Individual Wage Determination in Township, Village and Private Enterprises in China

by

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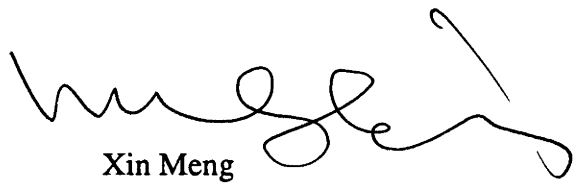
To my mother

Declaration

This thesis was written while I was studying at the National Centre for Development Studies at the Australian National University. The opinions expressed are my own original work, unless otherwise acknowledged in the text or Acknowledgments.



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Abstract

China has been a centrally planned economy for about forty years but recent market-oriented economic reform has brought significant change, especially to the rural economy where there has been a remarkable development of township, village and private non-agricultural enterprises (the TVP sector). In 1971 the share of the TVP sector in China's industrial production was 3 per cent. By 1986 it had increased to 21 per cent (Byrd and Lin, 1990).

The TVP firms operate in a more competitive environment compared with the state sector. However, they are still restricted by many economic and social-political constraints, particularly in the labour market.

This thesis examines individual wage determination in the TVP sector in the year of 1985. Up to 1985, the general situation of the TVP labour market appeared to be a mixture of old and new systems. On the one hand, the level of employment was mostly controlled by the community authorities. On the other hand, the majority of firms had decision-making power over wage setting.

The emphasis of this thesis is placed on the applicability of the human capital model to the TVP wage determination. It is found that in the male labour market, labour market experience plays a very important role in the individual wage determination. However, the importance of the different experience variables (agricultural experience, firm tenure, other non-agricultural experience) varies between different employee groups (staff and workers). Agricultural and the other non-agricultural experience play an important role in staff's wage determination while firm tenure dominates other experience variables in workers' wage determination.

The most unusual result for the total male sample analysis is an insignificant effect of education on individual wage determination. The analysis for the piece rate and time rate groups separately suggests that this insignificant effect reflects education having

no impact on increasing labour productivity in the TVP sector due to most of the jobs being unskilled. However, a further analysis involving consideration of the effect of institutional change displays a new picture: education in fact has a significant impact on wage determination for the group of people who found their job by their own effort, while it is insignificant for those who were assigned to their job. The thesis also manages to show that these different results both reflect a labour productivity effect. Apart from these, the role of education as a screening device for the TVP job assignment is also confirmed.

Women are paid 20 per cent less than men in the TVP sector. This pay differential arises mainly because of within occupational discrimination. Occupational segregation does not contribute heavily to this wage differential.

A comparison with other studies shows that the experience-earnings profile for the TVP sector is like the case in the United States rather than in Japan, though the employment system in the TVP sector is similar to that in Japan.

Contents

List of Tables

List of Figures

1

INTRODUCTION

This dissertation is a study of individual wage determination in China's rural township, village or privately owned non-agricultural enterprises (the TVP sector) in 1985. The principal data[1] used by this study were collected jointly by the World Bank and the Institute of Economics of the Chinese Academy of Social Sciences in 1986 and 1987. 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.[2]

Before economic reform in 1978, China's rural economy contained only an agricultural sector: non-agricultural activities conducted by the rural population were of minor importance and were generally viewed as being integrated with the agricultural sector rather than as having a separate identity. However, market-oriented economic reform initiated in the late 1970s has encouraged the rapid development of rural non-agricultural activities so that another sector has emerged within the rural

[1] 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.

[2] For detailed information on the characteristics of each regions, see Byrd and Lin (1990).

economy---the so-called TVP sector. This sector was fast growing and by 1985, about 20 per cent of the rural labour force was engaged in the TVP sector. Its total value of output accounted for about forty-four per cent of the gross rural social product[3].

1.1 Scope of the study

Most of the theoretical and empirical work on individual wage determination has been undertaken in market economies. The dominant paradigm is the human capital model. This model assumes that individuals maximize their lifetime income and firms maximize profits. The theory is reinforced by the free choice of employers to choose their workers and the free choice of employees to choose their employer. Labour mobility seems to be essential for the applicability of the model.

The TVP is regarded as the most market oriented sector in the Chinese non-agricultural economy. However, as will be demonstrated in the next chapter there was very limited labour mobility in rural China until 1985. Firms could not choose their workers freely. Nor could employees freely choose their employer. Most workers were assigned to a firm and, once employed, could not easily leave. Nor could firms easily fire labour. However, it appears that in most instances firms could control individual wage determination. Under these circumstances the questions of whether human capital theory applies and whether the individual wage determination pattern in the TVP is similar to those in the western market economies naturally arise. These are the major questions to be addressed by this thesis.

1.2 Importance of the study

Before economic reform in 1978, the wage policy in urban sectors was based on two principles: minimization of labour cost through the payment of low wages and

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

equalization of earnings. The Communist Party tried hard to narrow the wage gap between different occupational and educational groups and was successful (Jackson, 1990). Economic reform encouraged a strengthening of the motivating function of wages in order to stimulate better work performance. However, because of the political sensitivity of labour reform (White, 1985)[4], the introduction of market oriented wage determination to the urban sectors was very slow. In the meantime, since the rural TVP sector is much less controlled by the government, and has much less of a socialist tradition compared with the urban sectors, wage determination is more market oriented in that sector. However, as will be shown in the next chapter, the rural labour market, in which the TVP sector is a key element, was distorted in the sense that the quantity of labour employed by the firms was mostly controlled by the township or village authorities.

An examination of the pattern of wage determination in the TVP sector, and a comparison of it with wage determination in the western market economies, will provide a clear indication of the extent to which the TVP wage determination system is market oriented. It will also permit some policy issues to be addressed and thus provide a basis for formulating proposals for further reform of the TVP wage determination system. Finally, understanding the current pattern of wage determination also provides a guide to the likely future of the wage determination system in the urban sectors if reform continues.

1.3 Outline of the Study

There are eleven chapters in this dissertation. Apart from the introduction and concluding chapters, the thesis is organized into three parts.

[4] White pointed out that "labour reform is an area of particular political sensitivity since it engages deep ideological issues rooted in Marxist definitions of 'socialist' and 'capitalist' modes of production." (White 1985).

Empirical and theoretical background

The first part comprises three chapters. Chapter 2 provides a brief overview of China's rural economy, the institutional changes to its production and income distribution systems, and the development of the TVP sector.

Chapter 3 describes the general characteristics of the rural labour market. It looks at labour supply to and demand from the TVP sector; recruitment, dismissal and job changes within the sector; and wage levels and wage determination. It concludes that the rural labour market is not a free market because employment is mostly controlled by the local government. Most firms, however, have decision making power over their wages.

Chapter 4 surveys the human capital literature and the empirical evidence on the model as applied to industrial and developing countries, as well as China. It concludes with a model of individual wage determination for the TVP sector. The model develops a special function of wage determination in a situation where local governments allocate labour and the wage is not used to attract employees to the firm. In this model the wage is used to encourage employees not to shirk work but 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, this model hypothesizes that the human capital model should be applicable to individual wage determination within the TVP sector. The following two parts of the thesis will provide empirical tests of this hypothetical model.

Empirical study of wage determination in the TVP male labour market.

Part two comprises Chapters 5, 6 and 7. Chapter 5 applies the human capital model to the analysis of individual wage determination for male employees. In general, the

human capital model seems to work well. Firm tenure and other job experience[5] affect wages in the normal way. Formal education, however, does not seem to affect wages. The reasons for this are analyzed in depth.

An attempt is made to ascertain whether the wage determination patterns of staff and workers differ. It is found that work experience variables (agricultural experience, firm tenure and other non-agricultural experience) have a different impact. For staff, agricultural experience seems to play a significant role, while for workers, firm tenure is the most important variable. The chapter gives some possible explanations for these results.

To further analyze whether wage determination in the TVP sector reflects labour productivity effects or socially determined rules of payment, the total male sample is sub-divided into piece rate and time rate groups and the human capital model is estimated for these groups separately. The hypothesis tested in this section is that piece rate payment is a direct measure of labour productivity and any relationship between wages and human capital variables for the piece rate group reflects labour productivity effects. The results show that the wage determination pattern for the time rate workers is more similar to that for the piece rate workers than to that for the time rate staff. This implies that they are paid according to the labour productivity. It seems consistent with the general hypothesis: individual wage determination in the TVP sector does reflect labour productivity effects.

Chapter 6 analyzes the impact of institutional change on wage determination and examines in further depth the relationship between education, wages and occupation. The TVP labour market has been moving towards a more market oriented situation: a movement away from job assignment by the local authorities towards firms choosing their own employees in terms of quality. The total male sample can be subdivided

[5] Other job experience is obtained by subtracting firm tenure from total experience.

into two groups to capture the effects of this change: a market oriented group which includes those who found their jobs through their own effort; and a non-market oriented group which includes those who were assigned to their job by the township or village authorities. For the market oriented group the firm can choose which person is employed and it has an interest, therefore, in choosing the most productive workers.

The experience variables have similar effects in the wage determination for each group indicating that these relationships have not changed as the TVP sector has evolved towards market orientation. However, the effect of education differs between the two groups. It has a significant effect on the wage determination of the market oriented group but an insignificant effect on the wages of the non-market oriented group. It is conceivable, therefore, that the role of education in wage determination is being affected by institutional changes and this is the reason why education is generally found to be insignificant in aggregate wage equations.

Chapter 6 then attempts to determine whether the different roles of education for the two groups reflects a labour productivity effect. This is done by disaggregating the two groups further into piece rate and time rate employees. It is found that the education effect is consistent across the disaggregation within each group. More education increases the pay of both piece rate and time rate employees in the market group. This seems to suggest that education does have an impact on the labour productivity of these employees and productivity is rewarded. In the non-market group, education affects neither the piece rate nor the time rate employees' wage.

This raises the possibility that there are differences in the underlying technological processes of the market and non-market groups. 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.

Does education, therefore, play no role for the non-market group? When data are fed into an occupational assignment model, it is found that education does have a role. More educated people are more likely to be in the staff group than in the workers' group. However, the wage gap between these two groups is so slight that there is no correlation between wage and education. The situation is different for the market oriented group, where education also affects occupational attainment but this in turn is reflected in the wage structure.

A puzzle then arises. If education has neither a direct nor indirect (through occupation) effect on wage determination for the non-market group, why did 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?

The chapter suggests that there is a non-wage side-payment for seniority in the non-market oriented group. These side-payments include shorter hours of work, better work conditions and the opportunity to appoint family members and other relatives to jobs in the TVP firms. If it was possible to incorporate the non-wage benefits into the wage variable, it might be possible to find a positive correlation between education and earnings for the non-market oriented group. The chapter provides some empirical evidence to support this hypothesis.

Chapter 7 makes three comparisons. First, it compares the results of the TVP male wage determination found in this study to those found by Gelb (1990) using the same data set. Second, it compares wage determination in the TVP sector to that in China's urban sector (Byron and Manaloto, 1990). Third, it compares the earnings distribution in the TVP sector to that in Japan and the United States.

For the first comparison, the chapter indicates that the main differences between Gelb's study and this study come from the different methodologies employed by the two studies. And many of Gelb's results are misleading and are changed when variables and data are disaggregated. These changes are important and contribute significantly to our understanding of the TVP labour market.

Comparison with the Byron and Manaloto (1990) study shows that the wage determination patterns for urban China and the TVP sector are quite similar.

The chapter ends with a comparison of the TVP earnings distribution with that in Japan and the United States. The comparison shows that the TVP workers' experience-earnings profile is similar to that of the United States rather than to that of Japan.

Female wage determination and the gender wage differential

Women earn 20 per cent less than men in the TVP sector and the question is whether this earning gap, which is so similar to that of the industrial economies, can be explained by differences in labour productivity or by wage discrimination against women.

Chapter 8 provides a description of the gender wage differential and a comparison of the structure of wage determination of men and women. This comparison suggests that the wage determination process for women in general is similar to that for men. However, the rate of return to education is higher for women than for men, and it has a significant effect on wage determination of the total female observations while it is only significant for the wage determination of the male market group. Furthermore, the impact of the different experience variables on wage determination for the female staff group are different from those for male staff.

Chapter 9 calculates the impact of gender wage discrimination using the approaches proposed by Blinder (1973) and Cotton (1988). It is concluded that over 80 per cent of the gender wage differential can be explained by wage discrimination (without considering gender differences in occupational attainment).

Chapter 10 focuses on the determinants and role of female occupational segregation. According to economic theory, the difference in occupational attainment plays an important role in the explanation of the gender wage differential. In this chapter, two major issues are addressed. The first concerns the determinants of female occupational attainment and whether they are similar to those for males. The empirical results suggest that the determinants of occupational attainment are quite similar. The second issue is: to what extent the gender wage gap can be explained by occupational segregation in the TVP sector. The chapter answers this question by adopting Brown, Moon and Zoloth's (1980) approach. The estimated results suggest that the occupational attainment of men and women is very similar, but it is the different pay in the same occupation that matters. Within-occupation wage discrimination in the TVP sector in China is quite serious compared with other developing and industrial economies, while the wage effects of discrimination in occupational attainment are not as serious as within-occupation discrimination. The chapter explains this phenomenon as the result of the unique situation of decision-making in the TVP sector with respect to employment and the wage level: township and village governments, which have decision-making power over the occupational distribution, implement an equal opportunity policy in the TVP occupational distribution, while employers, who makes TVP firms' decisions regarding the wage level, actually discriminate against women.

Conclusion

Chapter 11 summarizes the main findings and conclusions of the dissertation, and poses some questions for further research.

PART I

EMPIRICAL AND THEORETICAL BACKGROUND

The TVP sector operates in China's rural economy. To understand its wage determination system, it is useful to know the development of the rural economy, its income distribution system and the situation of the rural labour market. Furthermore, it is also worthwhile to have an overview of theoretical frameworks through which individual wage variations are analyzed in economics. These are the basic contents of this part of the thesis.

