The Differences of Wage Determination Mechanism Between State-owned and Non State-owned Enterprises[*]

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Abstract：Using CHIPs data of 1995 and 2002, this paper analyzes the differences of wage determination mechanism between state-owned and non-state enterprises from both statistic and dynamic perspectives. The empirical results of 2002 show that significant differences mainly appearing in the return rates to both education and experience between state-owned and non-state enterprises. First, the wage-education curves of both types of enterprises have quadratic forms with upward openings, but the curve of non-state enterprises is much steeper while the curve of state-owned enterprises is rather flat, and the two curves intersect at a point representing 12 years of education. Second, the wage-experience curve of non-state enterprises is close to a line while the curve of state-owned enterprises has an evident quadratic form, which indicates a higher return rate to experience in state-owned enterprises than in non-state enterprises. Furthermore, we compare the difference of wage determination mechanism of 2002 with 1995 and draw following conclusions. First, the basic wage of 1995 is significantly lower in state-owned enterprises than in non-state ones; however, no significant difference appears between two types of enterprises in 2002. Second, the degree of gender discrimination in non-state enterprises is slightly lower in 2002 than in 1995, which rarely changes in state-owned enterprises. Third, from 1995 to 2002, the return rates to education and training together with their decreasing degrees are higher in non-state enterprises than in state-owned enterprises.

Key words：Labor Market Segmentation, Ownership System, Wage Determination Mechanism

Introduction

Since the reform and opening up in the late 1970s, the urban and rural labour market in China has undergone tremendous changes. China has no labour market under the traditional system, i.e. rural labour force is strictly limited to the people's communes and mainly engages in agricultural work while the employment arrangements of urban labour force is completed conducted by labour administrative sectors of the government, which sets strict limitation to job adjustments for employees. In the process of transition to market economy, Chinese labour market has emerged and has been enjoying a remarkable development recently. However, because of the inconsistent progress of reform in different sectors, the unbalanced developments of different regions, and the rigidity and mobility barriers within the urban labour market, the labour market in China is not a perfect one. In particular, before middle 1990s, the emigration of urban labour force among different sectors and different ownership enterprises is heavily bound（Knight and Song,1995; Zhao, 2002; Chen et al., 2005）.Although this situation has improved, the internal segmentation of urban labour market is still evident. Hence, the labour market segmentation is considered a potential source of the widening wage gaps in Chinese urban areas（Knight and Song, 2003）.

Over the past decade, an increasing amount of researches have emerged analyzing various factors of Chinese labour market by studying the wage gaps between different groups, which include analysis of the wage gaps between migrant workers and urban employees (Knight et al., 1999; Meng and Zhang, 2001; Maurer-Fazio and Dinh, 2004; Yao and Li, 2004; Wang, 2005; Yan, 2007), the wage gaps between urban male and female workers（Gustafsson and Li, 2000; Hughes and Maurer-Fazio, 2002; Maurer-Fazio and Hughes, 2002; Liu et al., 2004; Dong et al., 2004; Bishop et al., 2005; Démurger et al., 2005; Li and Dong, 2008; Zhang and Dong, 2008）and the wage gaps between enterprises of different ownerships（Li,2005; Zhao, 2001 and 2002; Dong and Bowles, 2002; Chen et al, 2005; Zhang and Xue, 2008; Sylvie Démurger et al., 2009）.However, most previous studies only concern the direct impacts of these factors on wage gaps, lacking consideration of the interactions between these factors and other wage-effected factors. Choosing the ownership segmentations as the focus, this paper mainly analyzes the differences of wage determination mechanism of state-owned and non-state enterprises.

This paper adds to existing studies in the following respects. First, many previous studies pay close attention to the effects of education and experience on wages, and generally limit to the direct impacts of these factors on wages. But our paper concerns the ownership segmentations mainly focus on analyzing the differences of wage determination mechanism between state-owned and non-state enterprises. Second, using two years of data instead of a single year, this paper dynamically analyzes the change directions and degrees of the effects of various wage determinants during the time period, and hence make a judgment about the change tendency. Third, most existing studies make use of aggregate industry data rather than individual data driven form household investigations. This paper uses survey data, which contains much individual information that is relatively credible, to help us clear the effects of various factors precisely. Finally, we make a breakthrough in the econometric model. Starting from the Mincer function with the combination of practical experience in China, we loose the hypothesis that the marginal return rate to education remains unchanged, and introduce education square into the model. Fortunately, the empirical results support the paper's bold breakthrough in the model.

Data

Our data comes from two surveys conducted by the Institute of Economics, Chinese Academy of Social Sciences, with the assistance of the State Statistical Bureau in Beijing. The first survey of household incomes in 1995 is conducted from January to March 1996 and the second refers to the year 2002 is implemented in the spring of 2003. Both samples are derived from larger samples of the State Statistical Bureau. The questionnaires are designed by the members of the research team. Most questions in the questionnaires of the first survey reappear in the second one, despite some new questions added. Both questionnaires have fairly comprehensive questions about household income and its components.

The sample provinces and cities are almost the same in the two urban surveys, with approximately equal sample sizes. These samples are drawn from 11 provinces, including Anhui, Beijing, Gansu, Guangdong, Henan, Hubei, Jiangsu, Liaoning, Shanxi, Sichuan and Yunnan. Although the sample sizes are not in proportion with the actual population in these provinces, the two are highly related, i.e. more samples are taken in provinces with larger populations. The 1995 data has 6931 household samples and 21694 individual samples, and the 2002 one has 6835 household samples and 20632 individual samples. Since this paper is limited to urban enterprise employees with household registrations[①], we add three constrains, namely non-agricultural households, serving officers, and working in companies, to screen the samples. The screened samples of 1995 and 2002 consist of 7081 and 5698 validated individual samples, respectively.

