The role of education in wage determination in China's rural industrial sector

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1995

Education and Institutional Change in the Wage Determination System of the China's Rural Industrial Sector

Abstract

The TVP labour market has undergone a great change during the economic reform period. Starting from a fully controlled recruitment system, more employees obtained employment through a more market oriented mechanism. This study applies human capital theory to investigate the impact of this institutional change on TVP wage determination. It is found that education as one of most important human capital variables plays an important role on the wage determination of those who obtained jobs through own effort (the market group), while it is insignificant for those who were assigned to the jobs (the non-market group). The further analysis suggests that although education plays different role on the market and non-market groups wage determination they are both productivity orientated. And the reason for this might be that the underlying technological processes of the work undertaken by the market group is higher than that for the non-market group. Does education, therefore, plays no role for the non-market group? The paper employs a logit model to prove that education is an important determinant for both the market and the non-market groups' occupational attainment. This suggests the following general picture: for the market group, there is a direct relationship between education, occupation and wage determination; for the non-market group this relationship is somewhat indirect. The rate of return to education is more likely to be reflected by non-wage benefit.

China's economic reform which started in the late 1970s aimed to transform a Stalin styled centrally planned economy into a market oriented one. During the reform period a new sector, the rural township village and private enterprises (the TVP sector), has been emerged and remarkably developed. It is regarded as the most market oriented sector in the Chinese non-agricultural economy and has progressively become more so along with the process of economic reform. It can be seen as a sector which is in a period of transformation moving from a planned economy to a market economy.

Since 1978 the TVP labour market had undergone a great change. Starting from a mixed working-point system, the wage determination system in the TVP sector had gone through the "within-firm-working-point" system, the fixed wage system, to the "wage-link-up-with-the-profit" system. Similarly, starting from a fully controlled recruitment system, up to 1985, more employees obtained employment through a more market oriented mechanism.

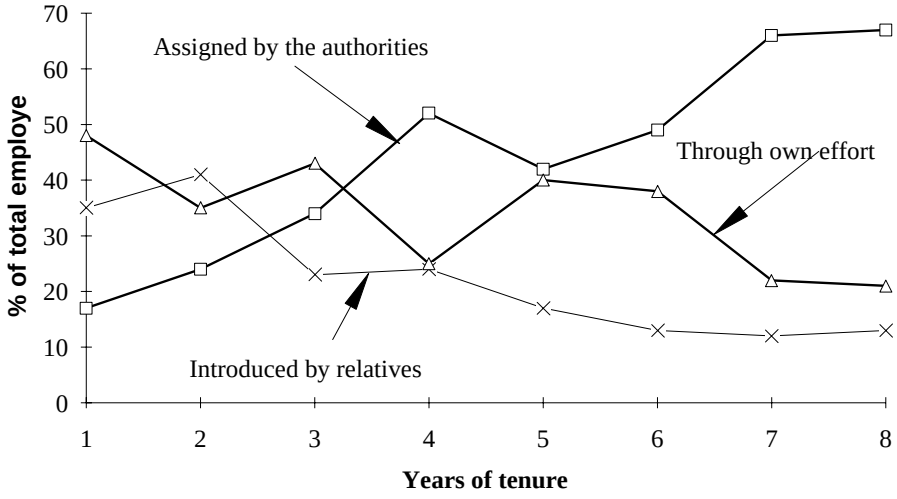
In the previous paper (Meng, 1991), we discussed the wage determination system in the TVP sector. In there the most important finding was that educational background seemed to play an insignificant role in individual wage determination in the TVP sector. The issue to be addressed in this paper is whether the institutional change leading to a greater freedom in hiring labour has impacted on the TVP wage determination procedure. In particular, we examine whether human capital variables have changed their significance in TVP wage determination along with the transformation from a more controlled sector to a more market-oriented sector. In addition, we examine in further depth the relationship between education, wages and occupation.

The paper proceeds as follows. The next section briefly describes the institutional changes in the TVP labour market and examines its impact on wage determination system. Emphasis is placed on the difference of impact of education on the wage determination for the market and non-market groups. Then in section 2 the effect of education on wage determination and occupational attainment is further discussed. Section 3 provides a explanation for the findings in the previous two sections. The conclusions are presented in Section 4.

1 Institutional change and its impact on wage determination

Although the data[1] are drawn from a 1985 cross-section, it is still possible to see the institutional transformation in the TVP labour market. Figure 1 shows the correlation between the years of tenure 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 two groups are refereed to as the non-market and market groups, respectively. 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.

Figure 1
Institutional change of the TVP employment system



[1] The data were collected in a survey of 121 firms drawn from China's township, village and private enterprises. The survey was corried out by the Institute of Economics of the Chiese Academy of Social Sciences and the World Bank in 1986-1987. The data used to estimate wage equation are from the Workers Survey Questionnaire which includes 46 firms from the total sample. There are 1174 observations on individual employees but due to missing values the sample has been reduced to 1061 observations. In this paper the analysis is confined to male workers. There are four regions in the sample: Wuxi conty in Jiangsu province, Jieshou county in Anhui province, Shangrao county in Jiangxi province and Nanhai county in Guangdong province. Wuxi is used as the base for the regional dummies.

