An examination of wage determination in China's rural industrial sector

meng, xin

Economics, Research School of Pacific and Asian Studies, Australian national University

1994

An Examination of Wage Determination in China's Rural Industry Sector[*]

Xin Meng
Australian National University

Abstract

Under traditional Chinese socialist ideology, labour is not considered as a commodity, and wages are not viewed as the price of labour. Market oriented economic reform initiated in the late 1970s, however, has brought some changes to this politically sensitive area—pricing and allocation of labour, especially in the rural industrial sector, are now much more sensitive to market pressures. This paper surveys the performance of labour markets in China's rural industrial sector after 10 years of economic reform. It examines whether conventional models of wage determination, modified to reflect the peculiar circumstances of the Chinese rural labour market, can be used to explain variations in wages in this sector of China. It is found that after only a decade of change, the pattern of wage determination in rural China has many parallels with wage determination in Western countries.

An Examination of Wage Determination in China's Rural Industry Sector

I. Introduction

Under traditional Chinese socialist ideology, labour is not considered as a commodity and wage is not the price of labour.[1] Conventional economic models of the pricing and allocation of labour, which emphasise the interaction of supply and demand factors, have little relevance in this setting. The relevance of supply and demand interactions to the explanation of labour market phenomena in China was increased, however, by the market oriented economic reforms initiated in the late 1970s. These reforms began in 1978 when a so-called household responsibility system was introduced in rural areas. This system leased land property to individual households and gave them decision-making power over the issues which concern production and income distribution. A major consequence of these changes has been the rapid economic development of an industrial sector in rural China. By 1985, around 20 per cent of the rural labour force was engaged in the rural industrial sector, which is referred to as the TVP sector (township-, village- or privately-owned enterprises). Its total value of output accounted for about 44 per cent of the gross rural social product in 1985.[2]

The impacts of the market oriented economic reforms in the late 1970s on wage determination and labour allocation in China's rural industrial sector are reviewed in this paper. The main aim is to examine through empirical tests whehter conventional models of wage determination, modified to reflect the peculiar circumstances of the Chinese rural labour market, can be used to explain variations in wages and

---

[1] The logic behind this is that properties in a socialist country belong to the people of the country, and, therefore, workers are masters of the country. Consequently, workers are the employers of the industries and they can not sell themselves to themselves.

[2] See Township and Village Enterprises Statistical Material, 1978-85 (Bureau of Township and Village Enterprises, 1987).

occupational distributions in this sector of China. It is found that after only a decade of change, the pattern of wage determination in rural China has many parallels with wage determination in Western countries. The empirical analyses are based on 1985 cross-sectional data.[3] These data were collected by the World Bank and the Institute of Economics of the Chinese Academy of Social Sciences in 1986 and 1987.[4]

The structure of the paper is as follows. The next section describes how the labour market in the TVP sector differs from the typical Western labour market. Section III examines whether the pattern of wage determination in the TVP sector can be explained by the human capital model. Section IV concludes the paper.

II. Decision making in the rural labour market in China

Before economic reform in 1978, labour mobility, employment and wage levels in China were all fully controlled by the central authority. Everybody was supposed to have a job, but at the same time no one had a choice over the type of work undertaken. In the rural areas, people who were born in a village had to work there for their entire life. The rules of the job assignment varied from time to time and from place to place. Officially, job assignment was supposed to take equality of income distribution into consideration. In practice, however, it was very often that nepotism in appointment dominated in this regard.

---

[3] Five questionnaires were designed for the township, village and private enterprises sample survey: a Workers Survey Questionnaire (WSQ) for TVP employees; an Enterprise Survey Questionnaire (ESQ) for management teams of sample firms; an Enterprise Director Questionnaire (EDQ) for directors of sample firms; an Enterprise Quantitative Questionnaire (EQQ), filled out by accountants of sample firms; and a Township Leader Questionnaire (TLQ). The total number of firms included in the survey is 121. The ESQ, EDQ and EQQ each sampled 121 firms. The WSQ was conducted in 46 firms of the total 121 sample firms, and the total number of observations is 1174. The main part of this study is based on the Workers Survey Questionnaire.

[4] Four counties were involved in the survey: Wuxi county in Jiangsu province, Nanhai county in Guangdong province, Jieshou county in Anhui province and Shangrao county in Jiangxi province. These four counties represent different levels of rural industrialization and different degrees of administrative control or different ownership structures. These four types of development conditions, particularly from the point of view of rural industrialization, should approximately represent the situation in most areas of rural China.

Individual income distribution in the rural areas in this period followed a work point system: each individual labourer's work points were evaluated against each day of work among the members of the production team to which she/he was assigned. Full points per day for a healthy man aged 20-45 were usually 10. However, the value of these work points in terms of money was unknown until the end of the year. At the end of each year, the net distributable income of a production team was divided by the total work points earned by all members who worked in the production team.

In the sub-sections that follow, attention is drawn to the way that economic reform has resulted in changes to the methods of labour allocation and wage determination in the TVP sector.

The situation of employment decision making

Generally speaking, early economic reform did not change the employment system very much in the TVP sector. This can be seen from the information listed in Table 1 on the methods of obtaining the job held at the survey date (1985). Thus, in response to the question: "How did you get the job in this firm?" about 43 per cent of the sampled employees reported that they were assigned to the job by the local authorities. Another 23 per cent got their jobs by social contact with community or firm leaders. Only a low proportion of workers acquired their jobs through their own efforts in the market (which includes the choices of through examination and through own effort in Table 1).

Table 1. The way jobs were obtained in the TVP sector.

Choices	Frequencies	Percentage
Assigned by local authorities	445	42.6
Through examination	168	16.1
Through own effort	133	12.7
Through resource pooling	54	5.2
Introduced by friends and relatives	244	23.4

Source: *Workers Survey Questionnaire.*

Nevertheless, there are some changes in the TVP's recruitment system. Figure 1 shows the correlation between the years of tenure[5] and the proportion of employees assigned to their jobs by local governments, and the proportion of those who obtained employment through their own effort. The figure shows that among people with tenure of one year, about 17 per cent were assigned to their jobs, while among those with tenure of eight years, about 70 per cent were assigned to their jobs. The proportion of those who found their jobs through their own effort is 48 per cent among the one-year tenure group and 20 per cent among the eight-year tenure group. This implies that eight years ago (1978) most employees were assigned to their jobs, while in 1985, the proportion of employees who found the jobs through a market mechanism increased to about 50 per cent and the proportion assigned by the authorities decreased to 17 per cent. In other words, the importance of the market mechanism has grown substantially in recent years.