Measures

Wage: the value of the annual income of a full-time job divided by the actual working hours. The annual incomes of full-time jobs do not include the incomes of part-time jobs, the laid-off expenses of living, the minimum living allowance or hardship assistance issued by units, but they include the in-kind incomes from the full-time jobs, which are translated into currency. Annually actual working hours of 2002 = annually actual working months* average working days per month*average working hours per day. Annually actual working hours of 1995=annually working weeks (which equals to 50 in this paper)*average working days per week*average working hours per day. Besides, we consider that a critical part of income gap in China could be driven from various living expenses in different regions. In order to eliminate the influence of this factor, we adopt the urban price deflator (with a base of price index for cities and towns of 2002) of different provinces estimated by Brandt and Holz（2005）[②]to adjust the incomes within the consideration of the inter-provincial differences in purchasing powers. We believe that this adjustment is necessary, because the adjusted data reflects the regional real income gaps better than the unadjusted one. One of the multiple effects of the income adjustment of different regions using PPP is narrowing the income gaps between regions, in particular, the gaps between municipalities and other provinces since the living expenses in municipalities are much higher than that in other cities. The logarithmic hourly wage rate represents the value（ $Ln(Ad-Wage)$ ）of the explained variable in this paper.

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① Being local or not, with or without urban household registration will all affect income, so we exclude non-local samples together with those without urban household registrations in order to avoid influence of external factors, focusing on factors that we are interested in. In addition, considering that the wage determination mechanism of informal sector workers such as urban self-employed workers, as well as government and institution staffs differs from that of regulated enterprises, the paper is limited to subjects of serving workers in regulated enterprises.

② For more information on the data, see Brandt and Holz, 2005, Spatial Price Differences in China: Estimates and Implications, Available at http://ihome.ust.hk/~socholz/SpatialDeflators.html.

Gender: female gender is coded as 1 and male gender as 0. A great many previous researches have proved the existence of gender discrimination. For instance, Shu and Bian (2003), analyzing changes in the gender gap resulting from differences in human capital, political capital, labor-force placement and family structure, find neither longitudinal change nor city-level variation in urban China. We predict that female gender has a significantly negative effect on wages.

Education: years of education when the survey is conducted. This factor is directly from the survey.

Training: years of vocational training when the survey is conducted. This factor is directly from the survey.

Experience: the number of years since the respondent begins to work. This factor is directly from the survey.

Education, training and experience are three typical human capitals. Systematic human capital theory, pioneered by the Chicago School in the mid-twentieth century, is based on the economic value of education. Schultz (1961), thought to be the founder of modern human capital theory, defines that human capital is generated from the investment on education, health, training, migration and information. Human capital investment helps to increase human resources as well as affecting future currency and consumption ability（Becker，1962）. As predicted, human capital has a positive promoting impact on income increase.

Tenure: the number of years since the respondent begins to work in the exact company they are serving in when the survey is conducted. This factor is directly from the survey. From the perspective of human resource management, generally a salary system will be designed to connect salary with tenure by aggrandizing the salary as the tenure increases, which mainly helps to reduce the resignation probability of talented employees, and thus to save the management cost of the enterprises. Therefore, we suppose a positive correlation between tenure and wage.

Performance: enterprises with relatively high profits are coded as 1, otherwise, coded as 0. Oswald（1996）states that in the perfect competitive labour market, profit sharing does not exist, in other words, common wages are paid to the same workers either in high-profit or low-profit enterprises. However, in the real labour market, a positive correlation of profits with wages might appear in following ways. First, the negotiation model shows a long-term market equilibrium characterized by a positive correlation of wages with profits as well as a negative correlation between wages and unemployment rates. Second, the labour supply curve leans northeast rather than being perfectly elastic, while short-term demand will push the labour demand curve rightward, leading to a positive correlation between profits and wages in the short run. Third, consider the existing risk-sharing labour contracts. If both employers and employees are risk aversion ones, they will share the acceptance of risk, resulting in profits positively correlated with wages. Among all the three cases, the third one appears much more frequently in human resource management practices. As a conclusion, a positive correlation between performance and wage could be expected.

Contract Term: regulars workers or long-term contracts are coded as 1, otherwise coded as 0. [①]

Ownership: (central, provincial) state-owned, (regional) state-owned and state-holding enterprises are coded as Own=1, otherwise Own=0 [②]

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① For simplicity, regular workers and long-term contracts in the context below are collectively referred to as long-term contracts, others referred to as short-term contracts.
② For simplicity, (central, provincial) state-owned, (regional) state-owned and state-holding enterprises in the context below are collectively referred to as state-owned enterprises, others referred to as non-state enterprises.

Descriptive statistics

The results in table 1 show that hourly wage in state-owned enterprises is higher than that in non-state ones, and that discrepancy form 1995 to 2002 has no significant changes. Meanwhile, we find the average education, training, experience and seniority of employees as well as the proportion of profit-making enterprises are also higher in state-owned enterprises than in non-state ones. So far, however, we have no sufficient reason to draw the conclusion that the "over paid" phenomenon occurs in state-owned enterprises.

Table1

Data Description 1(Grouped by gender)

		State-owned Enterprises			Non-state-owned Enterprises		
		Mean	Male	Female	Mean	Male	Female
(a) Data Description, 1995							
Obs.		5397	3037	2360	1684	700	984
Ln（Ad-Wage）	Mean	1.17	1.24	1.08	0.92	1.04	0.84
	SD	0.62	0.60	0.63	0.67	0.65	0.67
Education	Mean	10.40	10.57	10.18	9.38	9.65	9.18
	SD	2.72	2.81	2.58	2.62	2.70	2.55
Training	Mean	0.30	0.32	0.27	0.21	0.26	0.18
	SD	0.75	0.78	0.71	0.60	0.66	0.54
Experience	Mean	19.68	20.87	18.14	18.10	19.98	16.77
	SD	9.35	9.97	8.22	8.86	9.49	8.13
Tenure	Mean	16.18	17.08	15.02	14.35	15.27	13.70
	SD	8.96	9.57	7.95	8.51	9.18	7.95
Performance	Mean	0.67	0.68	0.66	0.59	0.60	0.59
Contract Term	Mean	0.97	0.98	0.97	0.89	0.89	0.89
(b) Data Description, 2002							
Obs.		3260	2010	1250	2438	1296	1142
Ln（Ad-Wage）	Mean	1.76	1.82	1.66	1.49	1.58	1.40
	SD	0.62	0.60	0.63	0.72	0.70	0.72
Education	Mean	11.19	11.13	11.29	10.56	10.58	10.54
	SD	2.73	2.80	2.61	2.89	2.93	2.84
Training	Mean	0.13	0.15	0.10	0.10	0.11	0.09
	SD	0.42	0.47	0.32	0.35	0.38	0.32
Experience	Mean	21.64	23.17	19.18	18.98	20.45	17.32
	SD	9.28	9.53	8.28	9.61	9.93	8.96
Tenure	Mean	18.34	19.61	16.29	12.66	13.29	11.96
	SD	9.60	10.04	8.46	9.85	10.45	9.08
Performance	Mean	0.28	0.30	0.25	0.22	0.24	0.21
Contract Term	Mean	0.90	0.91	0.87	0.53	0.55	0.51