Chapters 2 and 3 provide an empirical background for the study: the rural economy and its development, rural income distribution system and its institutional changes and the general characteristics of the rural labour market.

Chapter 4 surveys the human capital literature: its basic contents, debates which concern this study, and the empirical evidence on the human capital model. It also specifies a theoretical model for analyzing wage determination in the TVP sector.

2

BACKGROUND: THE RURAL ECONOMY AND THE TVP SECTOR

Before providing a detailed description of the rural economy and the development of the TVP sector, it is useful to understand the relationship between the rural and urban economies.

The rural economy was separated from the urban economy in the sense that no labour migration was allowed between the late 1950s and the start of economic reform in 1978. The successful implementation of this labour immobility policy was strongly supported by the household registration system: people born in a rural community had to stay there for their whole lives; their children also belonged to the same community.

Before economic reform, all rural non-agricultural activities were integrated into the agricultural sector. The local commune or brigade controlled all aspects of production and income distribution was independent of the activities of individuals. Institutional changes in the rural economy and its income distribution system have had a great impact on the emergence and development of the TVP sector and the pattern of its income distribution. Thus, in order to comprehend wage determination in the TVP sector, the background of the whole rural economy and the history of the TVP and its income distribution system have to be briefly investigated, though it is beyond the scope of this study to discuss them in any detail.

2.1 Institutional change in the rural economy and its income distribution system

Since 1949, China's rural economy has experienced dramatic institutional changes. Redistributive land reform at the beginning of liberalization in 1949 established a small family farming system. At that stage the income distribution was simply that each family received an income equal to its total family output minus government direct taxes.

However, this small family farming system did not last long. Between 1955 and 1957, China launched a large-scale agricultural cooperative movement and soon after (the period of the Great Leap Forward), the people's commune movement swept across rural China. The economy and administration of a given area (about 4,000 households and a population of 20,000 on average) were put under a single organ, the commune, within which there were no independent property owners. An attempt was made to apply communist principles of production and income distribution[1] which state 'from each according to his/her ability, to each according to his/her needs' (Lou, 1990; Griffin and Griffin, 1984).

The Great Leap Forward was a disaster which resulted in the loss of life of 30 million (Johnson, 1988). In order to recover from this disaster, there was once again a restructuring of the rural institutional system. Between November 1961 and February 1962, rural ownership was changed to a three-tiered system: commune, brigade and production team. The basic accounting unit was also changed, first from a commune to a brigade, which generally had a population of 1,000-2,000, and then from a brigade to a production team. The average team consisted of about 30 households or about 150 people (Byrd and Lin, 1990)[2]. The production teams were entitled to have

[1] During a brief period (1958-59) all members of the commune ate together with the food being provided from a communal kitchen without charge (Johnson, 1988).

[2] Both productive and administrative hierarchies in rural China had three levels before the economic reform: commune, brigade and production team.

relatively independent power in their management of land, labour and other publicly-owned properties. However, communes and brigades were part owners of the production teams' properties and provided economic and administrative supervision to the teams. Therefore, it was often the case that communes or brigades used production teams' land, labour or outputs without any compensation.

During this period (1961-78), the individual income distribution in the production team followed a work point system: each individual labourer's work points were evaluated against each day of work among the members of the team. 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. The main difference between the work point system and a normal wage system is the *ex ante* indeterminacy in the value of a work point.

The work point system affected individual incentives in the following ways:

(1) The value of each work point was determined not only by an individual's own effort but also by the efforts of all the other co-workers. The nature of agriculture is such that it is difficult to monitor work performance. Consequently, members of the production team have an incentive to shirk in the hope that other people would pay their contribution and in the belief that no matter how hard they worked, the results of their extra contribution would be shared by all the members in the team.

(2) Food grain was distributed on a per capita basis and was paid for by work points earned by households. The households not earning enough work points to pay for food were, in principle, required to pay back the production team from the next year's earnings. However, in practice this was rarely enforced. Therefore, those who earned more than enough to pay for the grain ration had to bear the burden (Lee 1984).

Although during this period the size of production units decreased from the commune or brigade to the production team, the income distribution system discouraged individual work incentives. This, together with the low output prices and rapid population growth in rural areas, led to low agricultural productivity and a low rate of rural development. Actually a vicious circle existed: with constant or even slightly decreasing arable land areas, rapid population growth and poor production and income distribution systems, agricultural productivity dropped lower and lower, generating a very low income for the rural population, so that agricultural reinvestment was scarce. This in turn reduced rural labour productivity and further depressed the income of the rural population.

Between 1976 and 1977, a production team in the Anhui province secretly initiated a partial privatization movement. The farmers in the team were so poor that they did not care if they were caught and punished by the Party. They divided their team land into equal sized small pieces on a per capita basis, and each family member got his/her share. The production team made contracts with each family. The family should pay an amount of grain as taxes to the central and local governments, and the amount of grain required for the so-called collective accumulation for the production team, the brigade and the commune by the end of the year. The rest of the output would be the family income. Since both production and income distribution systems shrank to the smallest unit where each member's interests were highly correlated, not surprisingly, by the end of the year, the total output of the production team more than doubled, and the farmers in the team had enough to eat. Lots of teams followed them the year after, and they were all successful. At last, the central government realized that this was the only way for Chinese farmers to get rid of poverty. So in 1978 they introduced this new system, the so-called *household responsibility system* (HRS), to the whole country. This was the beginning of China's rural economic reform.

As a result of both the household responsibility system and an increase in grain prices, China's grain output increased 18 per cent per annum, and farm family income increased 43 per cent per annum between 1978-1985.

2.2 Development of the TVP sector

Historical background

The predecessor of China's rural non-agricultural sector was the rural sideline production and handicraft industry, undertaken by 10 million individual Chinese farmers as part-time jobs in 1954. Afterwards, those who were working part-time or full-time in the handicraft industry were organized into specialized "sideline production teams" under agricultural producer cooperatives during the 1955-57 period (Byrd and Lin, 1990).

China's commune and brigade (the predecessors of township and village) enterprises began in the late 1950s during the period of the Great Leap Forward. In order to fulfil the target set by the Communist Party to catch up with industrial countries in respect of 'industrialization', each commune and brigade established its own steel plant[3]. Most of the strong labour was organized to work in those plants. Only women and children were left in the fields. By the end of 1959, there were 700,000 small enterprises in rural China, and more than 5,000,000 farmers were employed in them. The total output value (evaluated by the government not by the market) was over Y10 billion, and this was 10 per cent of total national industrial output value in that year (Zhang, 1988).

However, that was only a statistical figure. The steel produced by these small plants was of such low quality that it was never used as an input. In the meantime,

[3] The main target was that the total national output of steel should catch up with the United Kingdom. in three years and with the United States in five years.

agricultural production was destroyed by siphoning manpower, funds and materials from the agricultural sector. A nation-wide economic crisis ensued. In 1960, the central government called for a readjustment of the national economy. As a result, most of the commune and brigade enterprises were closed. Only a small number of enterprises which were engaged in producing agricultural tools, repairing agricultural machinery, or processing food, remained.

It was not until 1970 that a new peak of development of rural commune and brigade enterprises appeared. Again it was called for by the central government in an effort to speed up agricultural mechanization. Most of enterprises established during the 1970-77 period were those associated with agricultural production, such as agricultural machinery and farm tools production, and chemical fertilizer.

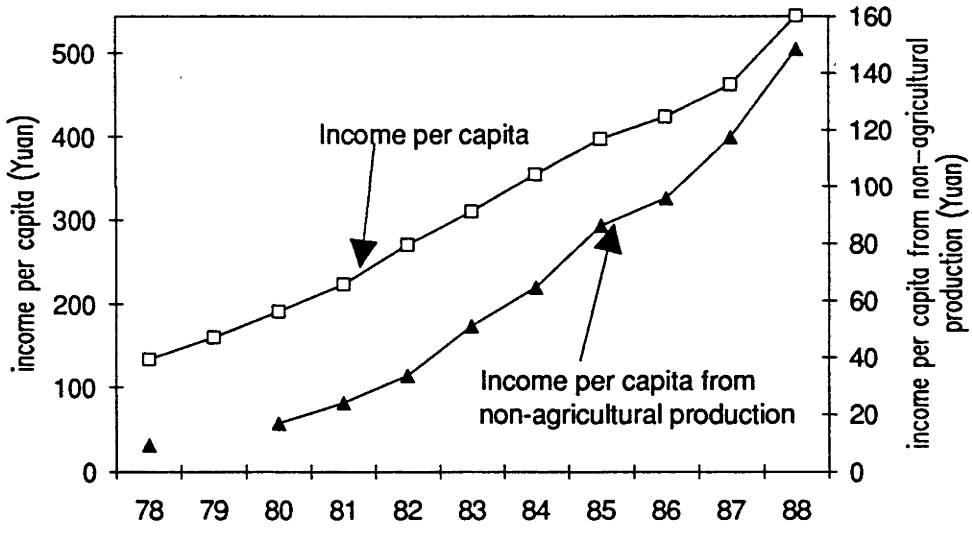
Rural township (formerly commune), village (formerly brigade), or privately owned enterprises have experienced an extremely rapid growth since 1978, especially since 1983. This growth was a direct result of the agricultural reform. After the introduction of the *household responsibility system* and the increase in grain prices in 1979, the rural economy underwent two major changes: (1) the increase in incentives to produce associated with the *household responsibility system* caused a sharp rise in labour productivity, which, in turn, created a large agricultural surplus; and (2) the implicit agricultural surplus labour now became explicit. Nevertheless, in spite of the latter, the regulations separating urban and rural economies have not been changed very much. Labour flows from rural to urban areas were still limited (at least until 1985)[4].

Under the pressure caused by the inability of plentiful surplus labour to migrate to urban areas, and with agricultural production surplus in hand, rural areas started their

[4] A labour force survey of 222 villages showed that the permanent migration of rural labour to urban areas, up to 1986, only accounted for 1.75% of the total labour force (The Nation-Wide 222 Villages Labour Survey Data, 1990).

own new process of industrialization. Hundreds of thousands of manufacturing, construction and other non-agricultural enterprises were set up, first in the south-east and coastal areas and then all over the country. They have absorbed agricultural surplus labour and raised the income of the rural population. As a result of ten years of development, the labour absorbed by the TVP sector accounted for 23.6 per cent of the total rural labour force in 1988 (Chinese Statistical Yearbook, 1989). And income per capita in rural areas increased 30 per cent per annum from 1978 to 1988. Among the components of this income increase, income from non-agricultural production increased 140 per cent per annum during the same period (Figure 2.1).

Figure 2.1
Change in total income and income from non-agricultural production (1978-88)
(Yuan)



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

Change in the income distribution system in the TVP sector

Before 1978, the income distribution system for commune and brigade enterprises 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 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*, 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 it is called the group of villagers). Therefore, the income distribution system of 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: 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); half fixed cash wage which was paid monthly plus half within-firm work points, paid at the end of the year; etc.

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 commune or brigade enterprises (by 1984 they changed to township and village 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 more 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.

Economic standing of the TVP sector in China's economy

So far, the development of the TVP sector and the institutional changes in its income distribution system have been investigated. The general situation of the TVP sector and its position in the whole economy should also be kept in mind.

Economic importance. As mentioned above, the TVP has grown rapidly since 1978. Up to 1988, its value of output accounted for 26.6 per cent of the value of national non-agricultural production and its employment accounted for 23.6 per cent of the total rural labour force (see Table 2.1).

Table 2.1
Development of rural non-agricultural enterprises 1978-1988

	1978	1988
Rural labour (thousand persons)		
Total	306,380	400,667
Labour in TVP	22,181	92,955
% of the total	7	23
Non-agri. output (billion yuan)		
Total	545	2,398
Rural	46	638
% of total	8	27
Industrial output (billion yuan)		
Total	424	1,822
Rural	39	453
% of total	9	25

Source: *Chinese Statistical Yearbook* (1989), Beijing: Chinese Statistical Press.

TVP enterprises were active in all but one of the fourteen main sub-sectors of Chinese industry in 1986. In some particular industries the share of the TVP output varied from a quarter to three-quarters of total output. For instance, in 1986, the TVP

produced 75 per cent of all bricks made in China, 22 per cent of cement, 26 per cent of coal, 26 per cent of silk, 47 per cent of silk textiles, 27 per cent of edible vegetable oil and 27 per cent of machine-made paper and cardboard (Byrd and Lin, 1990).

The TVP has also played an increasingly important role in China's export industry. Its share of total national export value reached 11.0 per cent in 1987 and 15.2 per cent in 1988 (*Chinese Rural Statistical Yearbook*, 1989). It is obvious that the TVP sector has already become a pillar of the national economy.

Marketization. China's economic reform which started in the late 1970s aimed to transform a Stalin styled centrally planned economy into a market oriented one. After ten years of reform, the rural agricultural and the TVP sectors were the two most market oriented sectors within the Chinese economy.

Compared with the state-owned industrial sector, the TVP has several features indicative of a market oriented economy:

(1) A relatively hard budget constraint. A soft budget constraint is one of the main characteristics of a firm in the centrally planned economy (Kornai, 1980). Compared with the state-owned industrial sector, a firm in the TVP sector has a relatively hard budget constraint because its owner has little power with respect to financial support. In China, the township is the lowest level of government. Its financial resources are very limited. If a township-owned firm is not competitive in the market, it is beyond its owner's power to get financial support for it. The possibility of obtaining financial support is even lower for a village-owned firm, and it is impossible for a privately-owned firm. A relatively hard budget constraint encourages firms to perform well in order to survive.

(2) A relatively small proportion of inputs and outputs are planned by various levels of government. Before economic reform, almost all inputs and outputs of state-owned enterprises were controlled by the central government. Economic reform introduced

the policy of decentralization and the proportion of resources controlled by the central government gradually declined. However, provincial and prefectural government plans still play an important role in state-owned enterprises.