Figure 1
Institutional change of the TVP employment system

---
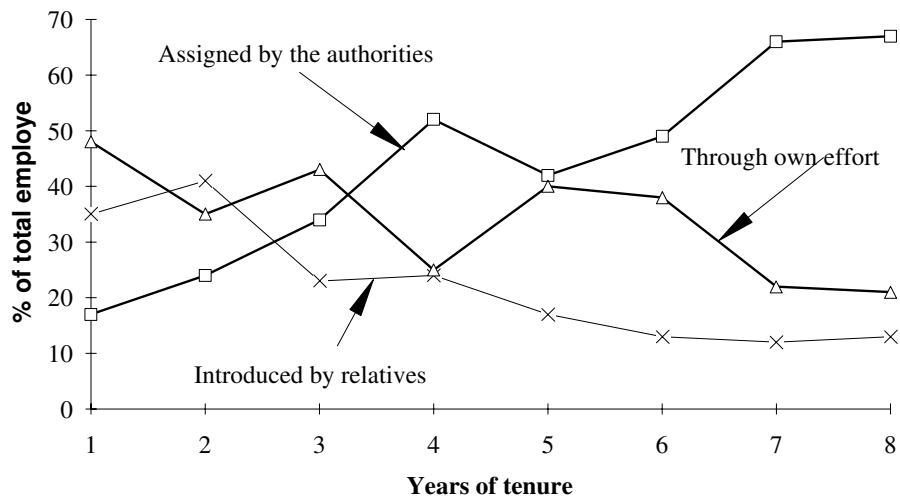
[5] Tenure is measured as the actual years of employment at a firm.

The other aspect of the employment relationship that may be examined with the data available is dismissal. Dismissal is a very politically sensitive issue in China because, as the master of the country, workers were not supposed to be dismissed by anyone. Despite this, around 97 per cent of the directors surveyed in Jieshou, 82 per cent in Wuxi, 73 per cent in Nanhai and 68 per cent in Shangrao thought they had power to dismiss employees. However, the average number of workers dismissed by each firm in 1985 was less than one person in all four counties. With such a small number of workers actually being fired by firms, the economic reform, which were expected to increase the dismissal rate, must in fact, have had little impact on this characteristic of the laobur market. In this respect the picture with regard to dismissals is quite different from that for recruitment outlined above. This difference, and the sharp difference between the views of directors and the practical record of dismissing workers, can be explained by political and social constraints which were not yet affected by the economic reform. For example, some communities in Wuxi issued regulations that prevented enterprises from dismissing employees unless they found new jobs. Each dismissal had to be approved by the community authority (Meng, 1990). The principal reason for all dismissals among the surveyed firms in 1985 was violation of the worker regulations[6].

Wage determination

Income distribution for the rural industrial sector in the old commune system was quite complicated. The workers in these enterprises, drawn from production teams, were paid within the same work points payment system as those who worked in the fields. Enterprises had to transfer a certain amount of their revenue to each of the production teams in proportion to the number of workers supplied. Workers did not get paid until the end of the year and were paid directly by their production team

---

[6] Such as fighting with co-workers, destroying machines, etc.

according to the work points they earned from the team. They were not paid directly by the enterprise.

After the introduction of the *household responsibility system* in 1978, the income distribution system in the agricultural sector changed dramatically. The production team, which had been the basic accounting unit, lost most of its administrative and economic functions. Both production and income distribution were now operated within families. Under these circumstances, it was impossible and meaningless for those who worked in the enterprises to have their income distributed within their home production team (now called the group of villagers). Therefore, the income distribution system of the commune and brigade enterprises was transformed from the old work point system to a within-firm wage system in the 1978-83 period. During this transformation period, various wage systems appeared, for example, within-firm work points system; fixed cash wage, which took wage levels in state-owned enterprises as the point of reference (but the wage paid was normally slightly lower); and half fixed cash wage which was paid monthly plus half within-firm work points, paid at the end of the year.

1983 was a turning point for the TVP sector: *the production responsibility system* was introduced to most of the township- or village-owned firms. This meant that the enterprises had more power over managerial decision making. Privately-owned rural non-agricultural enterprises were encouraged. And the majority of these enterprises switched to a monthly cash wage system.

The cash wage system links an individual's work effort with his/her payment more directly than the work points system, and gives an individual greater incentive to work hard. Specifically, most of the firms adopted a piece-rate wage system if it was possible. For those jobs which were impossible to count by piece, a time-rate wage supplemented by a bonus system was adopted.

Apart from this change of payment system, there was also a considerable decentralization of decision-making in regard to the wage level. While this area was highly controlled by the local authorities, in 1985, over 60 per cent of firms in the sample claimed that they had decision making power over wage and bonus determination.

The effect of special labour market decision making on wage determination in the TVP sector

The main difference between the TVP labour market and the theoretical construct analysed in conventional economic theory is obvious: the neoclassical modelis built upon the situation in which individual firms take a market wage level as given and choose the quantity of employees to maximize their profits, while in the case of the TVP labour market, firms seem rarely to have decision making power over the quantity of employment, and, instead of being a pre-determined variable, the wage is mostly an endogenous variable to the TVP firms.

Recent developments in theoretical labour economics have provided one theory that may explain part of the behaviour of firms in the TVP sector. Thus, efficiency wage theory (see, for example, Stiglitz, 1974 and Solow, 1980, 1985) modified the standard neoclassical labour market model by letting firms use the wage as a means of encouraging employees to stay with the firm, so as to minimise training costs, and as a means of inducing greater (optimal) effort from workers. This theory is normally used to explain the phenomenon of the simutaneouse existence of unemployment and above-market-level wages.

The situation in the TVP sector is slightly different from those described by the standaard efficiency wage model. The main differences are as follows. In the case of the TVP labour market, the attachment of the firm and the employees is exogenous. Firms cannot freely hire or fire employees. However, the only alternative employment opportunity for employees (agricultural employment) can only provide lower income

to them as labour productivity in the agricultural sector is lower than that in the TVP sector[7]. Therefore, employees in the TVP sector will not choose to quit to obtain lower wages given that the TVP firms pay employees according to their labour productivity. But, if the firm does not pay its employees fairly they may choose to shirk. If shirking is detected, the workers' wage level can be decreased.[8] This situation has two major impacts. First, it prevents firms from paying employees lower than their alternative wage since they will choose to quit from the TVP sector. Second, where firms pay their workers fairly, it is expected that the workers will respond by providing sufficient effort.

Under these circumstances, how would firms react to maximize their profit?[9] The firm's problem can be viewed as an attempt to choose the wage level in order to encourage its employees not to shirk. Equivalently, the problem is to choose a wage level that will induce the effort level from the employees that will maxmize the firms profit. This problem can be written as:

---

[7] A study by Meng and Huang (1994) shows that marginal productivity is much higher in the TVP sector than in the agricultural sector in China. Stiglitz (1982) also points out that "efficiency wage considerations may be important in both the rural and urban sectors; but there is no reason that the efficiency-wage function should be the same in the two sectors (since the nature of the work performed is so different, as are the environmental factors which affect the effect of wages on productivity). Thus, the wages paid in the two sectors may differ markedly."

