.3	21.5	-	-	0.2
1980	76.2	23	-	-	0.8
1983	74.7	23.4	-	-	1.9
1984	70.6	26.3	-	-	2.8
1985	70.2	26	0.05	-	3.5
1986	70.2	25.7	0.09	-	3.6
1987	70	25.3	0.15	-	4.1
1988	70	24.7	0.2	-	4.6
1989	70.2	24.3	0.3	-	4.5
1990	70.2	24	0.4	0.4	4.2
1991	69.9	23.8	0.6	0.4	4.5
1992	69.7	23.2	0.9	0.6	4.7
1993	68.4	21.3	0.8	1.2	5.8
1994	66.7	19.5	1.2	2	7.3
1995	64.9	18.1	1.4	2.8	9

Source: *China Statistical Yearbook* (1994, 1996).

Note: From 1984, percentages do not sum up to 100% because of the existence of other ownership types.

Table 2 – Descriptive Statistics

Ownership categories	All workers	SOEs at central or provincial level	Local publicly owned	Urban collectives	Private or individual enterprises	Foreign-invested enterprises
Number of obs.	10356	2802	5717	1621	86	130
%		27.1	55.2	15.7	0.8	1.3
Male (%)	52.9	60.2	53.3	39.2	45.3	54.6
Average age (years)	38.4	39.3	38.3	37.9	32.7	31.1
<i>Standard deviation</i>	9.4	9.7	9.3	8.8	9.4	10
Education (years)	11.5	12	11.7	10	9.9	11.5
<i>Standard deviation</i>	2.7	2.7	2.6	2.5	2.6	2.5
Experience (years)	19.3	20.3	19.4	18.2	10.8	12.1
<i>Standard deviation</i>	9.5	9.9	9.4	8.8	7.8	9.6
Communist (%)	24.7	29	26.9	12	3.5	9.2
Coast (%)	26	19.9	26.1	32.1	41.9	66.9
Primary sector (%)	2.8	5.3	2.1	1.2	-	-
Secondary sector (%)	45.9	43.1	42.3	63.2	17.4	61.5
Tertiary sector (%)	51.4	51.5	55.6	35.6	82.6	38.5
Long-term tenure (%)	96.4	98.7	98.6	91.8	6.1	61.4
Non-qualified (%)	16.7	11	15.4	31.3	11.6	18.5

Notes: 1. Long-term tenure includes both permanent workers and long-term contract workers, as opposed to temporary or short-term contract workers.

2. The primary sector includes agriculture, forestry, animal husbandry, fishing or water conservancy, and mining and geological survey and prospecting. The secondary sector includes industry and construction. The tertiary sector is composed of other economic sectors.

3. Experience is the number of years of work experience declared by the respondent.

4. The coastal region includes Beijing, Guangdong, and Jiangsu.

Table 3 – Average wage by ownership and its components

Ownership categories	SOEs at central or provincial level	Local publicly owned	Urban collectives	Private or individual enterprises	Foreign-invested enterprises
Number of obs.	3094	6182	1702	113	147
Wage	6997	6140	4795	5208	8213
Base wage	4021	3519	3077	4867	6528
(%)	(57.5)	(57.3)	(64.2)	(93.5)	(79.5)
Bonus	1044	996	730	213	929
(%)	(14.9)	(16.2)	(15.2)	(4.1)	(11.3)
Subsidies	1323	1088	631	58	479
(%)	(18.9)	(17.7)	(13.2)	(1.1)	(5.8)
Income in kind	118	92	67	70	87
(%)	(1.7)	(1.5)	(1.4)	(1.3)	(1.1)
Labor income	7078	6243	4953	6422	8259

Source: Calculated by authors with the 1995 CHIP survey data.

Notes: 1. The sample includes individuals aged 16 to 60, who declared working at least a part of the year and earning (positive) wages. Owners of private or individual enterprises are not considered.