There is a third group of employees who found their jobs by being "introduced by relatives or friends". Gelb (1990) comments that this group is similar to those who obtained their job by a free market recruitment procedure as they got their jobs voluntarily. In my opinion this is not the case for a developing country with abundant surplus labour. In most developing regions of rural China, like Jieshou and Shangrao, positions in the TVP sector are very scarce compared with the large amount of surplus labour. Everyone would rather be employed by the TVP sector than stay in the fields. But only those whose relatives or friends have power (high position in the local government) would be able to be "voluntarily" introduced into the TVP sector. In some developed regions, like Nanhai and Wuxi, where positions in the TVP sector are not very scarce, it might be reasonable to treat this category as a component of a market-oriented recruitment system. However, even there the possibility of nepotism in appointment still cannot be ruled out. Therefore, in general, this group is ambiguous in terms of which system it belongs to. In order to make the analysis accurate, I would rather exclude it from the analysis in this paper.

The basic statistical characteristics for the market and non-market groups are shown in Table 1. It is clear from this table that, on average, people in the market group earn about 20 per cent less than those in the non-market group (daily wage). They have about 1 year more schooling, 3.5 years less total experience, 2 years less firm tenure and 1 year less agricultural experience compared with those in the non-market group.

Table 1
Statistical characteristics for market and non-market groups

	market		non-market	
	mean	S.D.	mean	S.D.
YW	1305	675	1745	1151
DW	4.2	2.0	5.1	3.4
LDW	1.3	0.5	1.5	0.6
EDU	9.0	3.0	8.1	2.7
Age	30	9.0	33	10
TEXP	14.4	9.7	18	10.5
OJ	9.3	8.8	10.8	9.5
FT	5.2	4.6	7.2	5.8
ONAJ	3.6	6.6	4.1	5.9
AEXP	5.8	7.3	6.8	7.9

The question to be addressed is whether the change in recruitment system has an impact on wage determination. Here the difference between employment for the market group and the non-market group is a two-fold issue. From the employees' point of view (supply side), it is a matter of whether they are allowed to choose jobs. While from the employers' point of view (demand side) it is a matter of whether they are allowed to choose employees on the basis of their **qualities**. Whatever the selection method used the local authorities still control employment **quantity**.

Table 2 lists the results from applying the basic human capital model described in Meng (1991) to the two groups of employees that have been labelled the market and non-market employees. The results for pooled sample tests are also presented in Table 2[2].

[2] For a detailed description of the test methodology see Appendix A.

Table 2
Regression results of model 1 and model 2 for market oriented and non-market oriented groups separately

	Model 1			Model 2		
	Market n=182	**Non-Market** n=229	**Pooled** n=411	**Market** n=153	**Non-Market** n=206	**Pooled** n=359
Constant	0.689	1.910	-0.603	0.634	1.416	-0.782
	(4.24)	(8.90)	(-2.69)	(3.23)	(9.15)	(-3.13)
Schooling	0.039	-0.007	0.046	0.041	-0.007	0.048
	(3.13)	(-0.68)	(2.80)	(2.64)	(-0.61)	(2.46)
Other job experience (OJ)						
OJ	0.038	0.029	0.009			
	(3.13)	(3.56)	(0.63			
OJ^2	-0.0007	-0.0008	0.0003			
	(-1.79)	(-3.20)	(0.08)			
Firm tenure (FT)						
FT	0.039	0.007	0.031	0.046	-0.005	0.051
	(2.05)	(0.51)	(1.31)	(2.04)	(-0.29)	(1.83)
FT^2	-0.0007	-0.0003	-0.0004	-0.0008	0.0001	-0.0009
	(-0.86)	(-0.47)	(-0.45)	(-0.94)	(0.17)	(-0.86)
Other non-agri. exp. (ONAJ)						
ONAJ				0.057	0.020	0.036
				(3.47)	(1.62)	(1.76)
$ONAJ^2$				-0.002	-0.0009	-0.0009
				(-2.30)	(-1.59)	(-0.94)
Agri. experience (AEXP)						
AEXP				0.029	0.022	0.006
				(2.14)	(2.23)	(0.39)
$AEXP^2$				-0.0003	-0.0007	0.0005
				(-0.63)	(-2.23)	(0.89)
County dummy						
JS	-0.263	-0.185	-0.078	-0.300	-0.234	-0.067
	(-3.61)	(-3.12)	(-0.84)	(-3.64)	(-3.92)	(-0.66)
SR	-0.382	-0.496	0.113	-0.465	-0.524	0.059
	(-3.12)	(-6.97)	(0.89)	(-3.96)	(-7.33)	(0.43)
NH	0.323	0.690	-0.368	0.169	0.671	-0.503
	(2.78)	(6.72)	(-2.28)	(1.27)	(6.35)	(-2.96)
Breusch-Pagan Chi-Squared	6.93 (8)	23.9 (8)	31.9 (17)	18.5 (10)	22.1 (10)	40.9 (21)
Adjusted R^2	0.30	0.39	0.37	0.35	0.40	0.39