[8] Because of this, monitoring is extremely important for the TVP firms. That is why they normally choose a piece-rate payment when it is possible, as it can be seen as a perfect monitoring mechanism with the lowest cost.

[9] Byrd (1987) gives a detailed explanation when he assumes Chinese firms in the state-owned enterprises have an objective of profit maximisation. His explanation is even more relevant to the TVP case.

$$\underset{w}{Max} \qquad \Pi = pf[e(w)\overline{L},\quad \overline{K}] - w\overline{L} - r\overline{K} \qquad (1)$$

where Π is profit,

         p is price of output,

         w is wage rate,

         e is effort provided by each individual,

         L is labour input which is a constant in the short-run,

         K is capital stock which in the short-run is assumed to be a constant,

         r is rent for capital,

         $f[e(w)L, K]$ is the production function.

The first order condition of this problem is:

$$pf_e = w_e\overline{L} \qquad\qquad\qquad (2)[10]$$

f_e is the partial derivative of f with respect to e or the marginal product of effort, w_e is the partial derivative of w with respect to e or the marginal wage of effort. $w_e\overline{L}$ represents the marginal cost of effort. The result of equation (2) means that in order to maximise its profit the firm has to pay each individual at the wage level where the value of the marginal product of effort is equal to the marginal cost of effort.

Several points are evident from the above analysis. First, it is clear that the role of wage in the TVP firm is to induce effort from each individual so as to maximise the firm's profit. Second, in order to achieve this, the firm has to pay individuals at the wage level where the value of their marginal product of effort equals their marginal cost of effort.

However, the above analysis is based on the rather strong assumption that individuals are homogenous with respect to their provision of effort. If we relax this homogenouty assumption by accepting the fact that individuals in reality are different in terms of their effort supply, it is obvious that individuals who provide different levels of effort will receive different wage rates, provided firms can monitor effort. Then, if as believed, the individual's productivity can be increased through augmentation of human capital (namely education level, years of labour market

---

[10] For a detailed derivation, see Appendix A.

experience, etc), individuals could expect to get the market rate of return to their investment in human capital.

More specifically, the following propositions may be stated: (1) Labour market experience should have a significant impact on wage determination as it has a direct impact on labour productivity. (2) The impact of education on individuals' wage determination depends on whether it affects labour productivity. In the case where the level of technology is very low and the required skill level is very low, education may not have a significant impact on labour productivity. Therefore, it may not affect individual wage determination in some parts of the TVP.

To sum up, there are two hypothesis need to test according to the model established above: (1) Wage level is likely to be determined by labour productivity in the TVP sector. And (2) by and large, human capital theory should be applicable to the wage determination in the TVP sector.

III. Empirical test

Normally, productivity of effort is very hard to measure as the cost of monitor is too hight. However, for some kind of production, where the quantity and quality of output can be counted by piece, mornitoring cost is relatively low. In this case, productivity of effort can be directly related to the pieces of work completed, and hence to the piece-rate payment.

In the sample we used for this study, 40 per cent of employees are paid by piece-rate and their earnings can be considered as *a direct measure of labour productivity*. If we group the data into those paid by piece-rate and those paid by time and compare the results, we might be able to test if the employees in the TVP sector are paid according to their labour productivity.

To test the applicability of human capital model in the TVP wage determination, earning equations are estimated for the total male employees first, and then for the two occupational groups separately.

According to many applications of the human capital model, schooling and work experience, including general labour market and firm-specific skills, are the factors that have the most significant impact on individual wage determination. In an application across areas that differ appreciably in terms of economic development, there is also expected to be a regional element to wage determination. The basic human capital model is, therefore, specified as:

Model 1:

$$ln(w)=a+b_1S+b_2FT+b_3FT^2+b_4OJ+b_5OJ^2+b_6RE+u$$

where w is daily wage;
               S is years of schooling;
               FT is firm-specific tenure;
               FT^2 is firm-specific tenure squared;
               OJ is other job experience;
               OJ^2 is other job experience squared;
               RE is a vector of regional dummies.

This model is generalised in a number of ways. When the data were collected most TVP firms had existed for fewer than 10 years and most employees were farmers before they were employed by the firm. Model 2 therefore is specified to capture the relationship between the wage level and agricultural and non-agricultural experience.

Model 2:

$$ln(w)=a+b_1S+b_2FT+b_3FT^2+b_4ONAJ+b_5ONAJ^2+b_6AEXP+b_7AEXP^2+b_8RE+u$$

where $ONAJ$ is other non-agricultural experience;
               $ONAJ^2$ is other non-agricultural experience squared;
               $AEXP$ is agricultural experience;
               $AEXP^2$ is agricultural experience squared.

Finally, it is generally argued that wages in different types of work may incorporate a compensating differential that accommodates peculiar disamenities associated with that work. Accordingly, the wage-generating function is often expanded to include variables for the type of work undertaken. Reflecting this, both models are also estimated with a dummy variable for occupation of employment. In this regard, total employees are divided into two groups, staff and workers. Staff refers to those who are engaged in managerial and technical work. The workers group refers to those who are engaged in physical labouring work. The occupation variable has staff coded as 1 and workers as zero.

The results of the models described above for all male employees are reported in Table 2 and the results with the data disaggregated according to occupation of employment are reported in Table 3.

Table 2
OLS results of models of wage determination,
China's TVP sector, 1985.

	models			
	1		**2**[11]	
	without ocp	**with ocp**	**without ocp**	**with ocp**
	n=529	n=525	n=457	n=454
Constant	1.016	1.089	1.068	1.154
	(10.69)	(11.44)	(9.89)	(10.87)
Schooling	0.011	-0.0002	0.007	-0.007
	(1.63)	(-0.003)	(0.85)	(-0.81)
Firm tenure (FT)				
FT	0.028	0.021	0.032	0.024
	(2.80)	(2.15)	(2.91)	(2.19)
FT^2	-0.0007	-0.0006	-0.0009	-0.0007
	(1.93)	(-1.61)	(-2.15)	(-1.77)
Other job experience (OJ)				
OJ	0.029	0.027	(a)	(a)
	(5.48)	(5.12)		
OJ^2	-0.0006	-0.0006	(a)	(a)
	(-3.83)	(-3.89)		
Other non-agri. exp. (ONAJ)				
ONAJ	(a)	(a)	0.023	0.019
			(3.76)	(3.12)
$ONAJ^2$	(a)	(a)	-0.0005	-0.0004
			(-2.91)	(-2.65)
Agri. experience (AEXP)				
AEXP	(a)	(a)	0.025	0.022
			(3.18)	(2.89)
$AEXP^2$	(a)	(a)	-0.0005	-0.0005
			(-2.02)	(-1.94)
Occupational dummy	(a)	0.144	(a)	0.177
		(3.53)		(4.13)
County dummy				
Jieshou	-0.274	-0.265	-0.309	-0.293
	(-6.28)	(-6.16)	(-6.36)	(-6.19)
Shangrao	-0.441	-0.427	-0.495	-0.472
	(-8.19)	(-7.72)	(-8.77)	(-8.10)
Nanhai	0.529	0.524	0.481	0.478
	(7.70)	(7.54)	(6.61)	(6.56)
Breusch-Pagan Chi-Squared	47.02 (8)	55.44 (9)	47.64 (10)	51.72 (11)
Adjusted R^2	0.34	0.37	0.34	0.36

Note: [1] 't' statistics are presented in parentheses.