By contrast, the TVP sector has hardly any inputs obtained from, or outputs sold through, any level of government plan (which implies no low price inputs and no ensured sales). TVP input and output transactions are mostly through the market mechanism.

3

THE CHINESE RURAL LABOUR MARKET

China's rural labour market is one in which the rural population is the labour supplier and the rural agricultural sector and the TVP sector are the labour demanders. This chapter describes the general characteristics of China's rural labour market in which the TVP sector is one of the key elements. The primary aim of this description is to provide a background to the more detailed study of wage determination presented in Parts 2 and 3 of this thesis.

3.1 Labour supply for the TVP sector

China's township-, village- or privately-owned enterprises operate in rural areas. Given the limitations on urban-rural labour mobility described in Chapter 2, labour supply for the TVP sector can only come from the rural agricultural sector. The characteristics of this labour supply are outlined below.

Agricultural surplus labour

China, until the early 1970s, had rapid population growth and hence a plentiful labour force. However, the conventional labour transfer from rural to urban areas did not occur in the process of industrialization in China. Before the economic reforms of the 1980s, an urban-biased economic development strategy prevented the rural population from moving to urban areas. Migration between rural regions was also restricted because of very low rural labour productivity and unbalanced rural development. Urban industry hardly absorbed any labour from rural areas after 1949. In effect, the rural economy was rigidly separated from the urban economy by an almost total lack of labour migration.

The consequence of rapid population growth combined with labour immobility was a rapid decline in arable land per rural labourer (Table 3.1).

Table 3.1
Changes in rural labour force and arable land in China in 1952-1988

Year	Rural labour (10m persons)	Arable land (10m Mu)	Arable land per rural labourer(Mu)
1952	18.243	211.844	11.6
1957	20.566	235.866	11.5
1962	21.373	210.343	9.84
1965	23.534	214.936	9.13
1970	28.120	215.231	7.65
1975	29.946	224.318	7.49
1980	31.836	219.569	6.90
1985	37.065	215.439	5.80
1988	40.067	217.303	5.40

Source: *Chinese Statistical Yearbook (1989)*, Beijing: Chinese Statistical Press.

The rapid decline in arable land per labourer implies a rapid decrease in the marginal productivity of labour. By 1980 the arable land per labourer was approximately one half of the 1952 ratio (Table 3.1). According to Rawski's estimates, average labour productivity (per man-day) of the agricultural sector declined from 1.46 yuan in 1957 to 1.24 yuan in 1975 (Rawski, 1979). This reinforces the proposition advanced on the basis of the data in Table 3.1 that the marginal productivity of labour in the agricultural sector had been declining. If there was any other job opportunity which offered a higher opportunity cost than agricultural earnings, there would be an ample supply of labour from the agricultural sector. The potential supply of labour can be seen as implicit agricultural surplus labour. This surplus labour was an important motivation for the development of the rural TVP sector.

The economic reform which began in 1978 brought a great change to the Chinese rural economy. The extremely rapid growth of the TVP sector has absorbed much of the surplus rural labour. However, in most rural areas, about eighty per cent of the

rural labour force is still farming the limited arable land. They are the potential labour supply for the TVP sector.

The situation differs in each of the four counties. In Wuxi and Nanhai, where the rural TVP sector has developed more rapidly, around fifty per cent of the rural labour force was absorbed by non-agricultural activity by 1985, and as long as inward labour mobility is restricted there is a problem of labour shortage for the TVP firms in these counties.

In contrast, in 1985, there was still implicit surplus agricultural labour in the two less developed counties, Jeishou and Shangrao. Here, there have been no problems of labour supply from the agricultural sector as the wage rate paid in the TVP was higher than in the agricultural sector.

Labour mobility

General Situation of Labour Mobility in Rural China. Although the regulations regarding labour mobility were marginally relaxed, both rural-urban and rural-rural labour mobility were still extremely restricted in 1985. This can be demonstrated using data from a nation-wide survey of 222 villages called the Hundreds Villages Labour Survey Data (HVLD)[1].

The HVLD data set shows that permanent migration of rural labour to urban areas only accounted for 1.75 per cent of the total labour force in 1986 (see Table 3.2). From the table data, we can easily imagine the even lower degree of labour mobility at the beginning of the reform period.

[1] The "Nation-wide 222 Villages Labour Investigation", carried out by the Institute of Rural Development of the Chinese Academy of Social Science, covered 222 villages in Shanghai, Jiangsu, Zhejang, Fujien, Hebei, Shangxi, Inner Mongolia, Heilongjiang, Guangxi, Ningxia and Qinghai provinces in China. This data set (HVLD) is drawn from this investigation.

Table 3.2
Labour mobility in the 222 villages, 1986

Inflow/outflow	Total (persons)	% of total	Permanent (persons)	% of total	Seasonal (persons)	% of total
Total labour	189,006		..		..	
Outflow	26,993	14.3	5,596	3.0	21,397	11.3
to rural area	14,599	7.7	2,293	1.4	12,306	6.3
to urban area	12,394	6.6	3,303	1.8	9,091	4.8
Inflow	7,793	4.1	4,083	2.2	3,707	2.0
from rural	7,060	3.7	3,440	1.8	3,620	1.9
from urban	733	0.4	647	0.3	86	0.1

Source: *The Material of the Nation-wide Hundreds Villages Labour Survey, 1978-1986,* Beijing: Chinese Statistical Press.

In rural China, not only is the labour outflow quite small but the labour inflow is also very weak. The HVLD data show that only about 4.1 per cent of the total labour force came from areas outside the villages. Of this inflow 52.4 per cent was a permanent inflow, which means that only 2.2 per cent of the total labour force inflow is permanent. If we believe the representative nature of this data set, China's rural areas are very deficient in labour mobility.

Labour Inflow in the Four Counties under Survey. More detailed information about labour inflow is available in the township-, village-, or privately-owned enterprises sample survey. In all four counties, most of the labour in township and village enterprises came from within the community (Tables 3.3 and 3.4).

The figures in Table 3.3, which were derived from the 120 firm survey data, indicate that about 80 per cent of employees in the TVP came from the communities within which the enterprises were located, and only 9 per cent of the labour force came from other counties and provinces. An examination of the characteristics of the employees who came from other counties or other provinces shows that most of them were technicians. However, Nanhai is an exception in that about 18 per cent of workers came from the other counties or provinces.

It is interesting to compare the situations in Wuxi and Nanhai, both of which are characterized by a local labour supply insufficient to meet demands of the TVP firms. In Wuxi only 3 per cent of the total labour force came from other regions while 94 per cent came from the same community. In Nanhai, however, both the inter-regional and inter-community labour inflows are relatively strong, with about 33.8 per cent of the total labour force coming from other communities and 15.3 per cent coming from other counties or provinces.

Data from the Workers Survey Questionnaire indicate a similar lack of labour mobility (Table 3.4). The slightly different results (the percentage of employees who came from the same village or township in Table 3.4 is slightly lower than that in Table 3.3) are caused by differences in sample sizes. Table 3.4 is derived from a survey of 1074 workers. These workers belonged to only 49 of the 120 firms in the firm survey. Consequently, Table 3.3 may be more representative.

Table 3.3
Original home of employees in sample enterprises
(% distribution of employees in sample firms)

	Same township or village	Other townships (villages) in the county	Other counties in the province	Other provinces
Wuxi				
all employees	94.0	3.0	1.6	1.4
workers	94.2	3.5	1.7	0.7
technicians	78.6	1.4	5.3	14.6
manag. staff	93.1	0.6	0.5	5.9
Jieshou				
all employees	79.7	12.7	4.8	2.8
workers	80.6	12.1	5.2	2.7
technicians	65.9	18.3	2.4	13.4
manag. staff	78.1	16.5	2.3	3.2
Nanhai				
all employees	50.9	33.8	14.2	1.1
workers	47.7	35.0	16.0	1.3
technicians	85.1	3.0	10.9	1.0
manag. staff	53.5	39.7	5.6	1.2
Shangrao				
all employees	80.9	14.8	2.1	2.2
workers	83.6	11.4	1.9	2.7
technicians	68.5	5.6	5.6	20.3
manag. staff	73.9	18.5	1.7	5.9

Source: Meng, *The Rural Labour Market* in Byrd and Lin (eds) China's Rural Industry, Oxford: Oxford University Press.

Table 3.4
Where do you come from?
(% distribution of sample workers)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
same village	52.3	58.4	32.5	53.0	66.7
same township	17.2	22.3	6.1	17.8	22.7
same county	20.9	8.8	52.5	16.5	3.5
other county	4.8	4.9	3.9	9.7	2.8
other province	4.8	5.4	5.0	3.0	4.3
total observations[2]	1074	473	297	260	144

Source: *Workers Survey Questionnaire.*

[2] The regional distribution of the sample for the Workers Survey Questionnaire shown in this table will be the same for all the other tables derived from the same sample.

Data on the distance between workers' permanent living places and their factories reinforces this picture of a lack of labour mobility (Table 3.5). More than 90 per cent of the workers lived within 20 Li (10 km) of their factories, which also means that most of the workers were from the same township or village.

Table 3.5
Distance from home to firm (% distribution of sample workers)

Distance (Li)	Total	Wuxi	Jieshou	Nanhai	Shangrao
0-20	94.94	96.8	93.5	88.2	93.4
21-100	2.24	0.7	5.4	5.7	3.7
100 above	2.82	2.6	1.0	6.1	2.9

Source: *Workers Survey Questionnaire.*

Conclusion

The above discussion of the labour supply situation for the rural TVP sector suggests that:

(1) In general, China's TVP sector has a large labour supply.

(2) The labour supply for the TVP sector is drawn from a very small region and is normally confined to each community.

(3) Because of labour market segmentation, the labour supply for the TVP sector varies from region to region, depending on the level of economic development in each region.

3.2 Recruitment, dismissal and job changes

Recruitment

Except in Jeishou, more than 50 per cent of the employees were assigned to their job by or through community authorities when the enterprises were first set up (Table 3.6). Employers in Wuxi county have least freedom in choosing employees, compared with both Nanhai, which has a similar situation of supply and demand of

labour, and compared with Shangrao and Jieshou, where a large amount of potential surplus labour still exists. With regard to the two developing counties, Shangrao has more control over its firms' recruitment than Jieshou.

Table 3.6
Ways of obtaining employees when the firms were first established
(% distribution of sample firms)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
assigned by community	53	85	22	52	55
through resource pool[a]	5	..	14	..	5
directly by firm	32	12	42	39	40
through social relations	6	..	14	9	..
other	4	3	8	..	..
total observations[b]	115	34	37	24	20

Note: (a) Including those who invest in the firm, in terms of either land or money.
(b) The regional distribution of the sample for the Enterprise Survey Questionnaire shown in this table will be the same for all the other tables derived from the same sample.
Source: *Enterprise Survey Questionnaire.*

The responses to the question "how did you get your current job" in the Workers Survey Questionnaire (Table 3.7) are fairly consistent with the data shown in Table 3.6 in that most job-finding in Wuxi and Shangrao depends on community arrangement. Even in Nanhai about 40 per cent of the workers were assigned to their current job by the community authority. Among the five methods of finding jobs, "through examination" and "through own efforts" are closest to market transactions.

Table 3.7
How did you get your current job?
(% distribution of sample workers)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
community arranged	43	58	16	38	44
through social relation	23	16	28	41	22
through examination	16	16	31	4	3
through own effort	13	9	13	16	21
through resource pool	5	1	13	1	10

Source: *Workers Survey Questionnaire.*

Dismissal

The number of workers actually fired by firms or directors is very limited. Although 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, the average number of workers dismissed by each firm in 1985 was less than one person in all four counties. The sharp difference between the views of directors and the practical record of dismissing workers (for instance almost all the directors in Wuxi thought they had this right) can be explained by political and social constraints. 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[3].

A situation of insufficient or excess personnel could mean that the enterprise has little decision-making power over its employment level. There are three important features of the personnel situation in the TVP firms. First, when the TVP sector is in the initial stage of development, firms have to accept the employment quota given by the authority which is likely to be greater than its optimal demand, as in Shangrao, for example. Second, with the development of the TVP sector, local shortages of labour

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

often arise and in these situations, the community authority typically prefers to increase the wages and tolerate labour shortages rather than accept workers from outside the community, as, for example, in Nanhai and Wuxi. Third, no matter what the labour demand and supply situation is, dismissing workers is very difficult, otherwise Wuxi would not have had excess personnel. The judgement of the firm on the suitability of its worker numbers confirms this impression (Table 3.8).

Table 3.8
Do you have the right number of employees in your firm?
(% distribution of sample firms)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
not enough	9	16	11	27	..
too many	8	9	8	..	52
just right	83	75	81	73	48

Source: *Enterprise Survey Questionnaire.*

Among the firms with excess workers, three firms in Jieshou stated that the reason for not dismissing employees was that the enterprise itself would not want or allow such reductions, while most firms in Wuxi and Shangrao replied that the township or village (TV) authorities would not allow the number of workers to be reduced. Employees also believe that they have little chance of being dismissed (Table 3.9).

Table 3.9
Do you think it is possible that you will lose your current job?
(% distribution of sample workers)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
very possible	9	8	4.1	15	11
not very	46	49	42.0	53.1	37
not possible	45	43	54	32.2	52

Source: *Workers Survey Questionnaire.*

Job changes

Desired job tenure. Most workers are willing to stay in their present job for more than five years (more than 76 per cent of the total sample). There are, however, differences among the four counties (Table 3.10).