A set of F-tests is conducted to help to form a judgment as to whether the wage determination pattern for the two groups are different. F-tests are given by the following formulae:

Model 1: $$F(9,\infty) = \frac{(76.834 - 30.815 - 41.344)/9}{(30.815 + 41.344)/(411 - 18)} = 2.82 > 1.88$$

Model 2: $$F(11,\infty) = . \frac{(72.159 - 25.081 - 37.336)/11}{(25.081 + 37.336)/(359 - 22)} = 4.789 > 1.83$$

The results suggest that there is a difference in the wage determination process between the market and non-market groups.

The results presented in Table 2 suggest that: (1) For both models, education has a significantly different impact on the market and non-market groups wage determination. (2) For model 1, the effect on wages of each of the experience variables appears to be the same for the two groups. (3) For model 2, the difference between impacts of firm tenure and other non-agricultural experience on the two groups wage determination are marginally significant (at 10% level).

The above suggest that the major difference between wage determination in the market and non-market groups is the impact of education[3].

The most unusual result of the human capital model estimated for TVP male employees in the early paper (Meng, 1991) is that education does not have a significant impact on wage determination[4]. To explain this unusual result, several hypotheses were proposed and partially examined there. They are: (1) In the TVP sector many jobs are unskilled for which it might be expected that education does not matter in terms of increasing labour productivity. (2) The TVP firms may not use education as a screening device to assign employees to a certain position. The speculation that education does not affect labour productivity is based on the regression results for the piece rate employees. Thus it was reported that education is insignificant in determining the wage rate of the piece rate employees. Hence by assuming piece rate payment is a good measure of labour productivity, it might be concluded that education is insignificant in determining labour productivity.

[3] It is also noticed that the impacts of firm tenure and other non-agricultural experience on the wage determination of the market and non-market groups are different at a marginally significant level. These differences might be attibuted to the fact that firms in the non-market group are unable to choose employees in terms of their quality. It is also possible that the underlying technology is very simple for the non-market group so that the rate of return to experience is not as high as for the market group.
[4] See also Alan Gelb's (1990) result.

However, the significant impact of education on the market oriented group's wage determination raises a concern about the conclusions drawn from previous analysis in this study. Thus the issue of whether education has a major impact on the market group's labour productivity but not on that of the non-market group must be considered.

To examine this question, both the market and non-market groups are sub-divided into the piece rate and time rate groups. Modified model 1 is estimated using the sub-divided samples, and the results are presented in Table 3

Table 3
Results of model 1 for piece rate and time rate in market oriented group

	market		**non-market**	
	Piece Rate n=60	**Time Rate** n=126	**Piece Rate** n=58	**Time Rate** n=171
Constant	0.966	0.531	1.380	1.248
	(3.47)	(2.51)	(4.95)	(7.51)
Schooling	0.034	0.047	-0.013	-0.504
	(1.73)	(2.91)	(-0.55)	(-0.37)
Other job experience (OJ)				
OJ	0.027	0.045	0.047	0.035
	(1.17)	(3.03)	(2.15)	(3.34)
OJ^2	-0.0004	-0.0009	-0.002	-0.0009
	(-0.56)	(-1.86)	(-2.28)	(-2.76)
Firm tenure (FT)				
FT	0.014	0.044	-0.0008	-0.00009
	(0.28)	(1.94)	(-0.03)	(-0.005)
FT^2	0.0001	-0.0008	0.00009	0.00004
	(0.03)	(-0.94)	(0.08)	(0.06)
County dummy				
JS	-0.426	-0.210	-0.03	-025
	(-3.27)	(-2.41)	(-0.18)	(-1.50)
SR	-0.337	-0.581	-0.29	-0.591
	(-1.91)	(-2.51)	(-1.93)	(-5.48)
NH	0.202	0.350	0.96	0.56
	(0.77)	(2.57)	(7.18)	(5.69)
Breusch-Pagan Chi-Squared	8.98 (8)	5.41 (8)	12.08 (8)	16.13 (8)
Adjusted R^2	0.22	0.30	0.64	0.35

Table 3 shows that the wage determination patterns for the piece rate and time rate groups in both the market and non-market cases are quite similar[5]. If it is believed that piece rate payment is a good measure of labour productivity, the impact of each regressor on the daily wage in log form can be interpreted as the impact of each independent variable on labour productivity. Based on this belief, the similarity of the regression results for the education variable across the disaggregation within both market and non-market groups suggests that education might have a significant impact on labour productivity for the market group but not for the non-market group. The reason for this might be that the underlying technological processes of the work undertaken by each group is 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. The gradual liberalization of the TVP labour market has allowed those firms with higher technology to hire employees according to their education level. Education has a significant impact on these firms' labour productivity, and productivity is rewarded. However, firms whose technology is relatively low remain with the old recruitment system. Although they pay their employees according to labour productivity, education does not matter in terms of increasing their labour productivity[6].