[2] FT is firm tenure; AEXP is agricultural experience; OJ is other labour market experience, excluding firm tenure; ONAJ is other non-agricultural experience.

[3] (a)=variable not entered.

[4] Breusch-Pagan $\chi 2$ tests for heteroscedasticity. The degrees of freedom for the $\chi 2$ statistics are presented in parentheses

---

[11] By deleting observations with negative values of work experience in the residual categories the sample size for model 2 is reduced by about 15 per cent.

Table 3[12]:
OLS results of models of wage determination by occupational groups*

	model 1		model 2	
	workers	staff	workers	staff
	n=271	n=262	n=230	n=230
Constant	0.967	1.466	1.012	1.494
	(7.56)	(9.96)	(7.23)	(9.22)
Schooling	-0.009	-0.009	-0.014	-0.003
	(-0.08)	(-0.87)	(-1.09)	(-0.29)
Firm specific tenure (FT)				
FT	0.049	0.0002	0.057	-0.002
	(3.47)	((0.02)	(3.86)	(-0.13)
FT^2	-0.0017	0.0001	-0.002	0.0002
	(-2.91)	(0.23)	(-3.39)	(0.32)
Other job experience (OJ)				
OJ	0.015	0.031	(a)	(a)
	(1.89)	(4.66)		
OJ^2	-0.0002	-0.0007	(a)	(a)
	(-0.77)	(-3.96)		
Other non-agri. exp. (ONAJ)				
ONAJ	(a)	(a)	0.024	0.014
			(2.82)	(1.66)
$ONAJ^2$	(a)	(a)	-0.0005	-0.0004
			(-1.92)	(-1.20)
Agri. experience (AEXP)				
AEXP	(a)	(a)	0.012	0.026
			(1.03)	(2.92)
$AEXP^2$	(a)	(a)	-0.0002	-0.0007
			(-0.35)	(-2.36)
County dummies:				
Jieshou	-0.219	-0.299	-0.212	-0.347
	(-3.70)	(-4.96)	(-3.21)	(-5.35)
Shangrao	-0.222	-0.648	-0.256	-0.694
	(-2.87)	(-7.80)	(-2.96)	(-8.07)
Nanhai	0.821	0.211	0.774	0.190
	(8.22)	(2.93)	(7.35)	(2.44)
Breusch-Pagan Chi-Squared[13]	36.31 (8)	7.05 (8)	29.96 (10)	9.21 (10)
Adjusted R^2	0.41	0.33	0.40	0.35

*: For notes to Table see Table 1.

---

[12] In this table, the results for the workers group (both model 1 and model 2) are corrected for heteroscedasticity (using White's consistent covariance matrix). There is no heteroscedasticity problem for the staff group. The 't' statistics presented in the table for the staff group use the OLS covariance matrix.

[13] The critical Chi-Squared value at the 5 per cent significance level for n=8 is χ^2=15.51; for n=10, χ^2=18.31.

The salient features of these results can be discussed in two groups: those relating to the impact of experience on wages and those relating to the impact of schooling on wages.

Experience. Experience is an important determinant of wages. Other job experience (total experience minus firm tenure) and firm tenure are statistically significant and are associated with a rate of return of about 2.5 to 3 per cent for each additional year of experience over most of the first decade of work. This is similar to the pattern of experience effects reported in studies of Western labour markets (see, for example, Polachek and Siebert, 1993). When other job experience is further disaggregated into agricultural experience and non-agricultural experience (see model 2 of Table 2), the estimates of the coefficients appear very similar across the experience variables. This suggests that the source of labour market experience is largely irrelevant, though the result is a little surprising in that one might not expect a close relationship between learning experience in agricultural and non-agricultural jobs. However, when the total male sample is disaggregated into workers and staff sub-groups (Table 3) the situation becomes clearer.

For workers, firm tenure and other non-agricultural experience are statistically significant, with firm tenure having the greater impact on workers' wage determination. Agricultural experience is insignificant for workers. These results accord well with human capital theory. As individuals' experience in the firm or in other non-agricultural jobs increases, their labour productivity is expected to increase. Consequently, their wage should increase.

For staff, however, the most important source of experience seems to be agricultural employment. Other non-agricultural experience ranks second. Firm tenure seems unimportant. Two conjectures are offered concerning these results: (1) As noted in section II, most employees were assigned to their position by the community authorities. Moreover, the community authority normally assigned the leaders of the

production team or the brigade to be the management staff of the firm. The rank and starting wages in the firm reflected the length of the time that individuals were agricultural leaders. This might be the reason for the strong relationship between agricultural experience and wages for staff. Once they become staff members and gain experience in one firm, they are often assigned to a new firm as a higher level staff member. If the wage level set for the staff depended on firm tenure (either in the old or the new firms) they would be reluctant to move. Hence, there is no strong link between firm tenure and earnings but there is such a link between other non-agricultural job and earnings. (2) Management skills learned in agricultural and other non-agricultural sectors are easily transferred to management in the enterprise.

These conjectures are tested by further disaggregate both staff and workers group into piece rate and time rate group and estimate model 2 for all these groups. The results presented in Appendix A show that different experience variables have exactly same impact on both piece rate and time rate groups within each occupational group. For the workers group, firm tenure and other non-agricultural experience have significant impact on wage levels for both piece rate and time rate groups, but agricultural experience hardly has any impact on both groups wage determination. For staff, only agricultural experience matters for both piece rate and time rate groups. These results suggest the reason that the different experience variables have different impact on workers and staff wage determination is more likely to be a productivity oriented phenomena.

Education. Education has been shown in most studies of Western labour markets to be a key determinant of the income distribution (see, for example, Psacharopoulos, 1985). The most unusual result for the analysis of the male labour market in the TVP sector is an insignificant effect of education on individual wage determination. The poor performance of the education variable is a characteristic of both the analysis of the total male sample (Table 2) and of the analysis based on data disaggregated into workers and staff groups (Table 3). The return to education is at most 1 per cent for

the total male sample and appears to be negative for the disaggregated data. A question naturally arises as to whether this unusual result reflects a labour productivity effect or socially determined rules of payment.