Table 3.10
How long are you willing to stay in your current job?
(% distribution of sample workers)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
less than 1 year	3	2	1	5	7
1-3 years	11	12	3	22	16
3-5 years	9	8	6	15	14
above 5 years	77	78	90	58	63

Source: *Workers Survey Questionnaire.*

Nearly 80 per cent of sample employees were willing to stay in the current job for more than 5 years (Table 3.10). Very few of them wanted to quit within one year. Furthermore, in the four counties less than 10 per cent of workers wanted to leave their factories (Table 3.11). It is easy to imagine that the main reason for not wanting to leave a job is the segmentation of labour market and, therefore, the high cost of searching for a new one. In the developing regions, job vacancies are scarce. Therefore, looking for a new job within the region is very costly. Nevertheless, it was also very hard for those living in the developing regions to find jobs in a developed region, at least until 1985. By the time the survey was conducted, most developed regions did not allow outsiders to join their local labour market. This was because the objective of these regions' local governments was first to absorb their local surplus labour and then to maximize income per capita within the region. Allowing outsiders to come into the region would reduce the income level of insiders. In the developed regions, although job finding was not very difficult, some political or social costs were imposed on the job search of those who were in township- or village-owned enterprises, so that skilled labour could be retained by those firms.

Table 3.11
Do you want to leave your factory?
(% distribution of sample workers)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
yes	8	8	3	9	22
no	92	92	97	91	78

Source: *Workers Survey Questionnaire.*

The proportion of permanent and casual employees. The ratio of permanent and casual employees to the total labour force can shed further light on job changes. In the less developed regions, a permanent job is valued as employment security but in the more developed regions it is more of a restriction on job changes. The survey provides a general picture of the situation in the TVP sector (Table 3.12). Except in Nanhai, more than 75 per cent of labour in the sample firms held permanent positions. The employment system in Nanhai, however, has undergone remarkable changes since the reform began. The ratio of permanent workers has decreased very sharply from 92 per cent in 1980 to 40 per cent in 1985, thus, by 1985, casual labour was the dominant form of employment (Table 3.13).

Table 3.12
The percentage of permanent and casual jobs in total employment

	Wuxi	Jieshou	Nanhai	Shangrao
permanent	91.2	75.8	40.2	78.7
casual	8.8	24.2	59.8	21.3

Source: .Meng, *The Rural Labour Market* in Byrd and Lin (eds) China's Rural Industry, Oxford: Oxford University Press.

Table 3.13
Percentage of permanent and casual workers in total employment of TVPs in Nanhai county 1980-85

	1980	1981	1982	1983	1984	1985
permanent	91.8	87.9	86.3	76.1	48.3	40.8
casual	8.2	12.1	13.7	23.9	51.7	59.2

Source: Meng, *The Rural Labour Market* in Byrd and Lin (eds) China's Rural Industry, Oxford: Oxford University Press.

Even if a firm ran at loss, more than sixty per cent of the workers would prefer to remain in the factory receiving half payment (Table 3.14). This result implies that the cost of job searching must be very high. Except in Nanhai, most employees do not want to move. Reasons vary among counties. In Wuxi, where labour supply is tight, workers do not seem to be allowed to move. Community authorities in both Wuxi and Nanhai have issued regulations to restrain job changing. The flow of labour between enterprises must be approved by the township authorities. A fine of 500-2000 Yuan is imposed on anyone who seeks a job outside the community. Those who leave the community to find jobs outside face non-economic punitive measures, such as denial of family members' rights to job assignments from the community authority and higher tuition for school children (Meng, 1990). In Jieshou and Shangrao, where labour supplies are greater than demands, the obvious reason is that it is difficult for them to find new jobs. However in both cases, job searching costs must be very high.

Table 3.14
Choice if factories ran into losses
(% distribution of sample workers)

	Total	**Wuxi**	**Jieshou**	**Nanhai**	**Shangrao**
remain with half pay	66	65	84	47	58
find a new job	34	35	16	54	42

Source: *Workers Survey Questionnaire.*

In response to the question "As a director, if your firm ran into loss, what responses are you inclined to use?", more than half of the directors in the sample firms in Wuxi and Jieshou indicated they would not dismiss workers or shut down the firms (Table 3.15). This implies either that this behaviour is not allowed (as in Wuxi) or that the firm itself does not want to engage in such activities (as in Jieshou). As a matter of fact, lowering the wage level without dismissal is probably a cooperative firm's response.

Table 3.15
Firms' response if ran into losses
(% distribution of sample firms)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
dismiss part of employees	38	41	21	48	50
bankrupt	5	..	..	10	19
lower wage rate	52	59	72	42	19
ask for government subsidy	5	..	7	..	12

Source: *Enterprise Director Survey Questionnaire.*

Conclusions

The above discussion has given us a general picture of recruitment, dismissal and job changes in the rural TVP sector. Three points can be concluded:

(1) Most employment in rural non-agricultural sectors is arranged by community administration or by social contact with community or firm leaders; only a low proportion of workers acquire their jobs through their own efforts in the market.

(2) The firms have very limited rights in hiring or firing workers.

(3) Because of labour market segmentation, the cost of job searching is very high in rural China and job changing by employees is of minor importance.

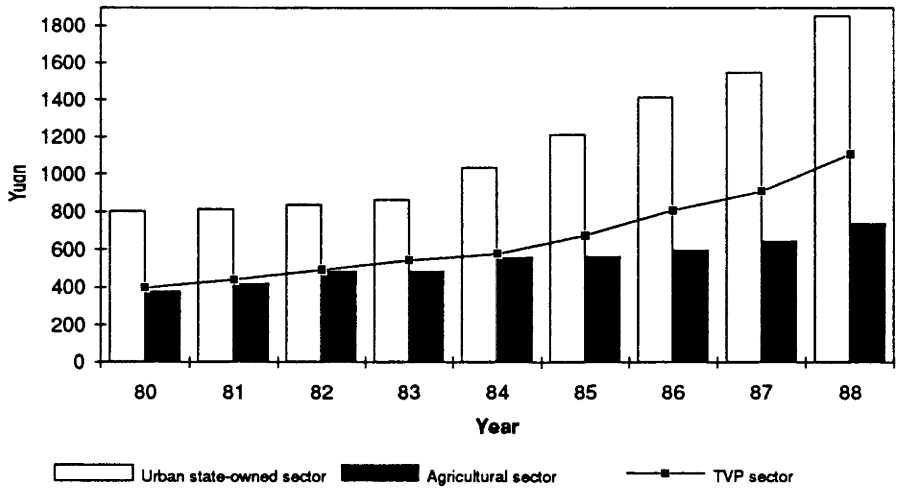
3.3 Wage level and wage determination

As mentioned in Chapter 2, the TVP income distribution system has undergone a transitional phase from a work point system within the agricultural sector to a cash wage system. The questions asked in this section are: (1) What is the TVP's wage level compared with the agricultural sector and the urban industrial sector? (2) How large are the wage differentials among the firms? (3) To what extent is the TVP wage level determined by market factors and to what extent is it arranged by the community authority?

General features of the wage level and wage differentials in the TVP sector

Considering Chinese rural labour markets as a whole, there are three striking features of the wage level in the TVP sector. First, similar to the situation in the other developing economies, the wage level in the Chinese TVP sector is above the rural reservation rate, which is indicated by the agricultural income. The wage level of the TVP sector in China falls between the wage levels in the urban industrial sector and the agricultural sector (Figure 3.1). The calculation of the wage levels for the agricultural sector is based on the rural residents sample data collected by the State Rural Investigation Team, but it is not very accurate. According to Wakashiro (1990), in 1985, the daily wage was 4.9 yuan for growing crops, 4.4 yuan for livestock farming, 8.4 yuan for processing agricultural products, 8.6 yuan for commercial service and restaurants, and 15 yuan for transportation and industrial processing in rural China. This information indicates that the wage level in the agricultural sector was far below that in the TVP sector. The agricultural wage in my calculations, therefore, may be over-estimated.

Figure 3.1
Comparison of wage level among the TVP, agricultural, and urban industrial sectors, 1980-88:



Sources: Data for both the urban state-owned sector and the TVP sector are from the *Chinese Statistical Yearbook, 1989;* the data for the agricultural sector are calculated from the sample data in the *Chinese Rural Statistical Yearbook, 1989.*

The second characteristic is that the growth rate of the TVP's wage is much higher than that of wages in the agricultural sector, and in most recent years it is also higher than the growth rate of wages in the urban industrial sector (Table 3.16).

Table 3.16
Growth rate of wage in different sectors
(percentage)

Year	Urban	Rural	
		agriculture	TVP
1981	-1.1	9.5	10.5
1982	1.4	16.7	-15.8
1983	1.6	-1.9	46.7
1984	22.0	10.5	14.4
1985	15.8	-1.9	16.7
1986	16.9	4.5	11.5
1987	10.6	6.4	12.3
1988	20.6	13.7	22.5

Sources: *Chinese Statistical Yearbook, 1988 and 1989; Chinese Rural Statistical Yearbook, 1989; Statistical Material of Rural Township and Village Enterprises (1978-1985).* Beijing: Chinese Statistical Press.

The third point to be made concerning the wage structure in the TVP sector is the sizeable wage differences across regions. Looking at the minimum, maximum, mean and standard deviations of wage levels in 28 Chinese provinces in 1980, 1985 and 1988, it is seen that not only are there large differences across regions, but also that the earnings gap has been slightly widening in recent years (Table 3.17).

Table 3.17
Statistical characteristics of the TVP's wage rates in 28 provinces
(yuan)

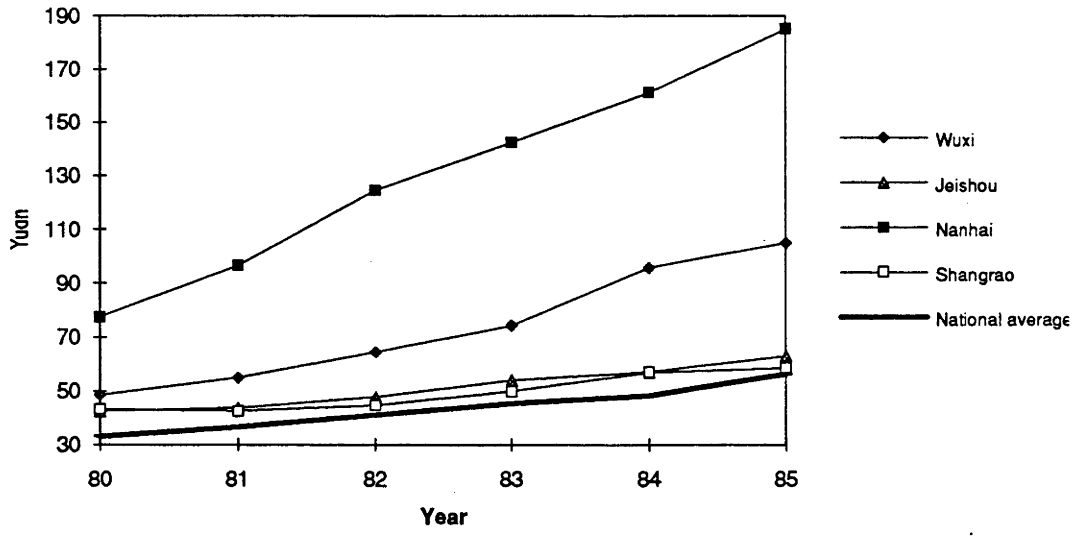
Year	minimum	maximum	mean	S.D.	C.V. (%)
1980	249	592	455	98	21.5
1985	417	1028	743	154	20.7
1988	806	1763	1073	237	22.1

Note: S.D.=Standard deviation
C.V.=Coefficient of variation
Sources: *Chinese Statistical Yearbook, 1989; and Township and Village Enterprise's Statistical Material (1978-1985).* Beijing: Chinese Statistical Press.

Wage levels and wage differentials in the four counties

The average wage level of the four counties in 1985 is 69 per cent higher than the average wage level of the TVP sector. Among the four counties, the wage levels in Jieshou and Shangrao are nearly the same as the national average, but Nanhai and Wuxi's are much higher, and this is consistent with the different situations of labour demand and supply during this period. Since 1982, the wage level in Nanhai has grown more rapidly than in Wuxi, even though both counties experienced excess labour demand. These phenomena are clearly displayed in Figure 3.2.

Figure 3.2
Wage level in the four counties and the national average (1980-1985)



Sources: Data for the four counties are from the *Enterprise Quantitative Questionnaire* and for the national average from the *Chinese Statistical Yearbook, 1988.*

Wage differentials among the sample firms in each of the four counties. A comparison of the minimum, maximum, mean and standard deviations of the wage level within each of the four counties shows that wage differentials among the sample firms in Nanhai and Shangrao are much higher than in Jeishou and Wuxi (Table 3.18).

Table 3.18
Statistical characteristics of the TVP wage rate in four counties

County	Minimum	Maximum	Mean	S.D
Jeishou	29	92	61.09	15.39
Wuxi	55	151	105.06	18.79
Shangrao	25	150	63.92	26.91
Nanhai	67	300	169.33	58.48

Note: S.D.=standard deviation
Source: *Enterprise Survey Questionnaire*

Wage differentials within firms. We have no data to indicate the wage differentials within each firm. However, the *Workers Survey Questionnaire* provides some

information concerning wage differentials within sample firms from the perspective of the workers. Generally speaking, in each of the four counties, most surveyed workers do not consider that there are large wage differences within their own firm, but they still indicate a preference for narrowing the wage gaps (see Tables 3.19 and 3.20).

Table 3.19
Wage difference among workers in your firm
(% distribution of sample workers)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
very great	7	8	3	11	9
quite great	35	42	33	31	23
quite small	46	43	43	49	58
no difference	12	8	21	9	11

Source: *Workers Survey Questionnaire.*

Table 3.20
Wage difference among workers should be
(% distribution of sample workers)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
smaller	42	44	30	46	57
remain the same	41	36	43	48	35
greater	17	20	27	6	8

Source: *Workers Survey Questionnaire.*

The workers were also questioned about their perceptions of the wage differences between ordinary workers and firm's leaders and technicians (Table 3.21 and 3.22).