2. The wage variable is defined as being the sum of the base salary, bonuses, allowances and subsidies, other wages, other income from work unit and income in kind.

3. Labor income is composed of the wage variable, plus other income from labor and private or individual enterprise proprietor's pre-tax net income.

Table 4 – Total wage, hourly wage and number of hours worked in 1995

Ownership categories	SOEs at central or provincial level	Local publicly owned	Urban collectives	Private or individual enterprises	Foreign-invested enterprises
Number of obs.	3094	6182	1702	113	147
Average wage	6997	6140	4795	5208	8213
<i>Coefficient of variation</i>	<i>0.51</i>	<i>0.59</i>	<i>0.68</i>	<i>0.92</i>	<i>0.76</i>
Average hourly wage	3.49	3.02	2.41	2.04	3.73
<i>Coefficient of variation</i>	<i>0.64</i>	<i>0.71</i>	<i>0.83</i>	<i>0.996</i>	<i>0.80</i>
Worked hours per week	41.4	42.3	43.3	56	47
<i>Coefficient of variation</i>	<i>0.17</i>	<i>0.18</i>	<i>0.22</i>	<i>0.29</i>	<i>0.19</i>

Source: Calculated by authors with the 1995 CHIP survey data.

Notes: See Table 2. The worked hours per week are calculated by multiplying the number of work hours on an average day by average number of work days per week in 1995.

Table 5 – Average wage by ownership and by working population

	SOEs at central or provincial level	Local publicly owned	Urban collectives	Private or individual enterprises	Foreign enterprises
Gender					
Male workers	7321 (1849)	6574 (3299)	5300 (664)	5813 (54)	8823 (80)
Female workers	6517 (1245)	5644 (2883)	4471 (1038)	4654 (59)	7484 (67)
Education level					
Less than primary	5883 (7)	3795 (12)	3274 (18)	8800 (1)	(0)
Primary	6145 (107)	5782 (219)	4479 (177)	3817 (14)	6272 (6)
Lower middle	6656 (758)	5673 (1695)	4305 (812)	4935 (50)	8250 (40)
Upper middle	6568 (634)	5622 (1584)	5086 (453)	5693 (36)	8044 (44)
Middle technical	6980 (612)	6368 (1140)	5893 (124)	5396 (5)	5991 (24)
Professional	7148 (573)	6891 (1058)	6357 (99)	9692 (4)	9806 (21)
College	8374 (403)	7545 (474)	7867 (19)	2953 (3)	11333 (12)
Region					
Coast	9493 (646)	8738 (1624)	6767 (543)	7224 (49)	9692 (97)
Non-coast	6339 (2448)	5215 (4558)	3871 (1159)	3665 (64)	5343 (50)

Notes: 1. The sample includes individuals aged 16 to 60, who declared working at least a part of the year and earning (positive) wages. Owners of private or individual enterprises are not considered.
2. Number of observations between brackets.
3. “Coast” refers to Beijing, Guangdong and Jiangsu.

Table 6 – Average hourly wage by ownership and by working population

	SOEs at central or provincial level	Local publicly owned	Urban collectives	Private or individual enterprises	Foreign enterprises
Gender					
Male workers	3.65 (1849)	3.2 (3299)	2.66 (664)	2.32 (54)	4.09 (80)
Female workers	3.25 (1245)	2.82 (2883)	2.25 (1038)	1.78 (59)	3.29 (67)
Education level					
Less than primary	2.83 (7)	1.65 (12)	1.94 (18)	3.92 (1)	(0)
Primary	3.12 (107)	2.98 (219)	2.18 (177)	1.4 (14)	2.57 (6)
Lower middle	3.29 (758)	2.77 (1695)	2.22 (812)	1.9 (50)	3.53 (40)
Upper middle	3.28 (634)	2.77 (1584)	2.5 (453)	2.28 (36)	3.48 (44)
Middle technical	3.44 (612)	3.12 (1140)	2.89 (124)	2.2 (5)	2.84 (24)
Professional	3.46 (573)	3.37 (1058)	3.16 (99)	3.61 (4)	4.95 (21)
College	4.4 (403)	3.81 (474)	3.86 (19)	1.39 (3)	5.48 (12)
Region					
Coast	4.77 (646)	4.30 (1624)	3.25 (543)	2.73 (49)	4.17 (97)
Non-coast	3.15 (2448)	2.57 (4558)	2.01 (1159)	1.51 (64)	2.87 (50)

Notes: See Table 5.