We estimated models 1 and 2 for piece-rate and time-rate male employees separately. The restults are presented in Appendix B. Statistical tests revealed that the processes of wage determination for the two groups were the same[14]. In particular, the results suggest that, once again, schooling is statistically insignificant for both groups, a result that holds no matter which specification of experience is adopted. As piece-rate earnings are a direct measure of productivity it appears that education does not affect labour productivity in the TVP sector.

From the perspective of the evidence on the wage-education relationship in western labour markets, the results for the TVP sector are a puzzle. However, examination of the nature of production in many of the firms leads us to the following explanation. In the TVP firms many jobs are unskilled and productivity would be the same for all workers in these jobs, regardless of level of education. Hence it would be expected that eduction would not be important in terms of wage determination.

Analysis of the institutional change of employment system in the TVP sector may also further our understanding of the role of education in TVP wage determination. As mentioned in Section II, among those who had tenure of 8 years (being employed at 1978), about 70 per cent were assigned to their jobs, and only 20 per cent found their jobs through their own efforts. Among those who had tenure of 1 year (being employed at 1985) 48 per cent found employment through their own efforts, while only 17 per cent were assigned to their jobs. This shows the gradual liberalization of the TVP employment system.

---

[14] F-tests are conducted to see whether the wage structures are the same for the piece rate and time rate groups. For model 1 $F(9, 529)=1.40$ and for model 2 $F(11, 457)=1.22$. They are both less than the critical value of $F(9, \infty)=1.88$ and the critical value of $F(11, \infty)=1.83$, so the null hypothesis of no structural change for both models cannot be rejected.

To exploit this characteristic of the data, the sample was disaggregated into market (those who found their jobs through their own efforts) and non-market (those who were assigned to their jobs) groups[15], and wage equations were estimated for the two groups separately (Meng, 1992)[16]. The most interesting result from these estimations is that education is significant for the market group but insignificant for the non-market group, the coefficient of schooling for the market group is 0.039 with a t-statistic of 3.13 while for the non-market group it is -0.007 with a t-statistic of -0.68. However, even the return to education for the market group, at around 4 per cent, is considerably lower than the 7 per cent to 10 per cent reported for the U.S. (Psacharopoulos, 1985).

The main concern raised by the above results is why education is significant for the market group but not for the non-market group. Does this reflect labour productivity effects? To examine this question, both the market and non-market groups are sub-divided into piece-rate and time-rate groups and human capital wage equations estimated for each sub-sample. The results[17] from this experiment indicate that education is a significant determinant of wages for both piece-rate and time-rate employees in the market group, while it is insignificant for both piece-rate and time-rate employees in the non-market group.

Hence, it is not the method of payment that leads to the difference between the impact of education for the market and non-market groups. Rather, it must be something to do with the underlying nature or philosophy of the two types of employment. In this regard, one reason why education might have a significant impact on labour

---

[15] Freedom of choice is the most important distinction between a market economy and a planned economy. In terms of the labour market, this freedom of choice is most obvious in terms of employment choice. In a market economy, any employer may hire any worker, and any worker may work for any employer. However, employment is highly controlled by the authority in a planned economy. Accordingly, these two groups (those who find their job by their own effort and those who are assigned to their job) are referred to as the market and non-market groups respectively.
[16] See Meng (1992) Table 6.2 in Chapter 6.
[17] See Meng (1992) Table 6.3 in Chapter 6.

productivity for the market group but not for the non-market group might be that the underlying technological processes of the work undertaken by each group are different. Because of these technological differences, people involved in higher technological production need to be more educated compared with those who undertake more simple jobs.

To develop this explanation, assume there are two different kinds of firms, one employing high technology and the other low technology. Before economic reform, most of the TVP firms probably employed low technology. Some might have employed high technology but were not allowed to choose high quality employees according to the firms' technological requirements. The gradual liberalization of the TVP labour market has allowed firms with higher technology to hire employees according to their educational level. And most importantly, because firms are allowed to choose the quality of their employees, more new firms may start to employ high technology. Education has a significant impact on these high technology firms' labour productivity, and productivity is rewarded.

Firms whose technology is relatively low, however, remain with the old recruitment system. They also pay their employees according to labour productivity. However, education does not increase labour productivity in the low-skill jobs that predominate in these firms.[18]

This speculation can be reinforced by a steeper tenure-earnings profile for the market group compared with the non-market group (Figure 2). It suggests that firm-specific training is more important for the former than for the latter, and this in turn suggests that the underlying technological level for the market group may be higher than for the non-market group.

---

[18] The argument here is suggesting that technology alone is insufficient in the sense that is requires certain economic environment in order to take effect. This augument could be testable by linking technology to educational requirement and different institutional settings had the variable of firms' technology level been avialable.

Figure 2
Comparison of tenure-earnings profiles between the market and non-market groups
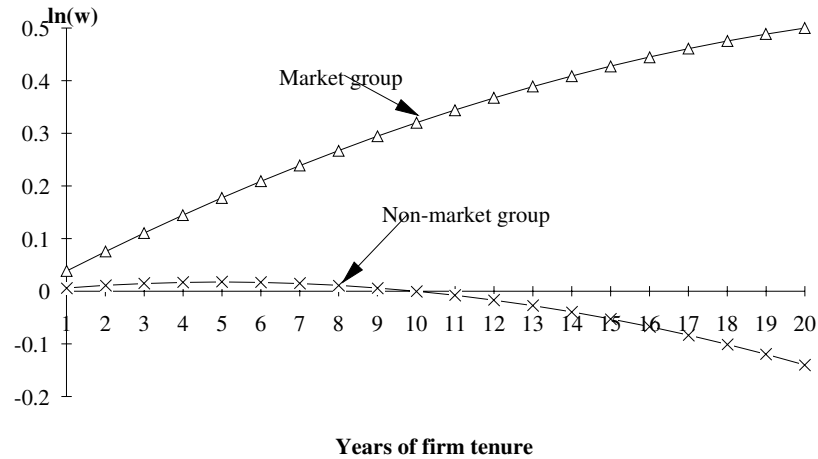
Source: *Workers Survey Questionnaire*.

Does education, therefore, play no role for the non-market group? Although education does not seem to affect earnings for the non-market group, perhaps it brings with it other rewards.

In the human capital literature, there is a controversy about whether education affects wages via its impact on labour productivity or only as a screening device. The logic behind the screening device hypothesis usually consists of two steps. First, schooling provides information about an individual's innate productive capabilities which determine the individual's job assignment; second, the individual's occupational level in turn determines his/her earnings.