[5] Both F-tests and Pooled sample tests are conducted to see whether there are structural differences between the two sub-groups, and whether individual coefficients are significantly different between the piece rate and the time rate groups for both the market and the non-market groups. The F-test for the market group is: F(9,186)=0.564, which is less than the critical value F(9,186)=1.88. So the null hypothesis of no structural change cannot be rejected. The F-test for the non-market group is that F(9,229)=2.04. So the null hypothesis of no structural change is rejected. The pooled sample tests confirm that the impacts of each of the three main variables (education, firm tenure and other job experience) on wage determination for the piece rate and the time rate groups are similar in each of the two cases (see Appendix C). The structural change for the non-market group is caused by two of the three county dummies.

[6] We know that if we estimate a human capital earnings equation within various age-groups, we tend to find that the return to education declines as we move into older age groups. This is attributed to the obsolescence of human capital skills. Therefore, one might argue that the significant impact of education on wage determination of the market group is because those who were in the market group had obtained their education more recently. However, the statistical characteristics of the two groups shown in Table 6.1 suggest that, on average people in the market group have 3 years less experience compared with those in the non-market group, and one more year education compared with those in the non-market group. In total they obtained their education about 4 years later than those in the non-

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 reward. This issue is discussed in the next two sections.

6.2 Education: labour productivity effect or a screening device?

In the literature on human capital, there is a controversy about whether education affects wage via its impact on labour productivity or only as a screening device. The conventional view is that schooling enhances earnings via the production of marketable skills. The screening device argument suggests that schooling serves to identify those individuals who are more productive in the market, the proposition being that an individual's productivity may or may not be affected by the formal schooling process (Wolpin, 1977).

This section examines whether the TVP use schooling as a screening device for both the market and non-market groups. The logic behind the screening device hypothesis usually consists of two steps. First, schooling provides information about an individual's productive capacity which determines the individual's job assignment; second, the individual's occupational level in turn determines his/her earnings. Hence, to look more closely at the screening hypothesis, an occupational attainment model is adopted for both sectors.

According to economic theory, an individual's occupational attainment is a function of the employers' willingness to hire that person (labour demand) and the individual's desire to work in a particular occupation (labour supply). The labour demand is determined by the individual's human capital, and the labour supply is expressed as an utility function which includes at least three components: income of occupations, taste

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market group. This will not be able to create a 4.8 per cent difference between the return to education for the market and non-market groups (see Table 6.2).

for the work involved and family size (Brown, Moon and Zoloth, 1980). In the Chinese rural labour market, supply side determinants are not very important due to the scarcity of employment positions in the TVP sector and the widespread use of assigment during most of the period. Therefore, the model adopted for this study can be seen as a job assignment model.

Brown, Moon and Zoloth specified a multinomial logit model to capture how the variables which affect demand decisions for an occupation and an individual's occupational supply decisions affect the probability of individual *i* working in occupation *j*. This model which is given as:

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

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

is used in this study to test whether education plays a significant role in occupational assignment. The independent variables used to estimate the occupational assignment equation include education, other job experience, firm tenure and three regional dummies.

As a first step the role of education in the assignment to the workers and staff groups is investigated for the market and non-market groups. Then the staff group is further disaggregated into five categories (shift leaders, operational personnel, technical personnel, ordinary staff and middle level staff).

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.

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)
OJ	0.093	0.12	0.085
	(6.02)	(4.26)	(4.47)
FT	0.098	0.154	0.086
	(4.28)	(3.22)	(3.16)
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[7]*:* (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 4[8], 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

[7] 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: $R^2=1-(lnL_r/lnL)$ (McFadden, 1974).
[8] A likelihood ratio test of the hypothesis that the coefficient vector is zero indicates that for all three regressions the estimated model is highly significant.

obtained for the market and non-market oriented groups. It is so interest that for the non-market group education plays an important role on the occupational attainment but not on their earnings.

For the binomial logit model, the marginal effect of each independent variable can be written as:

$$\frac{\partial P(y=1)}{\partial X} = \frac{e^{x'\beta}\beta}{(1+e^{x'\beta})^2}$$

The estimated marginal effects for each variable are shown in Table 5. These show the impact of a small change in each of the variable on the probability of being a staff member.