Table 3.21
Wage difference between ordinary workers and firm leaders
(% distribution of sample workers)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
very great	13	15	2	24	9
quite great	36	43	26	36	34
quite small	43	38	56	36	44
no difference	8	4	16	4	13

Source: *Workers Survey Questionnaire.*

Table 3.22
Wage difference between ordinary workers and firm's technicians
(% distribution of sample workers)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
Very great	7	4	6	16	5
Quite great	38	36	49	35	35
Quite small	44	50	33	41	40
No difference	12	10	12	8	20

Source: *Workers Survey Questionnaire.*

About fifty-five per cent of sample employees do not consider that there are large wage differences between skilled workers and unskilled workers. However, the situation differs from county to county. More than 50 per cent of the surveyed workers in Nanhai and Jeishou believed that the wage differences between employees with different skills were very or quite great. In Wuxi and Shangrao, about 60 per cent of the surveyed workers thought there were quite small or even no differences between unskilled workers and technicians. This pattern is similar to the pattern of marketization in the four counties: Nanhai and Jeishou are the more market oriented counties of the four, while Wuxi and Shangrao are controlled more tightly.

Wage determination

In a perfectly competitive labour market, the wage rate is determined by the forces of labour demand and supply. In a tightly controlled economy, the wage level is normally assigned by government. In a cooperative firm, the distribution of income is determined by all the members in the cooperative.

The responses to the question "who has decision making power about the wage and bonus level in your firm?" in the *Enterprise Survey Questionnaire* show that nearly 70 per cent of sample firms have some form of decision making power over the firm's wage and bonus levels (Table 3.23).

Table 3.23
The decision making power over the wage and bonus levels in the firm
(% distribution of sample firms)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
by township or village government	26	31	17	21	44
jointly by the firm and government	9	12	8	4	13
by the firm with approval from gov.	23	33	19	21	14
by the firm independently	37	24	53	33	29
others	5	0	3	21	0

Source: *Enterprise Survey Questionnaire.*

The responses to the question "do you have decision-making power on wage and bonus determination?" in the *Enterprise Director Questionnaire* roughly confirm the results reported above (Table 3.24).

Table 3.24
Do you have decision making power on wage and bonus determination?
(% distribution of sample firms)

	Total	Wuxi	Jieshou	Nanhai	Shangrao
wage:					
Yes	62	57	70	65	58
No	38	43	30	35	42
bonus:					
Yes	69	68	71	75	59
No	31	32	29	25	41

Source: *Enterprise Director Survey Questionnaire.*

There is also a question in the *Enterprise Survey Questionnaire* asking the reason for changes in the wage or bonus levels in 1985 (Table 3.25). Among the five choices, 'assigned by township or village governments' is no doubt a non-market factor; 'increasing in profit' is most probably a cooperative's response because in a cooperative firm, marginal productivity of labour is equal to wage plus average profit per member, represented by a bonus or some other form. The third and fifth choices are surely market factors. The fourth choice is ambiguous, and fortunately only two firms choose it.

These data suggest that the wage and bonus changes in 1985 were probably mostly market oriented. However, the degree of marketization differs across counties. In Wuxi county 41.4 per cent of wage changes in sample firms were assigned by township or village governments. In Nanhai, however, the decisions of township or village governments account for only 10 per cent of wage changes among the sample firms.

Table 3.25
The reasons for changes in the wage or bonus in 1985
(% distribution of sample firms)

	Total	Wuxi	Jeishou	Nanhai	Shangrao
assigned by TV government	23	41	16	10	44
increasing in profit	25	28	29	25	13
increasing in work volume	38	24	52	40	33
influenced by other firms' wage increase	2	..	..	5	7
inflation	12	7	3	20	3

Source: *Enterprise Survey Questionnaire.*

Conclusions

(1) The wage level is higher in the Chinese rural TVP sector than in the agricultural sector and lower than in the urban state-owned sector. It is higher than the income in the agricultural sector because the marginal productivity of labour in the TVP sector is much higher than in the agricultural sector. Moreover, in order to absorb labour from the agricultural sector, the wage in the TVP sector has to be higher than that in the agricultural sector.

Lewis' model suggests that the finding that the wage in the modern sector is higher than that in the agricultural sector is due to higher living standards in the urban area than that in the rural area (1954). However, his explanation does not seems helpful in our case, because the TVP sector is also located in the rural area. My explanation is three-fold. First, a potential surplus agricultural labour can only become explicitly surplus when the opportunity cost of agricultural labour is higher than the current income. Second, no matter what the labour supply situation is, the wage in the TVP sector has to be approximately equal to the marginal cost of effort, otherwise employees will choose to shirk work because it is difficult for employees to be dismissed in the TVP (for detailed analysis see Chapter 4). Third, because the wage in the TVP is higher than that in the agricultural sector, a cost of job searching is incurred even under the old recruitment system. For example, in order to be assigned to the TVP sector, people have to try to establish a good relationship with the

township or village leaders. The efforts devoted to this purpose, either in money terms or non-money terms, should be seen as their job searching cost which has to be compensated by the wage they get from the TVP firm.

The fact that the wage in the TVP sector is lower than that in the urban state-owned sector is most probably due to the restriction on labour mobility from the rural areas to the urban areas. In this circumstance, employment in the TVP sector is the only alternative opportunity for the rural labourer to make himself/herself better off compared with the income level in the agricultural sector.

(2) Wage differentials between provinces and counties are very large, and this can probably be explained by the segmentation of the labour market together with the different stage of economic development in different regions.

(3) The majority of the firms have decision making power over their wage settings. However, wage determination in Nanhai and Jeishou is much more market oriented than in Wuxi and Shangrao.

3.4 Concluding remarks

The intention of this chapter was to provide a general picture of the Chinese rural labour market in which the TVP sector operates. It was established that:

(1) Although the level of development of labour markets in different regions was uneven, in a county like Wuxi, where the community authority's control was very tight, only 30 per cent of sample firms' wage levels were arranged by the authorities directly.

(2) These labour markets are distorted, and three specific distortions have been identified.

First, labour mobility is restricted at both inter-regional and inter-community levels. That means that these markets are segmented into very small pieces (typically each market corresponds with the community). Second, within each of these markets more than half of the sample firms' labour allocation is arranged by the community authority. Third, for a very small number of sample firms, even wage determination is arranged by the community authority.

(3) Because of market segmentation, labour costs in developed regions increased very rapidly while at the same time labour supply to the TVP sector still exceeded labour demand in developing regions.

(4) The degree of labour market distortion varies from county to county, and this variation is not determined by the level of economic development.

4

LITERATURE REVIEW OF HUMAN CAPITAL MODEL AND HYPOTHETICAL MODELLING OF WAGE DETERMINATION IN THE TVP SECTOR

Labour economics provides a number of theories to explain individual wage differences. This chapter reviews two of them, human capital theory and wage discrimination theory. These theories are going to be used to analyze the case of individual wage differentials in China's TVP sector in this study.

4.1 Neo-Classical Theory of Human Capital

The simplest neo-classical theory of the labour market is based on the assumption that individuals are identical in terms of productivity. This enables the problem of labour demand to be simplified to one where firms employ labourers to the point where the value of the marginal productivity of labour is equal to the marginal cost of labour. Since individuals are assumed to be equally productive, they must receive the same wage.

However, this theory is too abstract. Individuals are not identical in terms of productivity, nor in terms of ability. Galton (1869) first introduced the idea of ability differences influencing productivity. Following him, the ability school concentrated on the questions of how ability differs across individuals and how these differences influence the distribution of earnings (Pareto, 1897; Pigou, 1932; Staehle, 1943; Boissevain 1939; Roy, 1951 and Mandelbrot, 1960).

However, since innate ability is difficult to measure, it is hard to verify the theoretical formulation of the early models, and a new school, the human capital school, was

developed under the leadership of Schultz (1960, 1961, 1971), Becker (1962, 1964, 1967), and Mincer (1957, 1958, 1960, 1962, 1970, 1974, 1976).

General description of human capital theory

Instead of viewing ability as an innate characteristic of an individual, the human capital school saw ability as a produced characteristic. Four essential propositions form the basis of human capital theory:

(1) Individual productivity can be increased through augmentation of human capital which includes such areas as knowledge, skill, general physical acuity and endurance.

(2) Human capital can be gained from acquired education, training, good nutrition, exercise and health care.

(3) Labour is paid according to its marginal productivity.

(4) Individuals are optimisers, which implies a person will invest in human capital to the point where the marginal cost of investment equals the expected marginal benefit.

According to these four points, wage differences can be explained largely by differences in the distribution of human capital across the labour force. These differences are in turn are caused by differences in the distribution of investment in human capital.

The most important human capital variables are education and on-the-job training. The latter may be decomposed into general training and firm-specific training.

The private and the social costs of schooling are analysed in human capital theory. The demand for education depends on private decisions, while the supply of educational facilities depends largely on social costs and benefits calculated by government. The private cost of schooling includes the individual's forgone earnings during the education period and tuition fees paid by the individual, while all the

facilities and other human costs such as the teachers' time provided by society and the government are counted in the social cost of education.

The economic relationship between investment in, and return to, education is generally presented using the internal rate of return. The internal rate of return to human capital is defined as the discount rate at which the cost of investment is equal to the present value of the income stream yielded by the investment.

The calculation of the private rate of return to education only considers the private costs and the future money income received by an investor. However, externalities have to be considered when estimating the social rate of return to education. These externalities include factors such as the observation that children of more educated parents receiving more preschool education in the home and more guidance and encouragement in the later school years. In addition, education apparently reduces the propensity to engage in crime. These externalities are mostly positive, implying that they will increase the social rate of return to education.

The cost of on-the-job training needs to be analysed from the perspective of both the employee and employer. From the employee's point of view, the cost of on-the-job training is said to be the opportunity cost of training, which is the difference between the employee's alternative earnings and current earnings. On the other hand, the "teaching" provided by more senior employees and the equipment and materials used are included in the cost from the employer's point of view, in the sense that they could have been used in producing current output if they were not being used to raise future output.

Evaluating the rate of return to on-the-job training is much more complicated than the case of formal education. If a firm's wage and marginal product represent the cost of, and the return to, on-the-job training, respectively, the internal rate of return approach requires the present value of the marginal product stream to equal the present value of the wage stream. This can be written as (Becker, 1962):

$$\sum_{t=0}^{n-1} \frac{R_t}{(1+r)^{t+1}} = \sum_{t=0}^{n-1} \frac{E_t}{(1+r)^{t+1}} \qquad (1)$$

where R_t represents the return to on-the-job training,
E_t represents the cost of on-the-job training,
n is the number of periods,
r is the internal rate of return.

Assuming training is given only during the initial period, the cost of training in the initial period would equal wages plus the outlay on the training, and the cost in the other periods would equal wages alone. The returns during each period would equal the marginal products. In this case, equation (1) becomes:

$$MP_0 + \sum_{t=1}^{n-1} \frac{MP_t}{(1+r)^t} = W_0 + K + \sum_{t=1}^{n-1} \frac{W_t}{(1+r)^t} \qquad (2)$$

where K represents the firm's outlay on training,
MP_0 is the actual marginal product in the initial period,
W_0 is the trainee's wage earned in the initial period.

Equation (2) can also be written as:

$$MP_0+G=W_0+K \qquad (3)$$

where $$G = \sum_{t=1}^{n-1} \frac{MP_t - W_t}{(1+r)^t}.$$

G is the excess of future receipts over future outlays. It measures the return to the firm from providing training.

If the opportunity cost is considered, equation (3) becomes:

$$MP_0'+G=W_0+C \qquad (4)$$

where MP_0' is the trainee's alternative marginal product,
$MP_0'-MP_0$ is the opportunity cost of the trainee,
$C=K+(MP_0'-MP_0)$, is the total cost of training.

There are two kinds of training, general training and firm-specific training. Completely general training produces a portable skill and the marginal product would rise by the same extent even if the worker changed firms. In a competitive labour

market, wage rates would rise by exactly the same amount as the marginal product. Therefore, as trainees may quit after training, the firm which provides general training may not be able to capture any of the return. In this case the firm would provide the general training only if they did not have to pay any of the cost. The cost of this kind of training will be borne entirely by the trainees.

In the case of general training, the wages and marginal productivity are raised by the same amount in the future competitive labour market, which implies $MP_t=W_t$, so that:

$$G=\sum_{t=1}^{n-1}\frac{MP_t-W_t}{(1+r)^t}=0$$

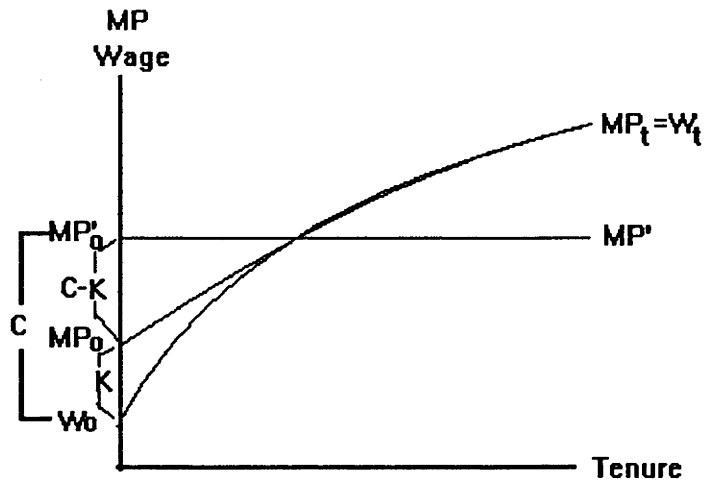
Therefore equation (4) becomes:

$$MP_0'=W_0+C$$

and because $C=(MP_0'-MP_0)+K$, then $W_0=MP_0-K$, which implies employees would pay for general training by receiving wages below their current productivity.

The cost of, and return to, general training are presented in Figure 4.1.