Although it is difficult to disentangle these two hypotheses empirically, it is possible to test whether the TVP sector uses schooling as a signal to assign employees to a certain level of occupation for both the market and non-market groups. This is tested

by adopting an occupational assignment[19] logit model. This model capture how the variables (education, firm tenure and other job experience) which affect demand decisions for an occupation affect the probability of individual i working in occupation j. The model is given as:

$$P_{ij} = prob(y_i = oc_j) = \frac{e^{x_i\beta_j}}{\sum_{k=1}^{J} e^{x_i\beta_k}} \qquad i=1, ..., N, \quad j=1, ..., J.$$

where N=sample size,
          J=number of occupational groups
          x_i=a vector of exogenous variables affecting supply and demand factors

We use this model to test whether education plays a significant role in TVP occupational assignment.

The results of the binomial logit model for the total sample and for the market oriented and non-market oriented groups separately are reported in Table 4. The workers group is used as a reference category.

---

[19] This model was originally called an occupational attainment model (Brown, Moon and Zoloth; 1980). In our case, it was community authorities who assigned people to their job. Therefore, I refer to it as an occupational assignment model.

Table 4
Binomial logit estimates of male occupational attainment:
(0=workers, 1=staff)

Variables	Total Sample	Market	Non-Market
Constant	-5.359	-5.599	-5.125
	(-8.17)	(-5.26)	(-6.11)
EDU	0.470	0.503	0.43
	(8.29)	(5.58)	(5.94)
FT	0.098	0.154	0.086
	(4.28)	(3.22)	(3.16)
OJ	0.093	0.12	0.085
	(6.02)	(4.26)	(4.47)
JS	-0.288	-0.721	-0.697
	(-1.03)	(-1.77)	(-1.15)
SR	-0.166	-1.992	0.641
	(-0.45)	(-2.75)	(1.41)
NH	0.428	0.252	0.337
	(1.19)	(0.37)	(0.80)

Note[20]: (1) For total sample,
     n=420, maximum likelihood=231.05, χ^2=119.2, pseudo R^2=0.205.
  (2) For the market oriented group,
     n=192, maximum likelihood=96.06, χ^2=72.36, pseudo R^2=0.274.
  (3) For the non-market oriented group,
     n=228, maximum likelihood=132.32, χ^2=62.5, pseudo R^2=0.19

According to the results presented in Table 6,[21] three main human capital variables (education, other job experience and firm tenure) are significant determinants of occupational assignment for the total sample of employees. Education is the most important variable affecting the probability of becoming a staff member. Other job experience and firm tenure rank second and third respectively. The other variables do not seem to be important in determining an individual's occupation. Similar results are

---

[20] The formula for the Chi-squared measure is $\chi^2=-2(lnL_r-lnL)$, where lnL_r and lnL are the log-likelihood at the maximized value with the constant term only and the log-likelihood at the maximized value with all regressors in the model, respectively (Greene, 1990). The formula for the pseudo R-squared measure is $R^2=1-(lnL_r/lnL)$ (McFadden, 1974).

[21] A likelihood ratio test of the hypothesis that the coefficient vector is zero indicates that for all three samples the estimated model is highly significant.

obtained for the market and non-market-oriented groups. It is of interest that in the non-market group education plays an important role on occupational attainment whereas it has no impact on earnings.

The results of the binomial logit model (workers and staff) for the market and non-market groups suggest that education is an important determinant of occupational attainment for both groups. And the marginal effect of education on the probability of becoming a staff member is even stronger for the non-market group than for the market group (0.012 and 0.0055, respectively).

The binomial logit model discussed above is generalized in Meng (1992) to consider the assignment of employees to each of six occupational groups: workers and five sub-groups of staff, namely shift leaders, operational personnel, technical personnel, ordinary staff and middle level staff. This disaggregation provides results that reinforce the discussion here. In particular, it suggests that people with more education are not only more likely to be in the staff groups, but also more likely to be in a higher level of management staff group.

There is one final aspect of the wage structure that can be examined to further our understanding of the way wages are determined in the TVP sector. And this is the impact of occupation on earnings determination for the market and non-market groups. This issue can be examined by estimating a wage equation with occupational dummies for each group. Relevant results are reported in Table 5. These results indicate that for the market group the effect of education is consistent with the theory. More education brings about a higher occupational level, and this in turn brings more earnings.[22] For the non-market group, however, the results suggest that although the TVP uses education as a criterion for job assignment, the level of occupation is not a significant determinant of earnings.

---

[22] This can be proved by the fact that when the occupational dummies are added in, the rate of return to education decreases and becomes statistically insignificant for the market group.

Table 5
The regression results of model 3 for market and non-market groups
(workers=0)

	Market n=190	Non-Market n=226
Schooling	0.0158	-0.020
	(1.28)	(-1.52)
Occupational dummies		
Shift Leaders	0.196	0.040
	(1.95)	(0.37)
Operational Personnel	0.257	0.051
	(1.88)	(0.44)
Technical Personnel	0.261	0.042
	(2.81)	(0.37)
Ordinary Staff	0.100	0.175
	(0.86)	(1.72)
Middle level Staff	0.423	0.313
	(3.61)	(3.09)

Note: The regressions also include the variables included in the models listed in Table 2. The results for the whole model are reported in Meng (1992).

This is indeed a puzzle. If education has neither a direct nor indirect (through occupation) effect on wage determination for the non-market group, why do some people still invest in education? Furthermore, if occupation does not have an impact on wage determination, what is the motivation for people to seek to be promoted?

Perhaps people invest in education because this is necessary to achieve a high level occupation which might be correlated with non-wage benefits. For example, being a staff member means that there is no need to undertake heavy labour; individuals can gain a good reputation; and may have priority when attempting to establish employment opportunities for their children and relatives. In other words, payment in the TVP firms contains both wage and implicit benefits. If these non-wage benefits are considered as part of income, we might be able to find a significant effect of these occupational dummies on income determination. Unfortunately, it is not possible to measure non-wage benefits in these data and incorporate them into the regression.

One survey question, however, can partly provide support for the relationship between the level of occupation and non-wage benefits. The question asks all the directors of the surveyed firms: "How many of your family members are there in your firm?" The survey results show that on average each of 115 directors in the sample has 2.65 family members employed in his/her own firm.

To sum up, it is clear that the relationship between education and earnings in the TVP sector reflects productivity effects. It is shown that for both the market and non-market groups the TVP firms paid their employees according to their labour productivity. Education, however, has an important impact on labour productivity for the market group but not for the non-market group. This relationship can be detected directly from the regression results.

Nevertheless, education does play an important role in individual's occupational assignment for both the market and non-market groups in the TVP sector. Employees with higher education are more likely to be assigned to a higher occupational level. For the market group, there is a direct correlation between occupation and earnings. For the non-market group, it cannot be directly observed from the estimation of a wage equation. It may be captured, however, in some kinds of non-wage benefits.