Table 7 - Wage equation estimations

	Central SOEs		Local SOEs		UCEs		FIEs	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Education	0.024 <i>2.74</i>	0.040 <i>2.70</i>	0.036 <i>4.38</i>	0.048 <i>3.92</i>	0.023 <i>1.22</i>	0.020 <i>1.08</i>	0.073 <i>1.98</i>	0.077 <i>2.90</i>
Experience	0.034 <i>5.48</i>	0.052 <i>4.65</i>	0.040 <i>7.20</i>	0.066 <i>7.57</i>	0.053 <i>3.74</i>	0.061 <i>4.58</i>	-0.011 <i>-0.33</i>	0.043 <i>1.64</i>
Experience ²	-0.0004 <i>-2.92</i>	-0.0007 <i>-2.70</i>	-0.0005 <i>-4.12</i>	-0.0012 <i>-4.68</i>	-0.001 <i>-2.96</i>	-0.0013 <i>-3.38</i>	0.0007 <i>0.71</i>	-0.0003 <i>-0.41</i>
Tertiary sect.	0.040 <i>1.53</i>	0.036 <i>0.90</i>	0.056 <i>2.87</i>	0.052 <i>2.10</i>	-0.121 <i>-1.86</i>	-0.009 <i>-0.20</i>	-0.251 <i>-1.38</i>	0.242 <i>1.82</i>
Coast	0.362 <i>9.89</i>	0.318 <i>5.90</i>	0.459 <i>14.48</i>	0.400 <i>9.92</i>	0.393 <i>5.39</i>	0.512 <i>9.48</i>	0.292 <i>1.55</i>	0.500 <i>3.55</i>
_m1			0.167 <i>1.08</i>	0.621 <i>3.43</i>	0.723 <i>2.00</i>	0.996 <i>2.78</i>		
_m2	-0.221 <i>-1.11</i>	-0.814 <i>-3.00</i>			-1.410 <i>-3.89</i>	-1.169 <i>-2.90</i>		
_m3	0.087 <i>0.34</i>	0.489 <i>1.55</i>	0.158 <i>0.76</i>	0.032 <i>0.14</i>				
_m4	-1.058 <i>-2.59</i>	0.024 <i>0.05</i>	-0.761 <i>-2.16</i>	-0.929 <i>-2.66</i>	-0.386 <i>-0.81</i>	-0.467 <i>-1.21</i>		
_m5	1.178 <i>2.63</i>	0.081 <i>0.18</i>	0.921 <i>2.31</i>	0.863 <i>2.41</i>	0.909 <i>1.49</i>	0.493 <i>1.27</i>		
Constant	0.133 <i>0.83</i>	-0.943 <i>-3.07</i>	0.284 <i>1.56</i>	0.082 <i>0.30</i>	-1.122 <i>-5.39</i>	-0.960 <i>-5.10</i>	0.056 <i>0.10</i>	-0.686 <i>-1.74</i>
Observations	1588	1065	2977	2622	625	977	71	59
Adjusted R ²	0.23	0.24	0.31	0.26	0.24	0.23	0.06	0.34
Hausman	20.94	20.88	101.60	96.31	30.04	34.45	2.35	2.78
Test	[$\chi^2(5)$]	[$\chi^2(5)$]	[$\chi^2(5)$]	[$\chi^2(5)$]	[$\chi^2(6)$]	[$\chi^2(6)$]	[$\chi^2(6)$]	[$\chi^2(5)$]
Estimated wage peak	42	37	40	27	26	23	NS	NS