Figure 4.1
Cost of and return to general training



In Figure 4.1 C is the total cost of training, K is firm's outlay and C-K is the employee's forgone earnings.

Completely firm-specific skills can only increase a trainee's future marginal

productivity in the firm providing the training. If the cost of the specific training is borne by the trainee, he/she may not be able to capture the return to the investment because at any time during his/her tenure, the firm is free to dismiss him/her, and the firm-specific skill he/she gained from the specific training is useless in terms of increasing his/her marginal productivity in other firms. Accordingly, it might seem that the cost of this type of training should be borne by the firm. However, if a firm paid for the specific training of an employee who quit to take another job, the firm would suffer a loss in terms of not being able to capture further return. Because of this possibility, Becker concluded that the firm will shift some training costs as well as returns to employees.

In the case of specific training, an employee's future increase in marginal productivity will not be equal to the increase in his/her wage ($MP_t > W_t$), so that the present value of the return from training collected by the firm will be positive (that is, $G>0$).

Assume G' measures the return collected by employees and G'' measures the total return ($G''=G'+G$), and let α be the fraction of the total return collected by the firm. Then the following relation will hold:

$$G = \alpha G''$$

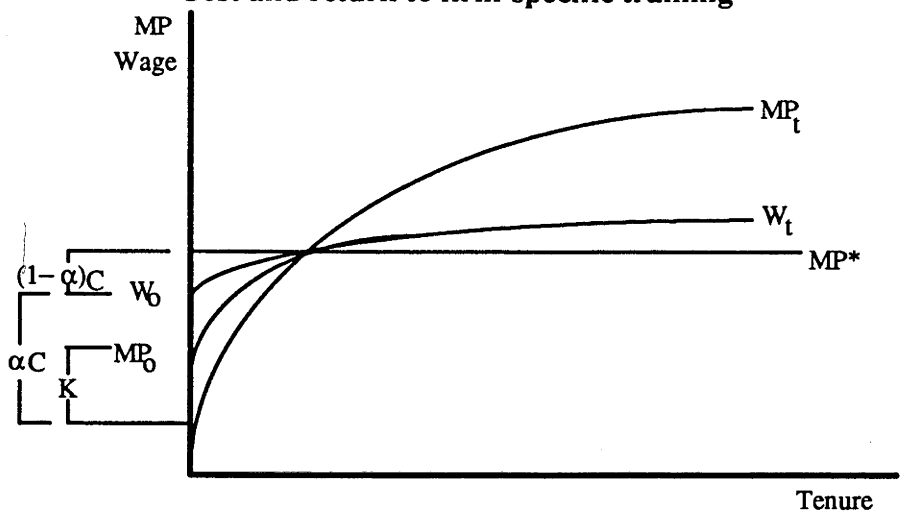
Since $G''=C$, equation (4) becomes:

$$MP_0' + \alpha C = W_0 + C$$

and so $$W_0 = MP_0' - (1-\alpha)C$$

This implies the employee pays a fraction $(1-\alpha)$ of the cost and gets the same fraction $(1-\alpha)$ of the return. (A formal version of Becker's model about the investment in, and return to, firm-specific training can be found in Hashimoto, 1981, where it is called an investment and benefit sharing model). Figure 4.2 presents the analysis for firm-specific training.

Figure 4.2
Cost and return to firm-specific training



In Figure 4.2 *(1-α)C* is the part of training cost borne by the employee and *αC* is the part borne by the firm. From the firm's perspective, the cost of the firm-specific training is divided into a wage in excess of the marginal productivity during training period component, W_0-MP_0, and the additional cost of training (firm's outlay) component, *K*.

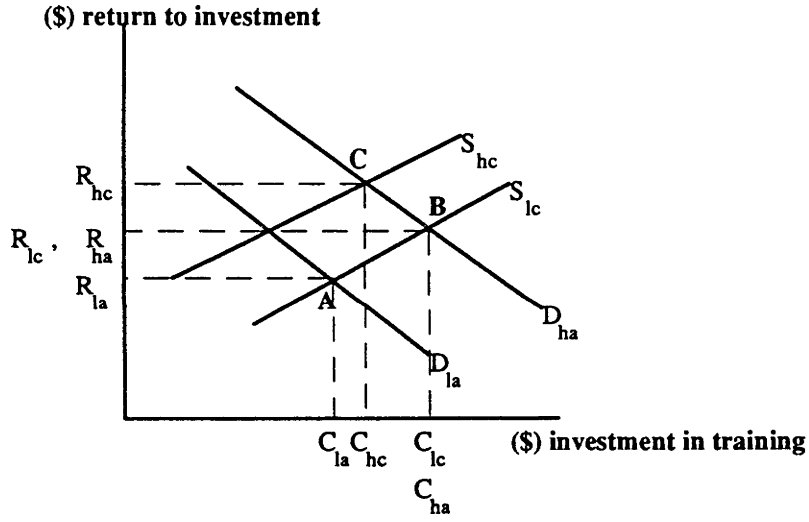
In the education market, the private rate of return is the key factor in determining an individual's demand for education, and the supply of training depends on a calculation of social costs and benefits. In the on-the-job training market things are slightly different. The demand for general training depends entirely on the trainee's decision because the total cost of general training is borne by trainees. The demand for specific training depends on both employee's and employer's decisions due to the fact that the total cost of training is shared between them. The supply of on-the-job training depends on the employer's own decision which is made according to how many trained people the firm requires. However, in a real market situation, each individual makes different decisions about how much human capital it is worthwhile to acquire.

What are the factors which account for different levels of human capital investment? Human capital economists explain these factors by using demand and supply analysis. Individuals choose to invest in human capital at different levels because their demand

for and supply of human capital differs.

The main factor which influences differences in individual human capital demand curves is individual ability. The more trainable a person, the higher the rate of return to his/her investment in human capital and therefore the further to the right is his/her demand curve for human capital. The most important factor which affects the position of an investor's supply curve is access to capital in order to finance educational costs. The poorer a person or his/her family, the higher is the cost of any given level of training. According to Becker (1964) this relationship can be presented as Figure 4.3.

Figure 4.3.
Demand and supply for human capital



(1) Assume two individuals have the same supply curve, say S_{lc}, but different demand curves; one with higher ability (D_{ha}) and the other with lower ability (D_{la}). In this case the equilibrium point for the person with higher ability is *B* and for the one with lower ability it is *A*. This means the person with higher ability will invest more in human capital than the person with lower ability (C_{ha} as compared with C_{la}) so that the rate of return to their investment will be different (R_{ha} as compared with R_{la}).

(2) Consider, on the other hand, two persons with the same ability (same demand curve, say D_{ha}) but different financial situations. The cost of training for the person

with a good financial background will be lower than for the person who has a relatively poor financial situation. Therefore, the supply curves for these individuals are different, say for the former, it is S_{lc} and for the latter, S_{hc}. Therefore, the equilibrium point of investment for the former is B, while for the latter it is C. That means the former will invest more (C_{lc} as compared with C_{hc}) but earn less than the latter (R_{lc} as compared with R_{hc}) because the cost is lower than for the latter.

(3) If supply and demand are positively correlated the result will be that the more ability and the more financial opportunities a person has, the greater the potential for earnings.

Functional form of the earnings and human capital relationship

Mincer is the pioneer who integrated the theories of human capital and income distribution (1958, 1974)[1]. The functional form of the relationship between earnings and human capital developed by Mincer is that the logarithm of earnings is a linear function of years of schooling (S) and a quadratic function of work experience (X), that is:

$$lnY_t=a_1+a_2S_t+a_3X_t+a_4X_t^2+U_t \quad (5)$$

where Y_t is earnings at age t,
S_t is schooling,
X_t is labour market experience,
U_t is a stochastic error.

This functional form initially comes from the definition of the present value of earnings for a person with S years of schooling, which is:

[1] The equation of the form "*log Earnings=α(0)+α(1)Schooling*" was first published in Becker and Chiswick's "*Education and the Distribution of Earnings*" (1966).

$$V_S = \int_S^L E_t e^{-rt} dt \qquad (6)$$

where E_t is earnings,
L is the age of retirement,
r is the discount rate.

Assume that a person with S years of schooling will earn a constant income E_s. Then from (6) we get[2]:

$$\frac{E_S}{r}(e^{-rS} - e^{-rL}) = V \qquad (7)$$

Assume that the number of years spent at work, N, is independent of the number of years spent in school. That is:

$$L=N+S \qquad (8)$$

Then equation (8) may be substituted into (7) to yield:

$$\frac{E_S}{r}e^{-rS}(1-e^{-rN}) = V = \frac{E_0}{r}(1-e^{-rN})$$

or $E_S=E_0e^{rS}$

so that $lnE_S=lnE_0+rS \qquad (9)$

If post-school training is taken into consideration, the model will be more complicated. Assume:

E_t=potential earnings at age t,

Y_t=actual earnings at t,

C_t=human capital investment in on-the-job training at t,

K_t=investment ratio at age t, or $K_t=C_t/E_t$.

and assuming the rate of return to on-the-job training is constant r_{tr}, then:

$$E_t=E_{t-1}+r_{tr}C_{t-1}=E_{t-1}(1+r_{tr}K_{t-1})$$

Solving this equation recursively yields:

$$E_t = E_S \prod_{i=S+1}^{t-1}(1+r_{tr}K_i)$$

So,

---

[2] This derivation draws upon Blinder (1976).

$$\ln E_t = \ln E_S + \sum_{i=S+1}^{t-1} \ln(1 + r_{tr} K_i) \qquad (10)$$

Substituting (9) into (10) and for small $r_{tr}K_i$, we get:

$$\ln E_t = \ln E_0 + rS + r_{tr} \sum_{i=S+1}^{t-1} K_i$$

This can be transformed to:

$$\ln E_t = \ln E_0 + rS + r_{tr} \int_0^X K(\tau)\, d\tau \qquad (11)$$

where X is the measure of time spent at work since the end of schooling.

Equation (11) is not estimable. Mincer (1974), Ben-Porath (1967) and Becker (1967) proposed that the ratio of investment in human capital during the post-schooling investment period must decrease with years of work experience. They specified different functional forms for the relationship between years of labour market experience and the investment ratio of on-the-job training K(t). In this brief overview only Mincer's (1974) linear specification is reviewed, which is:

$$K(t)=K_0(1-t/T) \qquad (12)$$

Substituting (12) into (11), and integrating gives:

$$\ln E_t=\ln E_0+rS+r_{tr}K_0X-(r_{tr}k_0/2T)X^2 \qquad (13)$$

Recalling that E_t is potential earnings and that actual earnings is defined as:

$$Y_t=E_t(1-K_t)$$

then $$\ln Y_t=\ln E_t+\ln(1-K_t) \qquad (14)$$

Substituting (12) and (13) into (14) yields:

$$\ln Y_t=\ln E_0+rS+r_{tr}K_0X-(r_tK_0/2T)X^2+\ln[1-K_0-(K_0/T)X]$$

Mincer further assumed that $f(X)=\ln[1-K_0+(K_0/T)X]$ can be approximated by a second-order Taylor series expansion, which enables him to write:

$$\ln Y_t = a_1 + a_2 S_t + a_3 X_t + a_4 X_t^2 + U_t \qquad (15)$$

An extension of the human capital model: occupational choice

The human capital model views the individual as an optimiser who invests in his/her

human capital so as to maximize his/her net present value of income. This theory has been extended to explain an individual's occupational choice (Stigler and Blank, 1957; Fleisher and Kniesner, 1980; Brown, Moon and Zoloth, 1980).

The basic idea of the occupational choice model is that individuals will compute the net present value of income from each occupation and choose the occupation with the highest net present value. This model is discussed further in Chapter 6.

4.2 Debates Concerning the Human Capital Theory

In the literature, there are a number of debates about human capital theory. It is worth noting that some of them are concerned this study.

The proxy for work experience

By assuming that during schooling no time is spent in the employed labour force, and that after schooling all time is spent in the employed labour force, Mincer(1974) defined the proxy for work experience as:

$$j=A-S-5$$

where A is age,
S is years of schooling,
5 is pre-school age.

However, he recognised that using j as an experience proxy for females is hazardous. The reason for this is that for married females, the assumption about continuity of work experience after schooling is probably not true. Blinder points out that

> *Even if attention is restricted to women who have never married, ..., the problem remains if females either (a) suffer more unemployment, (b) have lower labour force participation, or (c) work fewer hours when employed than do males.(1976: pp. 14)*

Blinder worked out how the regression estimates could be biased in Mincer's equation if j is used as a proxy for experience in inappropriate circumstances. He denoted the

discrepancy between real experience X and j by e, so that

$$j=X+e$$

In Mincer's equation the measurement error attaches to two of the regressors, j and j^2. Moreover, each e is non-negative, so the mean error is positive. If only schooling and j appeared in the regression, Blinder expected the coefficient of j would be biased downward, so the coefficient for schooling would be biased upward.

Blinder (1973) used age as a proxy for experience instead of j, and this was criticised by Rosenzweig and Morgan (1976). They showed how Blinder's specification ($lnY=b_0+b_1S+b_2A+b_3A^2+u$) could result in a downward bias in the estimated return to schooling for the total observations (both males and females together). They defined age as:

$$A=S+5+j$$

and substituted this into Blinder's equation:

$$lnY=b_0+b_1S+b_2(5+S+j)+b_3(5+S+j)^2$$
$$=b_0+[b_1+b_2+(10+2j+S)b_3]S+[b_2+(10+2S)b_3]j+b_3j^2$$

We can see from the above equation that the true schooling coefficient is equal to $[b_1+b_2+(10+2j+S)b_3]$ where b_1 and b_2 are positive and b_3 is negative. Thus the larger the j and the higher the average level of schooling, the less the magnitude of the underestimation.