The above analysis shows that although the TVP labour markets have some distinct features compared with the labour market defined in neoclassical theory, the human capital model can still explain their wage determination pattern to a certain extent. To illustrate further the relevance of the human capital model to wage determination in the TVP sector, it is used as the basis for an examination of the gender wage differential in the TVP sector.

IV. Gender wage differential in the TVP sector

Female employees account for about 45 per cent of the total sample. In general women earn 20 per cent less than men in the TVP sector. To understand wage determination in the TVP sector, it is important to know the nature of any structural differences of wage determination between the male and female labour markets, and the role of pay discrimination.

The wage differential between gender groups may be caused by two different factors: (1) a difference in productivity, and (2) discrimination. Within the second category, there are two potential sources of discrimination—wage discrimination within the same occupation and discrimination in the distribution of the male and female work forces across occupations.

In the labour economics literature, Blinder's (1973) wage decomposition is widely used to capture the labour productivity difference and discrimination within an occupation, while Brown, Moon and Zoloth's (1980) model is generally used to more comprehensively incorporate the effect on wages of differences in the distributions of males and females across occupations. In particular, Brown, Moon and Zoloth (1980) decomposed the total wage differential between men and women into components related to within-occupation wage differences and occupational differences. Each of these components contains a labour productivity effect and a discrimination effect.

Brown, Moon and Zoloth's comprehensive approach was used to decompose the gender wage differential in the TVP sector. The results are presented in Table 6.

Table 6
Decomposition of gender wage differentials

	value	% of total
Total LDW differential	0.2231	100.0
Intra-occupational	0.1707	76.5
Justifiable (PD)	-0.0501	-22.5
Unjustifiable (I+WD)	0.2208	99.0
Inter-occupational	0.0524	23.5
Justifiable (QD)	0.0213	9.6
Unjustifiable (OD)	0.0311	13.9
Total justifiable	-0.0288	-12.9
Total unjustifiable	0.2519	112.9

Note: LDW=daily wage in log term;
PD=gender wage differential due to productivity effect of occupational distribution;
I+WD=gender wage differential due to discrimination of occupational distribution;
QD=gender wage differential due to within occupational productivity differential;
OD=gender wage differential due to within occupational discrimination.

In this analysis, the total gender wage differential is decomposed into an ***intra-occupational*** (within occupational) gender wage differential and an ***inter-occupational*** wage differential (gender wage differential due to different occupational distributions for males and females). Among each of these categories, gender wage differentials are further decomposed into a portion labelled ***justifiable***, which is the portion of the gender wage differential which can be explained by the gender difference in personal endowments, and a portion labelled ***unjustifiable***, which is the wage differential that cannot be explained by the gender difference in personal endowments. This part of wage differential is normally referred to as gender wage discrimination.

The Table 6 results show that there is a 22.31 percentage point differential in the mean wage of men and women. Of this, intra-occupational wage discrimination (which accounts for 99 per cent of total wage differential) is far more important than the wage impact of discrimination of occupational distribution (which accounts for 13 per cent of total wage differential). The fact that the discrimination components add to

more than 100 per cent is due to the fact that the justifiable intra-occupational component is negative—a result which implies that within each occupation, females possess more of the factors that lead to higher wages than males (*i.e*., for some occupational groups, females have more education or experience and for other groups they have favourable regional distribution.).

Several similar studies have been undertaken for both developed and developing countries. It is found that in developed countries like the U.S., U.K. and Australia, within occupational wage discrimination is the main cause of the gender wage differential (Brown, Moon and Zoloth, 1980; Miller, 1987; Hawke, 1991). However, for the developing countries, like Sudan, gender wage differences are much smaller within occupations than across the labour market as a whole (Cohen and House, 1992).

It is interesting to relate the results of the Brown Moon and Zoloth (1980) decomposition to what is known about the decision making processes with regard to wages and occupation in the TVP sector. The explanation of why there is greater within-occupational discrimination but less discrimination of occupational distribution is as follows: In the TVP sector, the decisions of occupational distribution are mainly made by the local government while the decisions of within-occupational wages are mainly made by the directors of firms. This distinction appears to have an important bearing on why where is greater within-occupational discrimination but less discrimination of occupational distribution, and some comments are in order.

As a representative of higher level governments, community authorities aim to fulfil economic, political and sometimes ideological targets set by the central and provincial governments. A political and ideological target set by the communist government in China is equality of opportunity and income. Since traditionally women have been treated extremely unfairly in China, the government has paid greater attention to improving the position of women in society. In rural township and village enterprises,

community authorities have an incentive to implement this kind of government policy (which determines the promotion of the officials in the community authorities). Therefore, when they make decisions regarding the occupational distribution, they tend not to strongly discriminate against women.[23]

Within-occupational wage determination mainly depends on the tastes of the directors of the firms. Government opinion does not have a strong influence on individual wage determination in the TVP sector. Therefore, the following points might be able to explain the serious within-occupational wage discrimination:

(1) Traditionally, gender discrimination is very serious in China, especially in rural areas. The TVP sector appears to have followed this tradition.

(2) The TVP firms have monopsony power. In most rural areas in China, employment opportunities are scarce outside the home township or village. The only alternative is to work in the agricultural sector which has even lower income. If this is the case, they pay a lower wage to female employees than to male employees. The women have to accept this situation.

V. Concluding remarks

It is useful at this stage to draw together all the empirical evidence provided in the paper to depict a comprehensive picture of the wage determination system in the TVP sector.

The TVP sector is a newly developed sector, having emerged out of the economic reform period. Its system of labour allocation and income distribution has undergone a gradual change from a highly controlled system towards one that is more market oriented. Up to 1985 (the year this study has investigated), the TVP labour market

---

[23] Further discussion of these issues can be found in Meng (1992).

appeared to be a mixture of old and new systems: on the one hand, employment was still mainly controlled by the local community authorities, and dismissal was hardly allowed; on the other hand, the majority of firms had decision-making power over wage setting.

The human capital model is based on the assumption that there is a competitive labour market. To be able to analyse wage determination in the special mixed labour market that the TVP sector represents, we proposed a special function for wage determination in a situation where local governments allocate labour and the wage is not used to attract employees to the firm. It was conjectured that the wage in the TVP sector is used to encourage employees not to shirk, and to induce work effort from each individual. To do this, employees are paid according to their marginal productivity of effort so that extra productivity is rewarded. Hence, it is hypothesized that the human capital model should be applicable to individual wage determination within the TVP sector.

The empirical results seem to confirm our speculation: experience variables have a significant impact on wage determination when they can be directly connected to human capital accumulation (firm tenure for workers and agricultural experience for staff), while they are insignificant when they are more age-related (agricultural experience for workers).