Table 5
Marginal effects of three main variables on the probability of occupational assignment for binomial regressions

	Total Sample	**Market**	**Non-Market**
∂P(y)/∂EDU	0.0085	0.0055	0.012
∂P(y)/∂OJ	0.019	0.022	0.018
∂P(y)/∂FT	0.022	0.032	0.02

Table 5 shows that the marginal effect of education in determining whether a person is likely to be a staff member is larger in the non-market group than in the market group. For the latter, firm tenure and other job experience are more important.

A multinomial logit model is adopted to ascertain the impact of education on each particular level of staff. The six levels of occupations used in the model 3 are employed here. They are: workers, shift leaders, operational personnel, technical personnel, ordinary staff and middle level staff. Operational personnel are those who deal with marketing problems and technical personnel deal with technical problems. The other categories (shift leaders, ordinary staff and middle level staff) are management staff.

The results for the total sample and the market and non-market oriented groups are shown in Table 6:

Table 6
Multinomial logit result for males
(workers=0)

Total	**S.L**	**O.P.**	**T.P.**	**O.S.**	**M.S.**
Constant	-4.803	-6.65	-8.845	-7.430	-7.765
	(-5.26)	(-6.00)	(-8.26)	(-7.25)	(-7.49)
Edu	**0.339**	**0.405**	**0.646**	**0.451**	**0.519**
	(4.30)	**(4.56)**	**(7.66)**	**(5.49)**	**(6.23)**
OJ	0.033	0.13	0.084	0.121	0.105
	(1.43)	(5.65)	(3.8)	(5.55)	(4.71)
FT	0.043	-0.012	0.095	0.134	0.171
	(1.18)	(-0.23)	(2.56)	(3.97)	(5.17)
Jieshou	-0.629	-1.444	0.508	0.148	-0.691
	(-1.37)	(-1.83)	(1.22)	(0.34)	(-1.48)
Shangrao	-0.147	1.230	0.180	-0.554	-2.517
	(-0.26)	(2.38)	(0.30)	(-0.85)	(-2.30)
Nanhai	0.761	-0.346	1.354	0.058	-0.456
	(1.57)	(-0.47)	(2.53)	(0.10)	(-0.72)
Market	**S.L**	**O.P.**	**T.P.**	**O.S.**	**M.S.**
Constant	-4.665	-7.556	-8.561	-8.797	-7.898
	(-3.52)	(-4.21)	(-5.57)	(-5.06)	(-4.63)
Edu	**0.347**	**0.505**	**0.637**	**0.532**	**0.538**
	(3.10)	**(3.71)**	**(5.36)**	**(4.09)**	**(4.01)**
OJ	0.088	0.155	0.117	0.160	0.112
	(2.49)	(3.88)	(3.43)	(4.19)	(2.88)
FT	0.098	0.071	0.136	0.238	0.219
	(1.42)	(0.69)	(2.02)	(3.53)	(3.30)
Jieshou	-1.501	-2.477	0.116	-0.035	-0.647
	(-2.57)	(-2.17)	(0.20)	(-0.06)	(-1.06)
Shangrao	-2.297	-1.195	-0.926	-2.087	-17.445
	(-1.95)	(-0.94)	(-0.92)	(-1.64)	(-0.009)
Nanhai	-0.089	0.498	1.008	-0.652	-0.009
	(-0.104)	(0.50)	(1.13)	(-0.51)	(-0.009)
Non-Mkt.	**S.L**	**O.P.**	**T.P.**	**O.S.**	**M.S.**
Constant	-4.897	-5.735	-9.342	-6.565	-8.363
	(-3.78)	(-4.72)	(-5.71)	(-5.06)	(-5.71)
Edu	**0.334**	**0.286**	**0.681**	**0.402**	**0.546**
	(2.89)	**(2.16)**	**(5.18)**	**(3.63)**	**(4.64)**
OJ	-0.006	0.127	0.062	0.102	0.113
	(-0.16)	(3.97)	(1.87)	(3.76)	(3.85)
FT	0.032	-0.038	0.105	0.089	0.185
	(0.71)	(-0.60)	(2.18)	(2.12)	(4.23)
Jieshou	-0.003	-0.017	-0.952	-00209	-17.779
	(-0.004)	(-0.02)	(-0.79)	(-0.23)	(-0.007)
Shangrao	0.785	2.278	0.539	0.161	-1.972
	(1.11)	(3.37)	(0.67)	(0.21)	(-1.63)
Nanhai	1.230	-15.914	1.523	0.214	-0.899
	(1.93)	(-0.01)	(2.15)	(0.31)	(-1.03)

Note: (1) S.L.=Shift Leaders; O.P.=Operational Personnel; T.P.=Technical Personnel; O.S=Ordinary Staff; M.S.=Middle Level Staff.