By comparing the hourly wages of male and female employees, we can find wages of male gender exceed that of female gender in both types of enterprises; moreover, the discrepancy is larger in non-state enterprises. Then compare the results of 2002 and 1995, we find the wage differences between male and female employees in

non-state enterprises have decreased, while in state-owned ones, no such phenomenon appears. Now considering income-affected factors, we find the differences of average education, training and experience between male and female workers are greater in non-state enterprises than in state-owned ones; moreover, the differences are smaller in 2002 compared with those in 1995. Since that the larger wage differences between male and female employees in non-state enterprises could contribute to the larger discrepancy of their human capital levels, and that from 1995 to 2002, the fact that wages of male and female workers are turning closer could also attribute to a reduced discrepancy of their human capital levels, we can hardly assert that there is a difference in gender discrimination degrees between enterprises of different ownerships.

Table2

Data Description 2(Grouped by contract term)

		State-owned Enterprises			Non-state-owned Enterprises		
		Mean	Long	Short	Mean	Long	Short
(a) *Data Description, 1995*							
Obs.		5397	5256	141	1684	1501	183
Ln(Ad-Wage)	Mean	1.17	1.18	0.85	0.92	0.93	0.87
	SD	0.62	0.62	0.74	0.67	0.65	0.81
Gender	Mean	0.44	0.43	0.55	0.58	0.58	0.58
Education	Mean	10.40	10.41	9.99	9.38	9.38	9.38
	SD	2.72	2.72	2.71	2.62	2.60	2.79
Training	Mean	0.30	0.30	0.17	0.21	0.22	0.15
	SD	0.75	0.76	0.48	0.60	0.61	0.47
Experience	Mean	19.68	19.84	13.85	18.10	18.70	13.22
	SD	9.35	9.28	9.75	8.86	8.56	9.81
Tenure	Mean	16.18	16.31	11.18	14.35	14.90	9.82
	SD	8.96	8.93	8.64	8.51	8.26	9.21
Performance	Mean	0.67	0.67	0.70	0.59	0.58	0.72
(b) *Data Description, 2002*							
Obs.		3260	2918	342	2438	1298	1140
Ln(Ad-Wage)	Mean	1.76	1.79	1.55	1.49	1.63	1.34
	SD	0.62	0.60	0.71	0.72	0.64	0.76
Gender	Mean	0.38	0.37	0.48	0.47	0.45	0.49
Education	Mean	11.19	11.21	11.00	10.56	10.73	10.37
	SD	2.73	2.72	2.80	2.89	2.87	2.89
Training	Mean	0.13	0.14	0.09	0.10	0.13	0.06
	SD	0.42	0.42	0.34	0.35	0.42	0.25
Experience	Mean	21.64	22.12	17.62	18.98	20.96	16.73
	SD	9.28	8.97	10.78	9.61	8.97	9.83
Tenure	Mean	18.34	19.19	11.07	12.66	17.20	7.50
	SD	9.60	9.17	10.12	9.85	9.16	7.88
Performance	Mean	0.28	0.28	0.24	0.22	0.23	0.21

The statistical results grouped by contract terms are shown in Table 2, which indicate that long-term contract workers have higher hourly wages than short-term contract workers. This difference is not significant in 1995 non-state enterprises, but in 1995 state-owned enterprises and 2002 enterprises, the differences are rather prominent. Though not sufficiently testified, we still have reasons to speculate that in the latter three cases, the contract impact on earnings is significant. Yet we can make no identical deduction about whether any difference between the effect degrees of contract terms on earnings exists in state-owned and non-state enterprises, as has been analyzed above.

Next, we make use of SPSS to draw the Interactive Dot Charts, as shown in Fig.1 and Fig. 2.

We first look at the Interactive Dot Charts of hourly wage and education (as shown in Fig.1 (a) and Fig.2 (a)). The wage-education curves of both state-owned and non-state enterprises are found to be quadratic and convex to the original point, with the convexity of the former greater than the latter. This primarily shows that logarithmic hourly wage is a quadratic function of education. Moreover, the coefficient of the quadratic term of non-state enterprises seems to be larger.

Besides, the Interactive Dot Charts of hourly wage and training (as shown in Fig.1 (b) and Fig.2 (b)) indicate a linear relationship existing between the logarithmic hourly wage and the training. In particular, the curve of non-state enterprises seems to be steeper.

Then consider the Interactive Dot Charts of hourly wage and work experience. Fig.1(c) demonstrates that logarithmic hourly wage of both state-owned and non-state enterprise is a quadratic function of work experience (with quadratic coefficient less than 0). The wage function of non-state enterprises gets the maximum value with a work experience of 30 years, while the maximum value of state-owned enterprises occurs when the work experience equals 35 years. The former is relatively concave while the latter is relatively flat. The situation in 2002 is different with that in 1995 (as shown in Fig.2(c)). In the year 2002, the wage-experience curve of non-state enterprises is close to a line, while the curve of state-owned enterprises is significantly quadratic (with an access to the maximum value when the work experience is 40 years).