Notes:

1. The dependent variable is the logarithm of hourly wage. The four categories are: central or provincial SOEs, local SOEs, urban collective enterprises (UCEs), and foreign-invested enterprises (FIEs).
2. The reference category for regional location is the non-coastal region. The coastal dummy variable takes 1 for Beijing, Guangdong and Jiangsu, and 0 for other provinces.
3. The reference category for the economic sector is the secondary sector (including industry and construction).
4. The Hausman test for selection bias indicates that selection bias correction (using the Dubin-McFadden method) is needed for central SOEs, local SOEs, and UCEs only. Estimations for FIEs are made using standard OLS. Bootstrapped standard errors are calculated using 500 replications for central SOEs, local SOEs, and UCEs.
5. The estimated wage peaks from the coefficients of Experience and Experience² are given in years of experience.

Table 8 – Differences in working hours by ownership enterprises

	Men		Women	
	<i>Coefficient</i>	<i>t-statistic</i>	<i>Coefficient</i>	<i>t-statistic</i>
Local SOEs	1.108	4.48	0.430	1.62
Urban collectives	1.711	4.43	1.086	3.19
Foreign-invested enterprises	5.314	5.46	5.221	5.25
# Observations	5261		4723	

Notes: Dummy variable coefficients extracted from the estimation of a number of working hours equation including individual characteristics (see Appendix 2). The reference category is “State-owned enterprises at central or provincial level”.

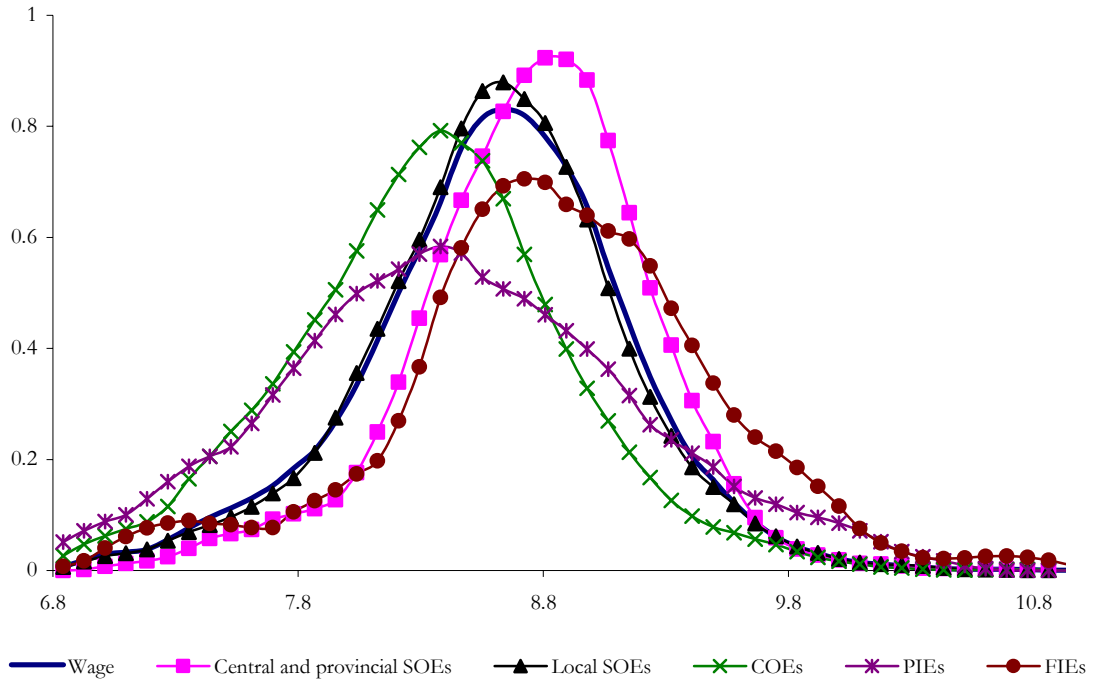
Table 9 – Decomposition of the wage differentials¹