(2) For the total sample, n=421; maximum likelihood=543.81, χ^2=198.08, pseudo R^2=0.154

(3) For the market oriented group, n=192; maximum likelihood=243.58, χ^2=105.2, pseudo-R^2=0.178

(4) For the non-market oriented group, n=229; maximum likelihood=278.23,.χ^2=129.12, pseudo-R^2=0.188

The above table shows that education is a significant determinant of each group's job assignment, and by and large, the higher the position, the more important is the role that education plays in the job assignment within the management staff.

The coefficients for the multinomial logit model are difficult to interpret. However, according to Greene (1990), the following relationship between relative probability and coefficients exists:

$$\textit{Since} \qquad \frac{P_{ij}}{P_{ik}} = e^{X_i'(\beta_j - \beta_k)}$$

$$\therefore \qquad \ln \frac{P_{ij}}{P_{ik}} = X_j'(\beta_j - \beta_k)$$

$$\therefore \qquad \frac{\partial \ln(P_{ij} / P_{ik})}{\partial X_i'} = \beta_j - \beta_k$$

Therefore, as X'_i increases, the likelihood that the individual is in occupation j rather than occupation k increases if $\beta_j > \beta_k$, and decreases if $\beta_j < \beta_k$. Thus, following Brown, Moon and Zoloth (1980), by ranking the coefficients on a certain variable by magnitude, the relative impact of that variable on the probability of belonging in specific occupations can be identified.

In our case, the rankings of the magnitude of coefficients on education, total experience and firm tenure for total observations and for the market and non-market oriented groups are shown in Table 6.7.

Table 6.7
Occupational rankings by size of coefficient on the three main variables

Total	**S.L.**	**O.P.**	**T.P.**	**O.S.**	**M.S.**
EDU	5	4	1	3	2
OJ	5	1	4	2	3
FT	4	5	3	2	1
Market	**S.L.**	**O.P.**	**T.P.**	**O.S.**	**M.S.**
EDU	5	4	1	3	2
OJ	5	2	3	1	4
FT	4	5	3	1	2
Non-Market	**S.L.**	**O.P.**	**T.P.**	**O.S.**	**M.S.**
EDU	4	5	1	3	2
OJ	5	1	4	3	2
FT	4	5	2	3	1

Some implications can be identified from the table above: (1) Not surprisingly, education plays the most important role in determining whether a person can be a technical staff member, while other job experience and firm tenure do not seem to matter very much for this position. (2) People with more education are more likely to be in a higher level of management staff group, and the ranking in this regard seems to be: middle level staff, ordinary staff and shift leader. (3) The longer the other job experience, the more likely it is for a person to be a marketing staff (operational personnel). The reason for this is probably that those who have longer other job experience have more widespread relationships, at least within the local area, which are very useful for marketing business.

The above implications seem to be consistent with both the total sample results and the results for the market oriented and non-market oriented groups. Therefore, it might be concluded that the job assignment procedure in the TVP has not changed very much during the economic reform. And the most important conclusion up to this point should be that, from the outset, the TVP sector has used education as a screening device for job assignment. Moreover, education does play a role in the non-market group: it is an important determinant of an individual being appointed to a high occupational position.

6.3. Education, occupation and non-wage benefits

Human capital theory is based on the premise that the cost of investment in human capital has to be equal to the present value of the income stream yielded by the investment. In other words, an individual makes a decision to invest in his/her human capital (education or training) based on his/her own lifetime cost-benefit analysis of investment in human capital. If it is believed that education is used as a screening device, through which an individual is assigned to a certain job, then it has to be true that there is a positive relation between the level of a job and earnings.

There is a obvious difficulty in disentangling the effect of education on productivity compared to its effect as a screening device. For this study, however, the difficulty is more fundamental. For the market group the effect of education seems consistent. More education brings more earnings and a higher occupational level. For the non-market group, however, education brings no increase in earnings but a higher occupation. This puzzle is now looked at more closely.

Table 6.8
The regression results of model 3 for market and non-market groups

	Market n=190	**Non-Market** n=226
Constant	0.834	1.385
	(5.39)	(9.29)
Schooling	0.0158	-0.020
	(1.28)	(-1.52)
Other job experience (OJ)		
OJ	0.0244	0.0249
	(2.00)	(2.74)
OJ^2	-0.0004	-0.0007
	(-0.89)	(-2.71)
Firm tenure (FT)		
FT	0.034	0.002
	(1.95)	(0.13)
FT^2	-0.0007	-0.0002
	(-1.02)	(-0.39)
Occupational Dummies		
SL	0.196	0.040
	(1.95)	(0.37)
OP	0.257	0.051
	(1.88)	(0.44)
TP	0.261	0.042
	(2.81)	(0.37)
OS	0.100	0.175
	(0.86)	(1.72)
MS	0.423	0.313
	(3.61)	(3.09)
County Dummies		
JS	-0.227	-0.139
	(-3.26)	(-1.20)
SR	-0.278	-0.457
	(-2.31)	(-4.89)
NH	0.275	0.704
	(2.54)	(8.45)
Breusch-Pagan Chi-Squared	9.71 (13)	26.21 (13)
Adjusted R^2	0.35	0.41

The results of an estimated wage equation with five occupational dummies for the market and non-market oriented groups are presented in Table 6.8[9]. For the market oriented group, except for the ordinary staff, all the other four occupational dummies weigh heavily on wage determination. However, with the occupational dummies in the model, education becomes insignificant in determining an individual's wage. This confirms the results of the job assignment model that education and occupation have a positive significant correlation. This part of the results is consistent with human capital theory: the cost of an individual's investment in education can be compensated by the rate of return to education directly or through the rate of return to occupation indirectly.