Finally see the Interactive Dot Charts of hourly wage and Tenure (as shown in Fig.1 (d) and Fig.2 (d)). They are quite similar to the Interactive Dot Charts of hourly wage and work experience (as shown in Fig.1 (c) and Fig.2 (c)). The high correlation between tenure and work experience is the major reason of this similarity. Compare Fig.1 (d) with Fig.1 (c) and Fig.2 (d) with Fig.2 (c) respectively, we find the curve of non-state enterprises is downward in 1995, while that curve of state-owned enterprises has no significant changes. In 2002, curves of both non-state and state-owned enterprises are slightly upward. This primarily argues that the older workers have suffered discrimination in non-state enterprises in 1995, and that they have enjoyed additional allowances in both types of enterprises in 2002 due to their seniority.
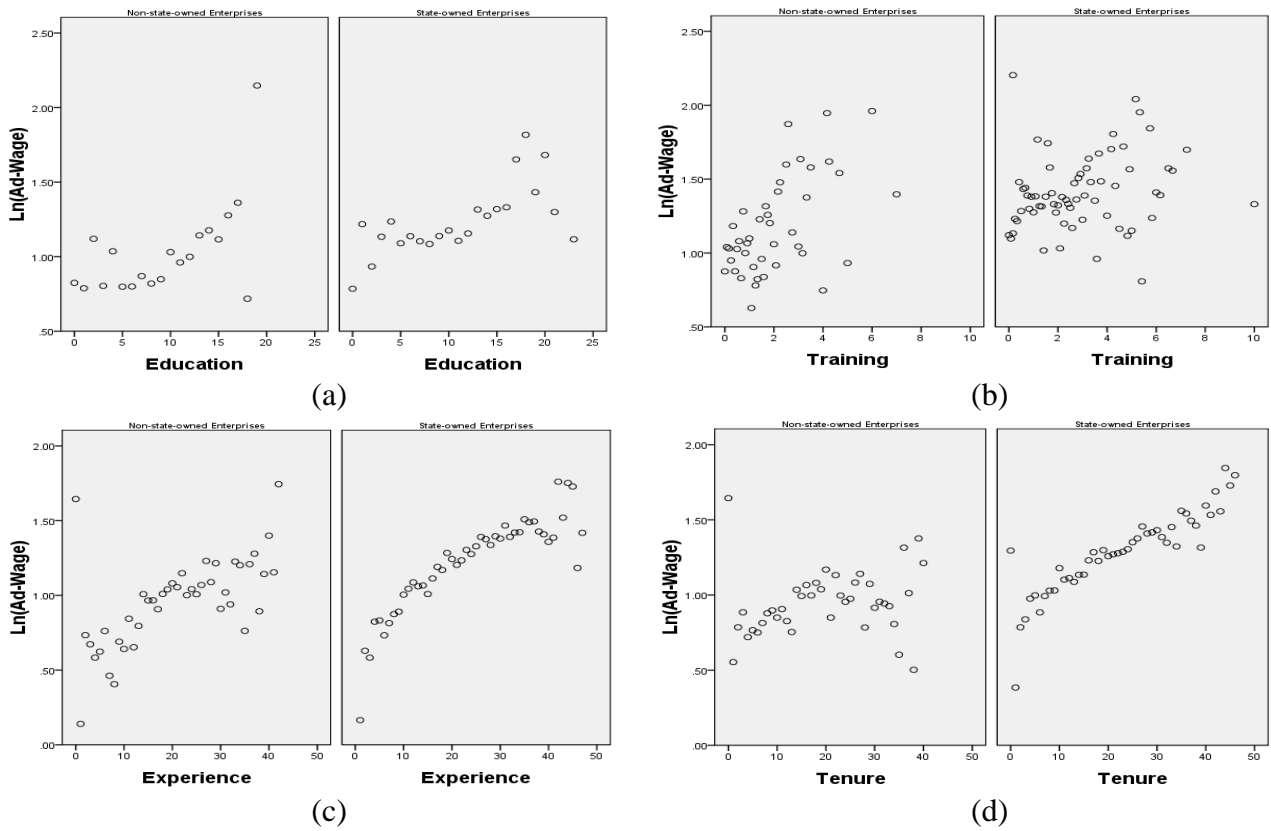
Fig.1. Interactive Dot Charts for 1995 of (a) Ln(Ad-Wage) and Education, (b) Ln(Ad-Wage) and Training, (c) Ln(Ad-Wage) and Experience, (d) Ln(Ad-Wage) and Tenure.
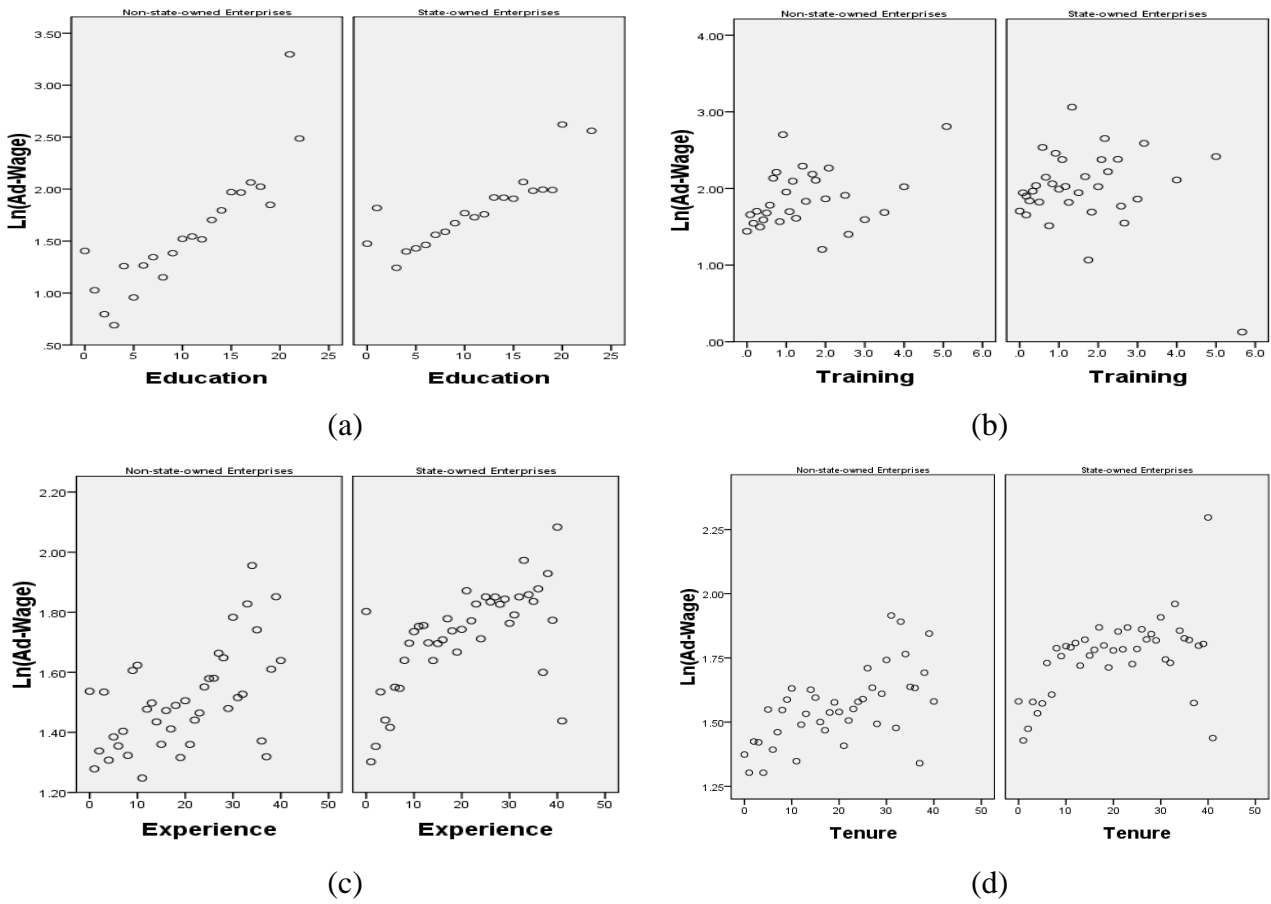
Fig.2. Interactive Dot Charts for 2002 of (a) Ln(Ad-Wage) and Education, (b) Ln(Ad-Wage) and Training, (c) Ln(Ad-Wage) and Experience, (d) Ln(Ad-Wage) and Tenure.