Education as a screening device

The conventional view of the positive correlation between education and earnings is that schooling enhances earnings through increases in an individual's labour productivity. In the early 1970s a new theoretical argument emerged suggesting that schooling may serve to identify those individuals who are more productive in the market, which determines the individual's job assignment; in turn the individual's occupational level determines earnings. The extreme form of the screening hypothesis

is that an individual's productivity is unaffected by the formal schooling process (Wolpin, 1977). And, therefore, the rate of return to schooling is only informationally based.

The formal presentation of this screening model was first developed by Spence (1973) and Stiglitz (1975). The basic assumptions of this model are: (1) there is imperfect information on an individual's productivity in the market; (2) firms are risk neutral and act competitively; (3) it is prohibitively costly to identify each individual's productivity within a work group (Stiglitz, 1975).

Under these circumstances, it is worthwhile to label an individual's labour productivity. From the employers' point of view,

> *if individuals differ in their capabilities according to the jobs they perform, and if substitution of labour is imperfect between jobs, firms would maximise output only by some non-arbitrary assignment of workers to jobs. Aggregate output is therefore larger if workers can be identified and 'assigned' to their most productive use (Wolpin, 1977: pp. 949).*

From the employees' point of view,

> *Individuals who can be labelled as 'more productive' are able thereby to obtain a higher wage, ... Thus, by its very nature, screening information has important effects on the distribution of income (Stiglitz, 1975: pp.283).*

Both human capital and screening hypotheses suggest there will be a positive relationship between education and earnings. Because of the common nature of their predictions, it is difficult to disentangle the hypotheses empirically. In other words, if one detects positive a relationship between education and earnings, it is hard to know if it is the effect of education enhancing labour productivity and productivity being rewarded, or the effect of more inherently capable people having experienced higher education and education being rewarded. While various tests have been proposed in the literature for distinguishing between the impacts of human capital and screening (Miller and Volker, 1984; Wolpin, 1977) the results of applications of these tests have

been inconclusive.

The age-earnings profile: efficiency wage model

Many empirical studies have reported a quadratic shape for the age-earnings profile consistent with the theoretical model proposed by Mincer (1974). The conventional human capital theory explains that this phenomenon is associated with the accumulation of human capital year by year along with labour market experience. The wage change through time depends on the change of life-cycle labour productivity.

More recent theoretical work has sought to explain the quadratic life-cycle wage growth without appealing to life-cycle productivity growth. The most challenging alternative to human capital theory is efficiency wage theory. Within the efficiency wage theory there are two hypotheses which challenge the productivity hypothesis and hence, the human capital hypothesis. One of these is the incentive hypothesis and the other is the labour turnover hypothesis.

Lazear developed the incentive hypothesis in the late 1970s and early 1980s.

> *Even in the absence of on-the-job training or skill acquisition, upward sloping age-earnings profiles are prevalent.... This results because holding out payments until later in the individual's lifetime alters the worker's incentives to reduce his effort on the job (Lazear, 1979: pp. 606).*

The basic logic of Lazear's model presented in his 1981 paper can be simplified as follows:

(1) The cost of monitoring is a positive function of the effort provided by employees.

(2) Effort has a negative effect on the employee's utility (U) but a positive effect on the wage.

(3) Capital markets are perfect and there is complete information so that an employee

is indifferent between a wage path which offers him/her a spot wage according to his/her spot productivity, and one which pays less than the value of marginal productivity (*VMP*) initially and more than the *VMP* later on until time T (the time for retirement), so long as the total present value of his wage stream is equal to the total present value of his/her *VMP* stream.

(4) Since $dU/de<0$ (e is effort provided by the employee), employees have an incentive to shirk. However, if shirking is detected, it will result in immediate dismissal. Therefore, the steeper the age-earnings profile, which implies the higher the employee's different payment compared with his/her *VMP*, the greater the cost of shirking.

(5) Since the firm pays the employee more than his/her *VMP* when he/she is senior, the firm would also seek to terminate the labour contract before time *T*. If it did so, however, the firm would lose its reputation for honesty. Without honesty, no one would sign a contract with the firm. The flatter the age-earnings profile, the lower the possibility of the firm being dishonest because the gain from terminating the labour contract is less than the cost of it.

(6) The steeper profile increases employee's effort provision but decreases the firm's honesty. Therefore, there will be an optimal profile which maximises the worker's expected lifetime earnings, expressed formally as:

$$\int_0^T \left\{W(t)-e^{rt}[f(t)+g(t)]\times\int_t^T[W(\tau)-W'(\tau)]e^{-r\tau}d\tau+f(t)\theta_t(t)\right\}e^{-rt}dt$$

subject to the constraint that the expected present value of lifetime marginal product equals the expected value of wages paid out.

(7) The competitive firm would choose the optimal upward sloping age-earnings path which discourages employees from shirking and ensures that firms earn zero profit. Lazear concluded that the important point is that the optimal paths are upward sloping, even though there is no on-the-job training and no rising *VMP* schedule.

(8) Since the upward sloping age-earnings profile is only a way through which employees are encouraged not to shirk, piece rate or self-employment, which itself embodies perfect monitoring, will have a flatter profile than time rate work.

Comparing Lazear's model and the standard human capital model, a similarity is observed: in both models, employees are not paid according to their spot *VMP*. However, as pointed out by Lazear, the explanations of this quadratic profile provided by the two models are totally different. For the specific human capital model, no matter how large the difference between the employee's spot *VMP* and earnings, the two will be positively correlated over a life time. For the Lazear model, however, the correlation between productivity and wage over the life cycle is zero.

In the efficiency wage school there is another hypothesis which explains the quadratic tenure-earnings profile. The self-selection, or labour turnover hypothesis, was developed by Salop and Salop (1976). Their basic idea is expressed as follow:

> *The firm discourages high turnover individuals from applying and encourages low turnover workers to apply for employment by predictably increasing an employee's wage with his tenure at the firm. (Salop and Salop,1976: pp. 620)*

The assumptions of the model are:

(1) There are positive turnover costs to firms in a perfectly competitive labour market.

(2) Individuals are identical in every respect, except that they differ exogenously in their probabilities of quitting, so that there is an incentive for firms to seek out and hire slow quitters.

(3) Workers are indifferent among all firms paying the competitive wage.

(4) Labour supply is perfectly inelastic.

(5) There is L amount of labour supply and n firms in the market, and each firm can hire its desired labour force at the going wage rate w. In addition, each firm trains its new workers, and incurs expenses of T per new employee.

(6) The proportion α of L workers have probability of q_s of quitting each period, and the rest, the proportion of $(1-\alpha)$, have a larger probability $q_f > q_s$ of quitting. Consequently the average quit rate is:

$$\bar{q} = \alpha q_s + (1-\alpha) q_f$$

In this model, the firm maximizes profits by choosing that work force for which the present discounted values of the expected marginal cost and marginal revenue product per worker are equal. The firm's expected present value of total costs are:

$$TC_{pdv} = \frac{wL}{r} + \frac{(r+\bar{q})TL}{r}$$

where r is the internal rate of return to human capital, TL is the firm's total training cost, and the subscript *pdv* stands for the present discounted value.

Because of the perfectly competitive market condition, a firm has only one way to raise its profits, and that is to employ those who have lower quit rates; this decreases its turnover cost (perfectly inelastic labour supply and the exogenous quit rate ensures that firms that can attract low turnover rate workers gain from it). Therefore, the firm's objective is to find a way to attract those workers with a lower quit rate so as to minimise the firm's turnover cost.

Salop and Salop designed a self-selection system (called a Two-Part Wage system, *TPW*) by which the firm can reach its objective. Under this system the new employee pays the firm an entrance fee of D_1, in return for which he/she receives wages of w^*+D_2 during his/her tenure with the firm (where w^* is the market wage rate). The tenure earnings profile for *TPW*, therefore, is steeper than for the normal market case.

By setting D_1 and D_2, the firm can encourage slow quitters to apply, and discourage fast quitters from applying. This strategy will reduce the firm's turnover cost and increase its profit.

The optimal D_1 and D_2 are derived in the following way: let q represent the quit-probability for a risk-neutral worker, and $E(q)$ represents his present value of net gain

from *TPW*. Then,

$$E(q) = -D_1 + \frac{D_2}{1+r} + \frac{(1-q)D_2}{(1+r)^2} + \frac{(1-q)^2 D_2}{(1+r)^3} + \ldots,$$

which can be reduced to: $E(q) = -D_1 + D_2(\frac{1}{r+q})$

In this case, the employee would be indifferent between a steeper and a normal profile if $E(q)=0$, which implies:

$$\frac{D_1}{D_2} = \frac{1}{r+q}$$

However, if $E(q)>0$ (which implies $D_1/D_2>1/(r+q)$), the employee would prefer the steep profile, while if $E(q)<0$, he/she would prefer a flat profile.

Therefore, if the firm sets D_1/D_2 so that

$$1/(r+q_f)<D_1/D_2<1/(r+q_s,)$$

the slow quitter would prefer the steeper profile and so apply at the firm, and the fast quitter would prefer the flat profile and so stay with the other firms (carrying on at the wage rate of w^*). Even if the firm sets $D_1/D_2=1/(r+q_s)$, making the slow quitters indifferent between the steep and the flat profiles, the fast quitters won't apply to the firm with a steep profile. Then the firm's average quit rate will be lower than the market average quit rate q, and the turnover cost will be lower than the market average cost.

As with the incentive hypothesis, the self-selection hypothesis is not concerned with the impact of on-the-job training and changes in the marginal productivity of labour on changes in earnings when it implicitly explains the steep tenure-earnings profile. However, its basic assumption of a positive turnover cost implies that there are some positive firm-specific training costs borne by the firm at the beginning of employment. This is because the main component of the turnover cost is the training costs.

4.3 Neo-Classical Theory of Wage Discrimination

The gender wage differential is a big issue for the TVP wage determination. It is of interest to explain this differential in this study. The following review provides a theoretical framework for the analysis.

Wage discrimination is defined as the wage difference which is caused by the personal characteristics of the worker that are unrelated to his/her productivity.

In general, there are four sources of discrimination: (1) personal taste; (2) imperfect information; (3) monopsony power; and (4) crowding.

Personal taste

A neo-classical theoretical analysis of wage discrimination may be conducted under the assumption of perfect or imperfect competition. The theory of wage discrimination under perfect competition has been fully developed by Becker (1957) and Arrow (1972, 1973).

Becker (1957) analysed discrimination based on personal taste. He writes that:

> *money, commonly used as a measuring rod, will also serve as a measure of discrimination. If an individual has a 'taste for discrimination,' he must act as if he were willing to pay something, either directly or in the form of a reduced income, to be associated with some persons instead of others. When actual discrimination occurs, he must, in fact, either pay or forfeit income for this privilege (1957: pp. 6).*

Three economic agents who discriminate against some definable group of employees were considered. They are employers, employees and consumers. This review will only consider the case of employer discrimination as it is more relevant to the TVP sector.

In the case of discrimination by employers, some employers may have a special taste or dislike for some employees with a particular characteristic, say females.

Discrimination would cause the wage rate for female employees to be lower than the wage rate for males. Becker derived the market discrimination coefficient (MDC) between the discriminated and non-discriminated groups as the proportional difference between their wage rates:

$$MDC = \frac{W_m - W_f}{W_f}$$

where W_m and W_f represent the equilibrium wage rates of men and women, respectively.

Arrow (1973) further developed Becker's model by considering an employer who seeks to maximise utility instead of profit. The assumptions used in his model are as follows[3]: (1) All firms possess identical utility $u(\pi, M, F)$ and production functions. (2) Males and females are perfect substitutes. (3) Supplies of males and females are perfectly inelastic. (4) The economy is in a short-run situation in which capital is given, so that output is a function of employment, i.e. $f(M+F)$, where M and F are the supply of male and female employees, respectively. (5) The price of output is normalised to unity.

Under these assumptions Arrow derived the firm's profit function as:

$$\pi = f(M+F) - W_m M - W_f F \qquad (1)$$

We can assume the employer equates the marginal productivity of each type of labour to the perceived price of labour. But the perceived price of labour is defined as the market price of labour W_f and W_m, plus the price the employer is willing to pay, in terms of reduction in profits, for increasing or reducing male or female labour supply. The second term is the marginal rate of substitution of profits for male or female labour, and is equivalent to Becker's term of the 'discrimination coefficient'. It is defined as d_m for males and d_f for females. Accordingly:

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[3] The summary of Arrow's assumptions presented here is drawn heavily from Millward, Sumner and Zis (1985).

$$MP_m = W_m + d_m \qquad (2)$$
$$MP_f = W_f + d_f \qquad (3)$$

where $d_m<=0$ and $d_f>0$. According to the perfect substitution assumption, $MP_m=MP_f=MP_L$. Then, from (2) and (3)

$$W_m - W_f = d_f - d_m > 0 \qquad (4)$$

which means that at the equilibrium, the wage rate for males exceeds the wage rate for females. And from (1) to (3),

$$\pi = f(L) - MP_L L + d_m M + d_f F \qquad (5)$$

where $L=M+F$. If there were no discrimination,

$$\pi_0 = f(L) - MP_L L,$$

Therefore, the change in profits is

$$\pi - \pi_0 = d_m M - d_f F \qquad (6)$$

By assuming:

$$d_m M - d_f F = 0, \qquad (7)$$

Arrow concluded that the entire effect of discrimination is that of a transfer from F to M (women are paid less than their marginal productivity and men are paid more).

By relaxing the assumption that utility functions are identical among firms, and following equations (4) and (7), the following relations can be shown to hold:

$$\frac{M}{L} = \frac{d_f}{(W_m - W_f)} \qquad \textit{and} \qquad \frac{F}{L} = \frac{-d_m}{(W_m - W_f)}$$

If we consider the facts that $d_f>0$, $d_m<=0$, and $W_m>W_f$, then from the above relations it is obvious that firms with the highest values of d_f have the highest ratios of M to L. Therefore, the conclusion is

> *Discrimination is costly to the entrepreneur and acts as a tax on him, since it shifts his demand for labour to the more costly component. Hence, it restricts his scale (Arrow, 1973: pp. 9).*

Therefore, competition tends to reduce the degree of discrimination in the market. In the long run, only the least discriminatory firms survive. Unless there is universal discrimination, discrimination that derives from employers' personal prejudice cannot

exist in the long-run under perfect competition.