The results for the non-market oriented group are different. They suggest that although the TVP uses education as a criterion for job assignment, three out of the five occupational dummies do not have a significant impact on wage determination. The *t*-ratio for the ordinary staff dummy is marginally significant. Only the middle level staff dummy has a significant effect on wage determination under the old system. Education is insignificant and of negative sign.

This is indeed a puzzle. If education had neither a direct nor indirect (through occupation) effect on wage determination under the old system, why did some people still invest in education? Furthermore, if occupation did not have an impact on wage determination, what was the motivation for people to seek to be promoted?

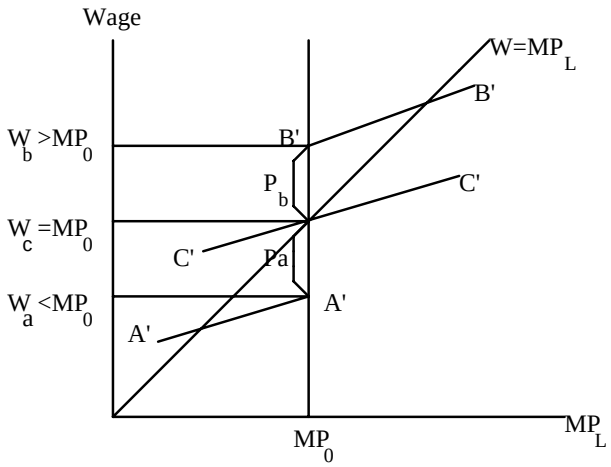
In the literature on wage determination, there is a theory of status developed by Frank (1984) which is used to explain why, in reality, individual wage differences within a

[9] The results for the total sample (Model 3 of Table 5.4 in Chapter 5) show that three of the five different staff levels have a significant positive relation with earnings. The other two do not have a significant impact on wage determination. This result seems quite consistent with the screening hypothesis. Although, in general, education does not affect an individual's earnings, the TVP use education as a criterion for job assignment, and the level of a position has a positive impact on wage determination.

firm understate individual differences in marginal productivity. This theory can be summarised as follows:

Because individuals care a great deal about their status in the income hierarchies of the groups to which they belong, there is a trade off between the wage and status. The difference between wage and marginal productivity of labour for each individual depends on his/her preference between wage and status.

Figure 6.2



Suppose there is a group of people who have the same marginal productivity of labour, say MP_0 in Figure 6.2. Person *A* cares about status very much; he/she would rather give up a certain amount of his/her wage $P_a=W_a-MP_0$ in order to get to the top position in group *A* in its income hierarchy (the top of the *A'A'* wage curve, which is flatter than $W=MP_L$ curve). Person B does not care about status at all. So he/she would rather be in the bottom position of group *B* (presented by *B'B'* curve) in order to get his/her wage W_b higher than his/her marginal productivity MP_0 by the amount of P_b $(P_b=W_b-MP_0)$. Anyone who is in between *A* and *B* in terms of their preference between wage and status will be allocated to the subgroups in between group *A* and *B* in which they either pay a lower premium than *A* or receive a smaller premium than *B* in return for a less extreme status in each sub-group. However, on average the firm will still pay the employees according to their labour productivity.

The concept of status used in Frank's model can be borrowed to solve the puzzle raised above. Why did people invest in education under the situation where there is neither a direct nor indirect positive relationship between education and earnings? And what motivation is there for people in the TVP firms to seek promotion when there is no significant correlation between occupation and wage determination under the old system?

Perhaps people invested in education because this is necessary to achieve a high level occupation which delivers status. Individuals cared about the status because in the TVP firms this might be correlated with non-wage benefits. For example, being a staff member means he/she normally does not need to undertake heavy labour; can gain a good reputation; and might 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 we consider these non-wage benefits as part of income (in addition to wage), we might be able to find a significant effect of these occupational dummies on income determination. Unfortunately, it is impossible for us to measure these non-wage benefits and incorporate them into the regression.

However, one survey question in the Questionnaire **for Directors** of the TVP firms can partly provide support for the relationship between high status and non-wage benefit. The question asks: "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 have 2.65 family members employed in his/her own firm. If we consider the fact that as a director he/she must have a business relationship with many other firms, and it might be easier for him/her to arrange a position for his/her relatives in these other firms, the figure of his/her relatives being employed because of his/her status would be greatly enlarged.