Methods

This study aims to explore the differences between wage determination mechanisms of state-owned and non-state enterprises. In the perspective of wage determination mechanism, many existing studies have followed the Mincer-type wage equation. The Mincer equation structured by Mincer（1974）asserts that logarithmic wage is determined by education, experience and its square. The derivation of the model includes an implicit assumption that the marginal Mincer rate of educational investment remains unchanged. Under China's system, however, we find this assumption suspicious. Li and Li (1994) use the data collected by Institute of Economics, Chinese Academy of Social Sciences, which contains 17891 employee samples from a survey to households in cities and towns in 1998, to estimate the individual yield of education. According to their estimation, the average annual education yield is 3.8% to urban employees, and the marginal yield of education is increasing with the average annual yields of 2.7%、3.4%、3.9% and 4.5%[①]for elementary school, middle school, high school and college education each. Chen and Min (1998) adopt the results from a joint survey conducted by the City Investigation Corps, State Statistical Bureau and the Institute of Higher Education, Peking University in 1996 (with a sample size of 7590). The estimated annual average yields of education various with middle school 3.59%, high school 4.19%, technical secondary school 6.76%, junior colleges 4.67% and undergraduate 6.58%. Li and Ding(2003) make use of the household survey data[②] collected by two investigations conducted by the Income Distribution Group and the Urban Poverty Research Group, Institute of Economics, Chinese Academy of Social Sciences, to make empirical estimations of the dynamic changes of individual education yield in China's cities and towns from 1990 to 1999. Each of the annual average yield in 1995 for middle school or below, high school and college education or above is 1.1%, 3.7% and 6.8%, which turns out to be 2.6%, 4.9% and 14.3%[③] in 1999. Yet estimations done by Zhang & Zhao（2005）reveals that the annual average yields in 1995 for middle school, high school and college education or above are 6.0%、5.1% and 6.1%. The corresponding rates of return are 5.0%, 7.0% and 9.5% in 1999, and 5.0%, 7.1% and 9.3% in 2001. All the studies above can strongly assert that in China the return of rate changes with the various educational levels, and the marginal yield of education tends to be increasing. Besides, earlier descriptive statistics (such as Fig.1 (a) and Fig.2 (a)) also support this assertion. [④]Based on this, we revised the Mincer equation by introducing the education square.

Our paper also regards the impact of tenure on earnings. We consider that tenure acts on wage in two ways as

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[①] See Li, Shi and Li, Wenbin, Estimation on Individual Yields of China's educational investment, carried in Zhao, Renwei and Ge, L. F.(1994) *Research on Income Distribution of Chinese Residents*. China: China Social Sciences Press. (In Chinese)

[②] For more details of the two surveys, see Zhao Renwei etc, 1994, *Study of Income Distribution of Chinese Residents* and Zhao Renwei etc, *Further study of Income Distribution of Chinese Residents.*

[③] The paper only offers estimated values (C) of coefficients in the regression model, with no direct access to the percentages (P). Therefore, we convert the estimated coefficients into percentages using the formula P = Exp (C) – 1. Then we get the yields of each educational level by subtracting the low education yield from the high one. Finally, divide the yields of each educational level by corresponding education, and we get the annual average yields. We regard the education of middle school or below as 9 years, high school education as 3 years and college education as 4 years, and thus the annual average yield of middle school or below might be smaller (since elementary education in some areas only has five years), while the annual average yield of college education or above might be larger (since the average years of college education or above almost exceed 4 years, and with China's economic development and the expending enrollment of graduate students, the bias tends to be even larger). Fortunately, Li, S. and Ding, S.'s results still sufficiently support the conclusion that the marginal education yield is increasing. Even though we consider the length of middle school or below and college education or above as 8 years and 6 years, incremental annual average yields of the three educational levels in 1995 and 1999 still appears (each has a yield of 1.2%, 3.7% and 4.5% in 1995 and 2.9%、4.9% and 9.5% in 1999).

[④] We consider that the increasing marginal education yields of Chinese urban education could be greatly resulted from the 'elite education' in China. And it seems to be commonly known by the society that the primary education (such as the nine-year compulsory education) is not as good as higher education (such as the college education) in China.

following. First, in order to screen and retain good staff, enterprises are likely to adopt "first reduced payment and then excess payment" order of salary payment, which indicates that staff in their early stages receive a salary lower than their marginal revenue product, while the payment to staff in their later stages will exceed their marginal revenue product. [①] We guess this sort of tenure-related pay plan is probably for short-term contract workers. Because of the strong binding of long-term contracts during the time span, which enables enterprises to receive some compensation if any excellent staff breaks the contract midway, enterprises have relatively weak motivation to adopt this pay plan. Next, tenure represents seniority in some degree. Bearing the far-reaching culture of seniority system in China, seniority is in all probability to play an important role in the wage determination mechanism. We believe this phenomenon is more likely to appear in state-owned enterprises where the majority of its subjects are long-term contract workers, and seniority makes no significant impact on short-term contract workers. And hence we include another two variables Tenure and Tenure*（1-Term）within the function, where Tenure captures pure effect of seniority and Tenure*（1-Term）captures tenure effect of the delayed payment contract.