Ownership		Average wage		Difference	<u>Effect on the observed wage difference of</u>							
(A)	(B)	Y _A	Y _B	Y _A - Y _B	Characteristics		Pure ownership + Hours		Pure ownership		Hours-worked	
					Min	Max	Min	Max	Min	Max	Min	Max
CSOEs	LSOEs	7006	6248	758	-288	-153	916	1047	1042	1197	-150	-125
					-38%	-20%	121%	138%	137%	158%	-20%	-16%
CSOEs	UCEs	7006	4992	2014	73	288	1755	1924	1920	2184	-260	-165
					4%	14%	87%	96%	95%	108%	-13%	-8%
FIEs	CSOEs	8324	7006	1318	-142	138	1180	1460	228	531	920	995
					-11%	10%	90%	111%	17%	40%	70%	75%
FIEs	LSOEs	8324	6248	2076	-201	124	1952	2278	1148	1587	675	852
					-10%	6%	94%	110%	55%	76%	33%	41%
FIEs	UCEs	8324	4992	3332	507	935	2398	2825	1753	2330	477	691
					15%	28%	72%	85%	53%	70%	14%	21%
LSOEs	UCEs	6248	4992	1256	363	513	749	889	827	985	-97	-77
					29%	41%	60%	71%	66%	78%	-8%	-6%

Notes: 1. Decompositions based on regressions results presented in Table 7 and Table 8. The values refer to measured effects evaluated as wage differences in Yuan. Percentages indicated in parentheses refer to measured effects as a percentage of observed total wage gap.

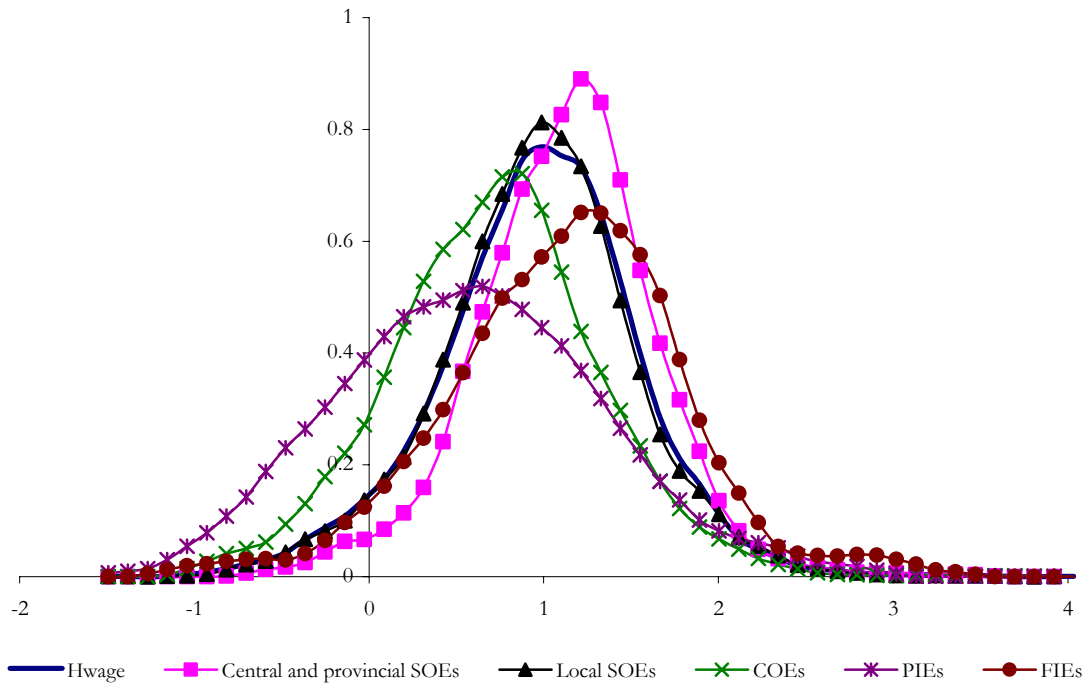
2. CSOEs refer to SOEs at central or provincial level, LSOEs to local publicly-owned enterprises, UCEs to urban collective enterprises, and FIEs to foreign-invested enterprises.