Thus, there is a market for status. The market price for status is equal to the value of the non-wage benefits. If it were possible to measure these non-wage benefits we might be able to find a normal relationship between education and wage and occupational status and wage.

To sum up, it is clear that in the new system, education, occupation and wage are directly correlated, just like the case in a market economy. In the old system the correlation between these variables is implicit to some extent: while high position of occupation does not directly relate to wage it may relate to some kinds of non-wage benefits.

6.4. Conclusion

This paper has investigated the impact of institutional differences on wage determination, in particular the impact of education on wage determination in the old and new systems. Several interesting findings lead to the following conclusions:

(1) In contrast to wage determination in the total male sample (see Meng, 1991), education plays an important role in the wage determination of the group of people who get their jobs through their own effort. For those who get their jobs through arrangement by the community authority, education is an insignificant determinant of the wage level.

(2) The system of recruitment in the TVP sector has changed along with the economic reform. Most of the people who got their jobs through their own effort were employed in the middle of the 1980s, while most of the people who got their jobs through community's arrangement were employed in the late 1970s and early 1980s. Therefore, the differences between the wage determination patterns for the two groups of people reflect the impact of economic reform.

(3) Although the old recruitment system was non-market oriented, the firms' profit maximizing objective function still leads the firms to pay their employees according to their labour productivity. The different impact of education on wage determination of the market and non-market groups, therefore, is more likely to reflect the differences in the underlying technological processes. Because of these technological differences, people involved in higher technological production need to be more educated compared with those who undertake more simple jobs. The gradual liberalization of the TVP labour market has led to these technological differences being reflected in the way that workers are allocated to firms.

(4) Although in the old system education did not play an important role in wage determination, the TVP firms used it as a criterion for job assignment. Education had an important impact on job assignment both in the old and the new systems. It is used as a screening device in the TVP firms.

(5) In the new system, it is clear that education is an important determinant of job assignment, which in turn determines an individual's wage level. Therefore, an individual who invests in education can directly get a return on his/her investment[10]. In the old system, this relationship is somewhat indirect. The rate of return to education is more likely to be reflected by implicit benefits.

(5) Therefore, in general we can say that education is a significant determinant of an individual's benefit both in the new and the old system. The difference is that for the latter it can not be directly observed from the estimation of a wage equation, and it is not productivity oriented.

[10] This conclusion does not mean that in the old system there is no side-payment for the staff members. It is rather saying that there is a direct correlation between status and wage.

Appendix A:

The test for the difference between coefficients for the market and non-market groups is done by estimating the original model (in this case it is model 1) including a market group dummy and its interaction terms on all other variables on data pooled across market and non-market observations. The model is specified as:

$$\ln(w)_i = \sum_{j=1}^{n} \beta_j X_{ij} + \sum_{j=1}^{n} \gamma_j X_{ij}^m + U_i$$

where X_j are the variables in the original model. The superscript m refers to the market group. The coefficients for the non-market group are the β_js and for the market group they are $(\beta_j+\gamma_j)$. U_i is an error term.

Appendix C:

Pooled sample tests for the differences of the coefficients between the piece rate and time rate groups in the market and non-market groups:

	Market Group n=186	**Non-Market Group** n=229
Constant	0.531	1.248
	(2.57)	(7.70)
Schooling	0.047	-0.005
	(2.98)	(-0.43)
Other job experience (OJ)		
OJ	0.045	0.035
	(3.11)	(3.73)
OJ^2	-0.0009	-0.0008
	(-1.92)	(3.07)
Firm tenure (FT)		
FT	0.045	-0.0001
	(1.99)	(-0.005)
FT^2	-0.0008	0.00004
	(-0.96)	(0.06)
County dummy		
JS	-0.210	-0.249
	(-2.47)	(-3.12)
SR	-0.581	-0.591
	(-2.58)	(-7.90)
NH	0.350	0.561
	(2.64)	(4.83)

(continued overleaf)

Piece Rate Dummy (DP)	0.436	0.132
	(1.21)	(0.38)
PEDU	-0.013	-0.008
	(-0.49)	(-0.31)
POJ	-0.18	0.012
	(-0.65)	(0.49)
POJ^2	0.0005	-0.001
	(0.49)	(-1.33)
PFT	-0.030	-0.0007
	(-0.52)	(-0.02)
PFT^2	0.0009	0.00005
	(0.30)	(0.04)
PJS	-0.216	0.221
	(-1.33)	(1.56)
PSR	0.243	0.313
	(0.83)	(2.04)
PNH	-0.148	0.415
	(-0.48)	(2.08)
Breusch-Pagan chi-squared	13.797 (17)	32.53 (17)
Adjusted R^2	0.28	0.42

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