Then our first equation takes the form:

$$Ln(Ad-Wage) = \alpha + \boldsymbol{X}\boldsymbol{\beta} + \mu \tag{1}$$

where the logarithm of hourly wage is explained by a vector of explanatory variables **X**, including gender, education, education square, training, experience, experience square, performance, tenure, contract term as well as tenure*(1- term); α is the constant and μ is the error term. In order to further explore the effect of ownership structure, we consider

$$Ln(Ad-Wage) = \alpha + \boldsymbol{X}\boldsymbol{\beta} + \gamma*own + \boldsymbol{X}\boldsymbol{\lambda}*own + \mu \tag{2}$$

The coefficients γ and λ imply that not only the level but also the structure of earnings are affected by ownership type.

Results

Average effect

When estimating Model 1, we only introduce Tenure with no consideration of Tenure*(1-Term), so that we can observe the overall effects of tenure on income. The coefficient of Tenure is 0.002, which is acceptable under the 10% significance level, as shown by the data in Table 3, confirming the positive correlation between income and tenure. Then we introduce Tenure*(1-Term) into the model and get Model 2. Comparing the coefficients and t-values of Model 2 and Model 1, only coefficients of Tenure, Term and the newly involved variable Tenure*(1-Term) have changed significantly. After involving Tenure*(1-Term), the coefficient of Tenure decreases from 0.002 to 0.001, which is no longer significant. But the coefficient of Tenure*(1-Term) is remarkably significant. These findings indicate that instead of seniority, tenure affects the income increase by the tenure effect of delayed payment contract. The increasing coefficient of Term can be explained in the way that the

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① For more on Delayed Payment Contract, see Edward Lazear, 1979, Why Is There Mandatory Retirement? *Journal of Political Economy,* 87(6),1261-1284; Robert Hutchens, 1987, A Test of Lazear's Theory of Delayed Payment Contracts, *Journal of Labor Economics*, 5(4), 153-170.

tenure effect of short-term contract offsets part of the differences between the long-term and short-term workers when Tenure*(1-Term) is not included. This shows that the wage order of short-term contract belongs to "low starting point, fast moving" type, while that of long-term contract belongs to "high starting point, slow moving" type.

Table 3

Estimates of earnings functions of 2002

	Model 1	Model 2	Model 3	Model 4
Constant	0.588***[7.61]	0.546***[6.94]	0.671***[6.58]	0.639***[6.17]
Gender	-0.112***[6.67]	-0.113***[6.73]	-0.120***[4.83]	-0.121***[4.85]
Education	0.020*[1.56]	0.022*[1.69]	-0.007[0.39]	-0.004[0.24]
Edu^2	0.002***[3.89]	0.002***[3.71]	0.004***[5.18]	0.004***[5.00]
Training	0.082***[3.93]	0.083***[3.98]	0.088**[2.48]	0.092***[2.60]
Experience	0.022***[6.52]	0.021***[6.26]	0.015***[3.07]	0.014***[2.88]
Exp^2	-0.0002***[2.87]	-0.0002**[2.47]	-0.0000[0.37]	-0.0000[0.12]
Performance	0.286***[15.36]	0.287***[15.44]	0.270***[9.06]	0.270***[9.06]
Tenure	0.002*[1.901]	0.001[0.47]	0.002[1.05]	-0.000[0.21]
Contract Term	0.190***[9.03]	0.255***[8.09]	0.166***[5.79]	0.227*** [5.09]
Tenure*(1-Term)		0.006***[2.77]		0.005*[1.78]
Own			-0.033[0.20]	-0.080[0.49]
Gen*Own			0.020[0.58]	0.020[0.58]
Edu*Own			0.038[1.47]	0.037[1.40]
Edu^2*Own			-0.003***[2.60]	-0.003***[2.54]
Trai*Own			-0.012[0.27]	-0.016[0.37]
Exp*Own			0.019***[2.69]	0.018***[2.67]
Exp^2*Own			-0.0004***[2.57]	-0.0004***[2.55]
Perf*Own			0.012[0.30]	0.014[0.37]
Tenure*Own			-0.002[0.61]	-0.001[0.19]
Term*Own			-0.051[1.11]	-0.007[0.10]
Tenure*(1-Term)*Own				0.003[0.71]
Obs.	5698	5698	5698	5698
$Adj.R^2$	0.197	0.198	0.206	0.207
F	156.147	141.463	78.755	71.782

Notes: 1. ***, ** and * denote statistical significance at the one, five and ten per cent levels respectively.

2. T-values are presented in square brackets.

3. The dependent variable is the logarithm of hourly adjusted wage (Ln(Ad-Wage)).

Now review Model 2 in a more specific way. The coefficient of Gender is -0.113, which means the wage of male workers is 112% (Exp (0.113)) that of female workers with other conditions remained the same, indicating that female workers are under serious discrimination. The function of wage on education is quadratic with the coefficient of the quadratic term above zero, which is entirely consistent with our hypothesis, proving exactly that the Mincer marginal yield of education is increasing in China. The coefficient signs of Training, Experience and Experience Square are also consistent with our expectation, showing that training has a significantly positive impact in promoting the income increase, and that experience function is a quadratic function with its opening

downwards. The coefficient of Performance is significantly above zero, which illuminates a strong positive correlation between the employees' income and the companies' profitability. Yet we can make little judgment on whether this positive correlation is due to the share of monopoly rents, the erosion of state-owned profits, or the risk-sharing pay system.

Interactive effect

For further study of ownership structure's impact on employees' wage determination mechanism, we build the estimated Model 3 and Model 4 by using equation (2), which contains the interaction term. First look at gender discrimination. In non-state enterprises, the wage of male workers is 113% that of female workers（Exp（0.121），while in state-owned enterprises the percentage is 111%（Exp（0.101），i.e. the degree of gender discrimination in state-owned enterprises might be slightly lower than that in non-state enterprises, nevertheless, this difference is not significant according to the results that the coefficient of Gen*Own does not significantly differ from zero.

Then consider the effect of education on earnings. The results of Model 4 are nearly consistent with the descriptive statistical results, i.e. the wage-education curves of non-state and state-owned enterprises both have quadratic forms with upward openings, but the curve of non-state enterprises is much steeper, while that of state-owned enterprises is rather flat. These two curves intersect at the point indicating 12 years of education, which indicates that the overall return to education for high educated talents (with college education or above) is higher when they are working in non-state enterprises than in state-owned enterprises; and that if low educated talents (with high school education or below) can work in state-owned enterprises, they will acquire a relatively high return rate to education. This also reveals that non-state enterprises treasure and respect talented people much more than state-owned enterprises.