Figure 1 – Kernel Density of total wages by ownership



Notes: In order to better visualize the density distribution, we consider the logarithm of the total wage only for those with total wage above 1000. *Wage* represents the total wage distribution of the whole sample. Local SOEs refer to local publicly owned enterprises, UCEs to urban collective enterprises, PIEs to private or individual enterprises, and FIEs to foreign invested enterprises.

Figure 2 – Kernel Density of hourly wages by ownership



Notes: see Figure 1. *Hwage* represents the hourly wage distribution of the whole sample.

Appendix 1 – Estimation of the Multinomial Logit Model for enterprise ownership choice

	Local SOEs		Urban Collective Enterprises		Private/Individual Enterprises		Foreign Invested Enterprises	
	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>	<i>Women</i>
Education	-0.051 <i>-4.06</i>	-0.570 <i>-3.55</i>	-0.249 <i>-12.23</i>	-0.296 <i>-13.88</i>	-0.278 <i>-3.42</i>	-0.296 <i>-4.24</i>	-0.018 <i>-0.34</i>	-0.138 <i>-2.08</i>
Age	0.027 <i>0.82</i>	0.050 <i>1.17</i>	0.063 <i>1.25</i>	0.095 <i>1.70</i>	0.236 <i>1.32</i>	-0.154 <i>-1.03</i>	-0.085 <i>-0.83</i>	0.211 <i>1.41</i>
Age ²	-0.0005 <i>-1.27</i>	-0.0008 <i>-1.48</i>	-0.0011 <i>-1.81</i>	-0.0015 <i>-2.12</i>	-0.0038 <i>-1.52</i>	0.0016 <i>0.81</i>	0.0008 <i>0.65</i>	-0.003 <i>-1.52</i>
Communist	0.167 <i>2.29</i>	-0.077 <i>-0.76</i>	-0.622 <i>-4.69</i>	-0.228 <i>-1.53</i>	-1.648 <i>-1.57</i>	-0.516 <i>-0.67</i>	-0.400 <i>-0.99</i>	-0.432 <i>-0.68</i>
# children under 6	0.061 <i>0.63</i>	0.239 <i>2.09</i>	-0.302 <i>-1.91</i>	0.029 <i>0.19</i>	-0.180 <i>-0.37</i>	0.518 <i>1.32</i>	-0.554 <i>-1.30</i>	-0.571 <i>-1.20</i>
# children at school	-0.251 <i>-3.26</i>	-0.092 <i>-1.05</i>	-0.322 <i>-2.56</i>	-0.309 <i>-2.62</i>	-1.960 <i>-1.95</i>	-0.149 <i>-0.38</i>	-0.402 <i>-1.12</i>	-0.484 <i>-1.06</i>
# dependent members	0.197 <i>1.53</i>	0.307 <i>2.08</i>	0.375 <i>2.09</i>	0.297 <i>1.60</i>	-0.605 <i>-0.74</i>	-0.359 <i>-0.47</i>	0.119 <i>0.25</i>	0.506 <i>0.93</i>
Size of household	0.037 <i>0.19</i>	-0.372 <i>-1.58</i>	0.530 <i>1.73</i>	-0.038 <i>-0.13</i>	1.128 <i>1.15</i>	0.556 <i>0.63</i>	0.933 <i>1.30</i>	-0.855 <i>-1.10</i>
<i>Way by which workers got their current job:</i>								
Employment agency	0.356 <i>1.00</i>	0.407 <i>1.25</i>	1.020 <i>2.32</i>	0.937 <i>2.54</i>		2.661 <i>2.27</i>	1.092 <i>1.01</i>	2.856 <i>4.92</i>
Inherited	-0.078 <i>-0.49</i>		-0.248 <i>-1.05</i>	0.008 <i>0.05</i>			0.281 <i>0.37</i>	0.721 <i>1.11</i>
Self-found	0.102 <i>0.85</i>	0.360 <i>2.79</i>	0.705 <i>4.50</i>	1.220 <i>8.37</i>	5.563 <i>5.34</i>	4.115 <i>7.37</i>	2.323 <i>7.73</i>	2.471 <i>6.13</i>
Other	0.041 <i>0.23</i>	-0.087 <i>-0.50</i>	0.445 <i>1.78</i>	0.463 <i>2.26</i>	4.604 <i>4.01</i>	2.767 <i>3.95</i>	1.681 <i>3.39</i>	1.116 <i>1.85</i>
<i>Relationship to the head of household:</i>								
Spouse	0.295 <i>3.84</i>	-0.070 <i>-0.82</i>	0.441 <i>3.66</i>	-0.025 <i>-0.22</i>	1.073 <i>2.00</i>	0.456 <i>0.95</i>	-0.246 <i>-0.55</i>	-0.122 <i>-0.27</i>
Child	0.082 <i>0.48</i>	0.009 <i>0.04</i>	-0.158 <i>-0.61</i>	-0.183 <i>-0.66</i>	0.504 <i>0.62</i>	-0.017 <i>-0.02</i>	0.592 <i>1.06</i>	1.684 <i>2.54</i>
Others	0.118 <i>0.27</i>	0.105 <i>0.37</i>	0.749 <i>1.36</i>	0.007 <i>0.02</i>	1.717 <i>1.19</i>	-0.445 <i>-0.43</i>	0.850 <i>0.72</i>	1.648 <i>2.18</i>
Constant	1.497 <i>2.02</i>	2.021 <i>2.12</i>	0.973 <i>0.85</i>	2.107 <i>1.72</i>	-8.019 <i>-2.23</i>	1.193 <i>0.35</i>	-3.156 <i>-1.40</i>	-3.326 <i>-1.11</i>
Number of observations	<i>Men:</i> 5300		<i>Women:</i> 4770					
Log likelihood	<i>Men:</i> -4974		<i>Women:</i> -4681					