More interestingly, the results suggest that education does not affect the wage level when the level of skill of the job is low (for the case of the non-market group). But when firms adopt higher technology, education affects labour productivity and labour productivity is rewarded in the TVP sector (for the case of the market group).

Apart from these interesting results, gender wage discrimination seems to play an important role in the TVP's wage determination. Above 90 per cent of the gender wage differential falls into the category labelled "intra-occupational unjustifiable differential", which is generally referred to as gender wage discrimination. The reason

for the serious gender wage discrimination in the TVP sector is that it arises from the combination of Chinese tradition and the fact that TVP firms are single buyers in China's rural labour market.

Appendix A:
Model 2 for piece rate and time rate groups by occupation

	workers		staff	
	piece rate	time rate	piece rate	time rate
	n=100	n=130	n=48	n=182
Constant	1.081	0.967	1.532	1.540
	(6.54)	(4.66)	(4.23)	(8.10)
Schooling	0.004	-0.030	-0.011	-0.003
	(0.25)	(-1.44)	(-0.41)	(-0.23)
Firm specific tenure (FT)				
FT	0.055	0.062	-0.021	-0.012
	(3.07)	(2.62)	(-0.34)	(-0.61)
FT^2	-0.0014	-0.002	0.001	0.0003
	(-2.02)	(-2.51)	(0.49)	(0.72)
Other non-agr. exper. (ONAJ)				
ONAJ	0.024	0.025	0.054	0.014
	(1.91)	(1.60)	(1.56)	(1.52)
$ONAJ^2$	-0.001	-0.0003	-0.003	-0.0004
	(-2.43)	(-0.62)	(-1.80)	(-1.00)
Agr. experience (AEXP)				
AEXP	0.004	0.023	0.049	0.024
	(0.30)	(1.09)	(2.02)	(2.44)
$AEXP^2$	-0.0001	-0.0003	-0.001	-0.0007
	(-0.12)	(-0.54)	(-1.14)	(-2.14)
County dummies:				
Jieshou	-0.373	-0.130	-0.281	-0.370
	(-5.02)	(-1.22)	(-2.42)	(-4.81)
Shangrao	-0.341	-0.341	-0.543	-0.772
	(-3.60)	(-1.93)	(-3.32)	(-7.30)
Nanhai	0.638	0.841	-0.041	0.232
	(4.03)	(6.89)	(-0.20)	(2.61)
Breusch-Pagan Chi-Squared[24]	48.5 (10)	8.5 (10)	8.6 (10)	8.1 (10)
Adjusted R^2	0.42	0.40	0.366	0.34

---

[24] Only the standard errors of the estimates for the piece rate workers are corrected for heteroscedasticity.

Table 4
Human capital models for male piece rate
and time rate employees separately:

	model 1		model 2	
	piece rate	time rate	piece rate	time rate
	n=166	n=363	n=147	n=310
Constant	1.041	1.011	1.038	1.012
	(7.12)	(8.20)	(6.78)	(7.42)
Schooling	0.010	0.013	0.009	0.010
	(0.91)	(1.54)	(0.58)	(0.91)
Other job experience (OJ)				
OJ	0.026	0.033		
	(2.53)	(5.38)		
OJ^2	-0.0006	-0.0006		
	(-2.19)	(-3.65)		
Firm specific tenure (FT)				
FT	0.045	0.019	0.05	0.024
	(2.84)	(1.42)	(3.1)	(1.56)
FT^2	-0.0012	-0.0004	-0.001	-0.0006
	(-1.66)	(-0.89)	(-2.0)	(-1.19)
Other non-agri. exp. (ONAJ)				
ONAJ			0.026	0.025
			(2.45)	(3.39)
$ONAJ^2$			-0.001	-0.0005
			(-2.7)	(-2.50)
Agricultural expe. (AEXP)				
AEXP			0.031	0.027
			(2.14)	(2.87)
$AEXP^2$			-0.001	-0.0006
			(-1.64)	(-1.83)
County dummies:				
Jieshou	-0.339	-0.261	-0.356	-0.287
	(-5.01)	(-4.60)	(-5.30)	(-4.60)
Shangrao	-0.381	-0.591	-0.441	-0.621
	(-5.10)	(-8.18)	(-5.40)	(-8.40)
Nanhai	0.524	0.521	0.488	0.471
	(4.01)	(6.60)	(3.61)	(5.57)
Breusch-Pagan Chi-Squared[25]	44.60 (8)	25.03 (8)	49.3 (10)	27.9 (10)
Adjusted R^2	0.36	0.34	0.36	0.34

[25] The critical χ^2 values for n=8 and n=10 at the 5 per cent significance level are the same as shown for Table 5.6. In this table the standard errors in all four regressions are corrected for heteroscedasticity.

References:

Blinder, A. S., 1973. "Wage Discrimination: Reduced Form and Structural Estimations", *The Journal of Human Resources*, 8, pp. 436-55.

Brown, R. S., Moon, M. and Zoloth, B. S.. 1980. "Incorporating Occupational Attainment in Studies of Male/Female Earnings Differentials", *The Journal of Human Resources*, 15, pp. 3-28.

Byrd, W. A., 1987. *The Market Mechanism and Economic Reforms in Chinese Industry*. Dissertation, Department of Economics, Harvard University, Cambridge, MA.

Chinese Rural Statistical Yearbook, various issues. Beijing: Chinese Statistical Press.

Cohen, B. and House, W. J., "Women's Urban Labour Market Status in Developing Countries: How Well do They Fare in Khartoum, Sudan?", *Journal of Development Studies*, 29 (3), pp. 461-83.

Greene, W. H., 1990. *Econometric Analysis*, New York: Macmillan Publishing Company.

Hawke A., 1991. "Male-Female Wage Differentials: How Important is Occupational Segregation?" The Australian National University, Centre for Economic Policy Research, *Discussion Papers* No. 256.

McFadden, D., 1974. "The Measurement of Urban Travel Demand", *Journal of Public Economics*, (3), pp. 303-28.

Meng, X., 1990. "The Rural Labour Market" in W. A. Byrd and Q. Lin (ed.) *China's Rural Industry*, Oxford: Oxford University Press, pp. 299-322.

1992, *Individual Wage Determination in Township, Village, Private Enterprises in China*, (Ph.D dissertation) Australian National University.

Miller, P. W., 1987. "The Wage Effect of the Occupational Segregation of Women in Britain" *The Economic Journal* 97, pp. 885-96.

Polachek, S. W. and Siebert, W. S., 1993. *The Economics of Earnings,* Cambridge: Cambridge University Press.

Psacharopoulos, G., 1985. "Returns to Education: A Further International Update and Implications", *The Journal of Human Resources*, 20, pp. 583-604.