In terms of the experience, a significant difference exists between two enterprise types. The wage-experience curve of non-state enterprises is close to a line, while the curve of state-owned enterprises takes an evident quadratic form (which reaches its maximum point with 40 years' experience). The results also accord with those of descriptive statistics. Two curves intersect when experience is about 45 years. In reality, however, experience is generally under 40 years (suppose to work at 20 and retire at 60), which leads to a higher overall return rate to experience in state-owned enterprises than in non-state enterprises.

The results from the estimation of Model 4 also illustrate that no significant differences can be found in aspects of the basic salary, the training yields and the wage gap between long-term and short-term contracts in state-owned and non-state enterprises, and that the relationships between employees' wages and enterprise's performance are similar as well. [1] Besides, our guess that seniority affects significantly on employees' income in state-owned enterprises is supported by no empirical results. As the results shown in Model 4, no matter in

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[1] Although the relationships between employees' wages and enterprise's performance are almost similar in two types of enterprises, their mechanisms could be different. In state-owned enterprises, the owners' lack of supervision on actual managers may result in managers and staff's erosion of the state-owned profits. And a higher enterprise profit leads to a greater share and income among them. While in non-state enterprises, the monitoring mechanism between the owners and the real managers is relatively completed, leaving little space for managers and staff to grab its profits. The correlation of employees' wages and enterprise's performance is mainly due to the risk-sharing salary management system adopted by this enterprise. Under this system, the better an employee's performance is, the greater profits will the firm get; at the meanwhile, more incentives will be paid to its workers. Otherwise, the incentives will be reduced or eliminated, which leads to a decline in their earnings.

non-state or state-owned enterprises, employees' income is hardly affected by seniority. However, tenure and earnings under short-term contracts have a significantly positive correlation, which seems to be even more remarkable in state-owned enterprises.

Table 4
Effect change between 1995 and 2002

	Model 4	Model 8	Change
Constant	0.639***[6.17]	0.364***[2.72]	0.274
Gender	-0.121***[4.85]	-0.126***[4.40]	0.005
Education	-0.004[0.24]	-0.034[1.48]	0.030
Edu^2	0.004***[5.00]	0.004***[3.15]	0.000
Training	0.092***[2.60]	0.050**[2.13]	0.042
Experience	0.014***[2.88]	0.060***[9.98]	-0.046
Exp^2	-0.0000[0.12]	-0.0010***[6.33]	0.0009
Performance	0.270***[9.06]	0.285***[10.10]	-0.015
Tenure	-0.000[0.21]	-0.005*[1.83]	0.004
Contract Term	0.227*** [5.09]	-0.225***[3.25]	0.452
Tenure*(1-Term)	0.005*[1.78]	-0.017***[3.48]	0.022
Own	-0.080[0.49]	-0.533***[3.08]	0.453
Gen*Own	0.020[0.58]	0.025[0.76]	-0.005
Edu*Own	0.037[1.40]	0.058**[2.14]	-0.022
Edu^2*Own	-0.003***[2.54]	-0.003**[2.31]	0.000
Trai*Own	-0.016[0.37]	-0.011[0.42]	-0.006
Exp*Own	0.018***[2.67]	-0.003[0.37]	0.021
Exp^2*Own	-0.0004***[2.55]	0.0001[0.64]	-0.0005
Perf*Own	0.014[0.37]	-0.019[0.58]	0.033
Tenure*Own	-0.001[0.19]	0.005*[1.78]	-0.006
Term*Own	-0.007[0.10]	0.358***[3.39]	-0.365
Tenure*(1-Term)*Own	0.003[0.71]	0.018**[2.46]	-0.015
Obs.	5698	7081	
Adj.R^2	0.207	0.239	
F	71.782	107.058	

Notes: 1. ***, ** and * denote statistical significance at the one, five and ten per cent levels respectively.

2. T-values are presented in square brackets.

3. The dependent variable is the logarithm of hourly adjusted wage (ln(Ad-Wage)).

Dynamic effect

In the time dimension, we think that the effect of each variable changes, but the direction and range of these changes are in all probability to be different. This paper, therefore, compares wage function of 1995 with that of 2002 (the results are shown in Table 4, and see the appendix for details about the estimation of 1995 wage function), in order to research for the effects of the ownership structures on the dynamic changes of wage determination mechanism.

The coefficient of Own is -0.533 in 1995, which is accepted at the significant level of 1%. This indicates that

the basic wage in state-owned enterprises in 1995 was far less than that in non-state enterprises. We consider it one of the highlighted reasons leading to the prevailing plunge into the commercial sea before 1997. During 1993 to 2003, a strong tendency appears for seeking positions in business，as a body of labours leave state-owned enterprises for non-state enterprises because of the higher wages in non-state enterprises, especially those with relatively high education and relatively strong ability. Since 1997, with the further reform of state-owned enterprises, being laid-off becomes a feature of that period as labours with lower wages and education have moved from state-owned enterprises to non-state enterprises. Even if in private sectors, their earnings are lower than other labours (Xing, 2007). This is why the basic wage gaps of state-owned and non-state enterprises in 2002 are not significant any more.

Then consider the gender discrimination. The coefficient of Gender changes from -0.126 in 1995 to -0.121 in 2002, i.e. the gender wage ration of male to female changes from 113.43% to 112.86%，which indicates a decline in gender discrimination in non-state enterprises. Becker(1957)'s 'competition inhibits discrimination' theory suggests that the intensive market reform as well as the increasing proportion of private economy in the overall economy push more and more enterprises to face up with increasing fierce market competition, which in return can inhibit the generation of gender discrimination. The results regarding non-state enterprises in this paper support Becker's statement. From 1995 to 2002, however, the gender wage ratio of male to female maintains at 110.63% without any tendency of decline, and the result seems to contradict Becker's argument. We suggest that the results drawn from Zhang and Dong (2008)'s research can help to explain this contradiction. Making use of data from industrial enterprises in 1990s, Zhang and Dong（2008）analyzed the wage differential between genders, concluding that the wage gap was smaller than the productivity gap of different genders in state-owned enterprises, while the reverse was true in private enterprises. This conclusion suggests that actual subsidy rather than gender discrimination against women exists in state-owned enterprises in China, nevertheless, this discrimination lies in private enterprises. According to this conclusion, we can explain the contradiction above in the way that no discovered decline in gender discrimination in state-owned enterprises is mainly due to the decrease of 'gender subsidy'. [1]