Notes: The dummy variables by province are not presented in the table. The base category is “State-owned enterprises at central or provincial level”.

Appendix 2 – Working hours determinants by ownership enterprises

	Men		Women	
	<i>Coefficient</i>	<i>t-statistic</i>	<i>Coefficient</i>	<i>t-statistic</i>
Education	-0.301	-7.11	-0.272	-5.96
Age	0.060	0.56	-0.167	-1.36
Age ²	-0.001	-0.87	0.002	1.05
Communist	0.450	1.79	-0.74	-0.24
# children under 6	0.173	0.53	-0.280	-0.88
# children at school	-0.123	-0.46	-0.319	-1.22
# dependent members	-0.368	-0.90	0.130	0.33
Size of household	1.318	2.01	2.021	3.04
<i>Way by which workers got their current job:</i>				
Employment agency	-0.108	-0.10	1.225	1.57
Inherited	-1.149	-2.16	0.078	0.17
Self-found	0.785	2.09	0.144	0.45
Other	-0.215	-0.37	-1.219	-2.51
<i>Relationship to the head of household:</i>				
Spouse	0.126	0.49	0.172	0.71
Child	0.179	0.32	-0.637	-1.07
Others	-1.231	-0.91	0.029	0.04
Local SOEs	1.108	4.48	0.430	1.62
Urban collectives	1.711	4.43	1.086	3.19
Foreign-invested enterprises	5.314	5.46	5.221	5.25
Constant			44.989	16.63
# Observations	5261		4723	
Adjusted R ²	0.04		0.05	

Notes: The dummy variables by province are not presented in the table.