Finally, consider the return of human capital. From 1995 to 2002，the coefficients of education square in state-owned and non-state enterprises almost have no changes, but the coefficient of education term in non-state enterprises increases greatly (increased by 3%)，while this coefficient in state-owned enterprises only has a slight increase (increased by 0.8%)．This reveals that the return rate to education increases faster in non-state enterprises. Besides, the marginal yields of training in state-owned and non-state enterprises increase by 3.6 % and 4.2%，respectively, without much difference between the two. The results driven form the wage-education function show that the return rate to experience is decreasing in either type of enterprise, and the decrease in non-state enterprises appears to be larger. The return rate changes of all three human capital factors illustrate that enterprises are increasing focus on employees' education and training, and thus weaken work experience's effects on wage

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[1] According to the labour law in China, employers should pay women employees as normal in their childbearing period. Then if the employers have economic rationality, they will conduct discrimination behavior when employing female workers. Employers' gender discrimination on employment will lead to gender discrimination on salary. Supposing men and women share the same labour supply curve, when gender discrimination exists, employers' labour demand curve to female workers is lower than male workers, resulting in a lower income level for women at the equilibrium point. Therefore, the gender wage gaps observed might represent their real productivity gaps instead of gender discrimination in the long-term. Supposing no gender discrimination exists in non-state enterprises, then to view backward, gender subsidies exist in state-owned enterprises.

determination. This is tightly related to the rapid development of new technology as well as the ever-changing work environment. As the human capital accumulated merely though work experience is facing rapid depreciation, one must rely on stronger learning ability and much more learning time for the increasing improvement of human capital in future work. The difference in changes of human capital return rate of state-owned and non-state enterprises is precisely because the latter one is facing more intense competition and rapid changes.

Conclusions

Are there only direct effects of ownerships on wages? Will ownerships affect impacts of other factors on wages? Focusing on ownership segmentations with the usage of CHIPs data of 1995 and 2002, we analyze the differences of wage determination mechanism in state-owned and non-state enterprises from both static and dynamic perspectives.

The empirical results of 2002 show that no significant differences exist either in the correlations of basic wages, training yields, employee earnings and corporate performance, or in the wage gaps of long-term and short-term contracts. In addition, the guess that seniority affects significantly on employees' income in state-owned enterprises is not supported by empirical results. The tenure and the earnings under short-term contracts have a significantly positive correlation, however, which seems to be more evident in state-owned enterprises.

More findings appear in our study. First, the gender discrimination is slightly lower in state-owned enterprises than in non-state enterprises, nevertheless, the difference is not significant Second, the return rate to education is relatively high for high educated talents (with college education or above) working in non-state enterprises, and for low educated talents (with high school education or below) working in state-owned enterprises. Third, the wage-experience curve of non-state enterprises is close to a line, while the curve of state-owned enterprises has evident quadratic form, with the overall return rate to experience higher in the later than in the former.

Comparing the differences of wage determination mechanism of 2002 and 1995, we also draw three conclusions. First, the basic wages are significantly lower in state-owned enterprises than in non-state enterprises in 1995, which become one of the main reasons of plunging into the commercial sea. However, the laid-off extend everywhere since 1997, which makes these differences not significant any more. Second, the degree of gender discrimination in non-state enterprises is slightly lower in 2002 than in 1995, while this degree keeps almost the same in state-owned enterprises, which might be explained by the decreasing of 'gender subsidy' to female employees in state-owned enterprises. Third, from 1995 to 2002, the return rates to education and training as well as their decreasing degrees are higher in non-state enterprises than in state-owned enterprises. This is probably because of the more intensive competitions and the greater transforms faced up by the enterprises as well as the relatively rapid depreciation of the human capital accumulated by experience, and only stronger learning abilities and more learning time can lead to employees' improving human capital and their competence for work.

Appendix Table A

Estimates of earnings functions of 1995

	Model 5	Model 6	Model 7	Model 8
Constant	-0.099[1.35]	0.022[0.27]	0.225*[1.76]	0.364***[2.72]
Gender	-0.118***[8.50]	-0.117***[8.45]	-0.127***[4.43]	-0.126***[4.40]
Education	0.019[1.60]	0.018**[1.54]	-0.034[1.46]	-0.034[1.48]
Edu^2	0.001*[1.91]	0.001***[1.96]	0.004***[3.17]	0.004***[3.15]
Training	0.043***[4.50]	0.043**[4.523]	0.049**[2.10]	0.050**[2.13]
Experience	0.056***[19.71]	0.057***[19.99]	0.058***[9.65]	0.060***[9.98]
Exp^2	-0.0008***[12.12]	-0.0008***[12.43]	-0.0009***[6.01]	-0.0010***[6.33]
Performance	0.284***[20.10]	0.283***[20.08]	0.287***[10.14]	0.285***[10.10]
Tenure	-0.001[0.44]	0.000[-0.05]	-0.006***[2.59]	-0.005*[1.83]
Contract Term	0.057*[1.75]	-0.076[1.50]	-0.044[0.96]	-0.225***[3.25]
Tenure*(1-Term)		-0.012***[3.43]		-0.017***[3.48]
Own			-0.380**[2.40]	-0.533***[3.08]
Gen*Own			0.026[0.79]	0.025[0.76]
Edu*Own			0.058**[2.13]	0.058**[2.14]
Edu^2*Own			-0.003**[2.32]	-0.003**[2.31]
Trai*Own			-0.010[0.39]	-0.011[0.42]
Exp*Own			0.000[0.02]	-0.003[0.37]
Exp^2*Own			0.0001[0.33]	0.0001[0.64]
Perf*Own			-0.020[0.62]	-0.019[0.58]
Tenure*Own			0.007**[2.45]	0.005*[1.78]
Term*Own			0.162[2.44]	0.358***[3.39]
Tenure*(1-Term) *Own				0.018**[2.46]
Obs.	7081	7081	7081	7081
Adj.R^2	0.228	0.229	0.238	0.239
F	232.913	211.120	117.518	107.058

Notes: 1. ***, ** and * denote statistical significance at the one, five and ten per cent levels respectively.

2. T-values are presented in square brackets.

3. The dependent variable is the logarithm of hourly adjusted wage (ln(Ad-Wage)).

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