Imperfect information

The theory of discrimination caused by imperfect information was developed by McCall (1972, 1973), Phelps (1972), and Arrow (1972, 1973). This kind of discrimination "can be thought of as reflecting not tastes but perception of reality" (Arrow, 1972: pp. 23). It occurs when employers do not have enough information about an individual's productivity. Consequently, they use personal characteristics as a productivity screening device on the basis of their pre-conceived idea that, say, female workers have lower productivity than male workers. There are three pre-conditions for this kind of discrimination to exist: (1) The cost of information used as a source for distinguishing different types of labour is reasonably low, such as sex or race; (2) The cost of information for determining the employee's true productivity is higher than the cost of the screening device; (3) The employer must have some pre-conception about the distribution of productivity within each of the different types of worker groups.

Even under these assumptions, in the long-run the employer will observe each employee's productivity on the job, and the employee's wage will be adjusted to reflect his/her actual productivity, and therefore the wage difference between the male and female groups of workers due to non-productivity reasons will disappear.

To sum up the above review, one might conclude that the personal taste and imperfect information hypotheses cannot explain large, persistent wage discrimination under conditions of perfect competition.

Imperfect competition

The way to explain persistent wage discrimination is imperfect competition. When monopoly exists in the product market, and monopolistic employers have a special

taste for some groups of employees, long-run wage discrimination may exist. The main point is the removal of the force of competition. However, if monopolies with special tastes do not exist in all product markets in an economy, then the final outcome will be segregation of the workforce rather than discrimination.

Along with the development of models of discrimination under conditions of perfect competition, neo-classical theory developed a model of monopsonistic discrimination (Robinson, 1934; Krueger, 1963; Madden, 1975; Gordon and Morton, 1974; and Cardwell and Rosenzweig, 1980).

Following Madden (1975), the basic assumptions of the model are:

(1) Monopsony power exists. That is, the buyer faces an upward sloping supply curve. This means his/her buying decision significantly affects the level of market demand and labour is not supplied at constant cost or wages.

(2) Labour supply can be separated into different labour pools.

(3) The separated labour pools have different wage elasticities of supply.

Under these assumptions, the monopsonistic model of discrimination can be specified as follows. Assume the production function for the monopsonistic firm is:

$$Q = f(F, M) \qquad (8)$$

where Q is the firm's output, and F and M are, respectively, the female and male labour forces employed in the firm. The labour supply functions for females and males are:

$$F = h(W_f) \qquad (9)$$
$$M = h(W_m) \qquad (10)$$

where W_f and W_m are the female wage and male wage, respectively.

The discriminating monopsonistic employer will equate the marginal rate of technical substitution between F and M with the ratio of the marginal costs of hiring F and M, which is expressed as:

$$\frac{\partial Q/\partial M}{\partial Q/\partial F} = \frac{W_m(1+1/\theta_m)}{W_f(1+1/\theta_f)} \qquad (11)$$

where θ_m and θ_f represent, respectively, the wage elasticities of male and female labour supplies. It is obvious from equation (11) that discrimination against women requires the condition of $\theta_m > \theta_f$.

The final way of explaining wage discrimination that is reviewed in this chapter focuses on imperfect labour mobility. In the literature it is called the "crowding hypothesis" (Zellner, 1972; Bergmann, 1971, 1974). The basic idea is that women or blacks are excluded from higher-paying occupations and are therefore crowded into other occupations, where the enforced abundance of supply lowers marginal productivity and hence wages. An interesting aspect of this hypothesis is that it ties together the elements of occupational segregation and wage discrimination. The importance of occupational segregation to the explanation of the gender pay gap in China's TVP sector is examined in Chapter 10.

4.4 Empirical evidence for the human capital model

Empirical evidence in some industrial and developing economies

The human capital model has been tested in many Western economies and the results show that both schooling and labour force experience are significant determinants of wages.

In the United States, schooling alone is typically found to explain about 6 or 7 per cent of the total variance in hourly earnings. When the effects of experience are added to the model, the proportion of the variance in earnings explained rises to about 30 pre cent. Adding in a variable for the number of weeks worked during the year increases the explanatory power to over 50 per cent (Mincer, 1970, 1974, 1976).

Similar results were found for many other industrial and developing economies.

George Psacharopoulos (1973, 1980, 1985) gives very detailed information in his review articles. The evidence presented in his 1985 paper can be summarised as follows:

(1) The rates of return to education for all 56 countries included in his study are positive;

(2) There is a pattern of declining rate of return by level of education in general. Primary education is the most profitable educational investment opportunity, followed by secondary education. Psacharopoulos explains this pattern as the result of the interaction between the low cost of primary education and the substantial productivity differential between primary school graduates and those who are illiterate.

(3) The rates of return for developing countries are normally higher than those for developed countries. Psacharopoulos suggests that this is a result of scarcity of human capital in developing countries.

(4) In all cases, the private rate of return is higher than the social rate of return because education is publicly subsidised in almost all countries.

(5) The returns in the private sector are higher than that in the public sector because of the equalisation policy implemented in the public sector in most countries.

(6) In developing countries the rate of return for women exceeds that for men. This may be explained by the fact that the labour force participation rate for educated women is much higher than for uneducated women.

(7) Rate-of-return estimates show relative stability over time which may be explained by the fact that the demand for educated manpower has kept increasing along with the supply of educated manpower.

One interesting aspect of the empirical studies is the different structures of return to

the general labour market experience and firm-specific skill found in Japan and the United States.

In the industrial economies there are two different employment systems: lifetime employment (normally represented by Japan[4]) and the so called flexible market employment system. According to the empirical evidence human capital variables, especially labour market skills, have different effects on wage determination in these employment systems. In the Japanese labour market, firm-specific tenure is especially significant in wage determination while in the United States general labour market experience is more important than firm-specific tenure (see Hashimoto and Raisian, 1985 and Mincer and Higuchi, 1988). When comparing the firm specific tenure-earnings profiles, the Japanese profile has a steeper slope than the United States profile.

The human capital theory's explanation of the above phenomenon is as follows (see Mincer and Higuchi, 1988):

(1) In the past decade Japan has had more rapid economic growth and technological change than in the United States. This has required greater and more continuous training and retraining.

(2) Because of the continuous investment in firm-specific skill, employers seek to hold their specialised employees to minimise training costs, and employees stay with the specific firm to maximise benefit from their specialised skill.

(3) Lifetime employment is an institution which enables both employer and employee

[4] There are some arguments which suggest that the lifetime employment system applies to only about 30 per cent of the male labour force, and employment tenure in small Japanese firms is very short. Therefore, the prevalence of lifetime employment in Japan is usually exaggerated. However, according to Hashimoto and Raisian (1985), the reality is contrary to the impression created by the literature. Their research concluded "long-term employment is more prevalent in Japan than in the United States. Also, earnings-tenure profiles are more steeply sloped in Japan than in the United States. Finally, employment tenure in small Japanese firms is not universally short as popular discussions suggest."

to maximise their benefit from firm-specific skill.

(4) A steep and quadratic tenure-earnings profile is a tool which ensures that lifetime employment exists.

From the above explanation, lifetime employment is an endogenous variable for the Japanese economy which is encouraged by the wage determination system.

Empirical evidence for China

There are two empirical studies available which apply the human capital model to Chinese wage determination.

Byron and Manaloto (1990) employed a human capital model as well as a production function approach to examine returns to education in China. Their data were taken from a survey of 800 adults in Nanjing city in Jiangsu province. The specification of the human capital model they used in their study is as follows:

$$lnY=b_0+b_1S+b_2E+b_3S^2+b_4(S\times E)+b_5E^2+u$$

where y is monthly income, S is years of schooling, E is experience, and $S\times E$ is a schooling-experience interaction variable. Apart from these independent variables, a female dummy was also included in their regression. They find: (1) there is an astonishingly low rate of return of income to education, about 4 per cent for each additional year of schooling; (2) experience is a more important variable than education; (3) females with the same qualifications and experience tend to be paid around 9 per cent less than males.

The results estimated from the production function are about the same as those presented above. In addition, they report that education and experience are highly substitutable.

Gelb (1990) analysed wage determination in China's TVP sector using models combining both human capital variables and characteristics of the firm in which

individuals worked. The data set used is the same as that analysed in this study. The results of his models are shown in Appendix A. The five models reported are: model 1 which uses only county dummies; model 2 which adds occupation dummies to the county dummies; model 3 adds ownership dummies, other firm characteristics, and age, sex, and days worked to the variables included in model 2; model 4 only contains 48 firm dummies; model 5 includes the individual variables and the firm dummies. The dependent variable is annual income.

In Gelb's study the most important findings for the human capital variables can be summarised as below:

(1) Occupational dummies have expected signs and are mostly significant determinants of an individual's wage level.

(2) Age, as a proxy for work experience, is a significant determinant of an individual's wage level. The estimated impact, however, is quite low (a 1 per cent increase in annual earnings for each additional year).

(3) Women in the TVP sector earn 14 per cent less than men.

(4) Education level does not seem to be a significant determinant of earnings, and in some cases the signs are opposite to that expected. As Gelb remarks:

> *The effect of adding the education dummy coefficients was more surprising. Most of the dummies are small and not significant, but those that are significant suggest that people with some college receive lower pay than would be expected on the basis of firm, sex, age, and occupation. This pattern is most unusual (1990: pp. 294).*

Gelb suggested that the unusual results pertaining to the education variables is a subject for further research.

4.5 A Model for Wage Determination in the TVP sector

The above theoretical and empirical review of the human capital model gives a

general idea about the way in which individual characteristics influence wage determination. The review suggests that the following factors should have an impact on an individual's wage: (1) education; (2) experience which includes general labour market experience and firm-specific experience; (3) gender; (4) occupation; and (5) family background.

The human capital model assumes that individuals maximise lifetime income and firms maximise profits. The theory is reinforced by the free choice of employers to choose workers and the free choice of employees to choose their employer. Labour mobility seems to be essential for the applicability of the model (otherwise the wage would not be equal to labour productivity).

As indicated in the previous Chapter there was very limited labour mobility in the TVP sector until 1985. Most workers were assigned to a firm and once employed could not easily leave. Nor could firms easily fire labour. However, in most instances firms could control individual wage determination. Under these circumstances the question naturally arises as to whether human capital theory applies. A concomitant question is whether the observed individual wage pattern in the TVP is similar to that of market economies. The rest of this section will focus on building a simplified model to present a framework for the subsequent analysis of these questions.

As mentioned in the previous section, there is a difference between the US labour market and Japanese labour market. Inter-firm labour mobility is quite frequent in the United States, while in Japan it is very limited. Japanese firms, however, can freely choose workers and there is no prohibition on the employee leaving the firm. In Japan it appears as though the wage determination system has evolved to keep workers with the firm, and it plays an important part in the lifetime tenure system. In China there is no need for the wage system to play this role. Workers are assigned to firms and in general they cannot leave to obtain another job. The wage system does not need to be designed to affect job tenure.

With these differences in mind, we sketch the key features of a different theoretical model compared with a standard flexible labour market model and the Japanese model to describe the situation of individual wage determination in the TVP sector.

Model 1: Flexible labour market model. This is the case of general skill training described by conventional human capital theory, where (1) there is no firm-specific skill involved in production; (2) there is full employment; (3) employers have free choice over their employment decision making and any employee who shirks will be fired; (4) employees have free choice on choosing employers, and if they are not paid by their labour productivity there are always better employment opportunities for them. Under these circumstances, employees have to be paid their spot labour productivity at least after their training period, otherwise they would quit (Becker, 1962).

Model 2: Japanese labour market model. In this case all the assumptions hold as described in the model 1, except for the first one. Here labour market skill involved in production is mostly firm-specific skill (see Becker, 1962 and Hashimoto, 1981). In this model employers and employees share costs and benefits of investment in firm-specific human capital. In other words, during the training period the wage paid to the employees will be higher than their labour productivity and lower than their alternative wage. During this period, the employees will not choose to quit and the employers will not fire them as they both will lose. After the training period, the employees will be paid higher than their alternative wage and lower than their labour productivity. Therefore, if employees choose to quit, the alternative wage they can get from the labour market will be lower than their current earnings, while if employers choose to fire employees they will lose the amount of return to their investment which is equal to employees' spot labour productivity in excess of the spot wage they earn (refer to Figure 4.2). Therefore, although both employer and employees are free to choose not to attach to each other, they both have greater incentive to develop a long-term employment relationship.

Model 3: The TVP labour market model. The TVP labour market model is based on the following assumptions: (1) the firm cannot freely hire or fire employees except when they provide zero effort; (2) the firm has a fixed amount of labour L which is assigned by the community; (3) the firm has wage setting power; (4) the firm's objective is profit maximisation[5]; (5) individuals are identical in terms of provision of effort, and each employee in the firm provides a certain amount of effort, e, where $e>0$. If $e \leq 0$, the firm is allowed to fire the employee. If employee is dismissed his/her alternative wage (agricultural wage) will be lower than the wage he/she obtained from the TVP firm[6]; (6) the firm takes the market price of capital r as given; (7) the opportunity costs for employees are far below their current wages.

Under these circumstances, employees will not choose to quit because the alternative earnings are below their current wages. On the other hand, the firm is rarely able to fire employees. The attachment of the firm and the employees is exogenous to the TVP labour market. Moreover, if the firm does not pay the employees fairly they will choose to shirk so long as $e>0$. However, if shirking is detected, their wage level will be decreased. Because of this, monitoring is extremely important for the TVP firms. That is why they normally choose piece rate payment when it is possible as it can be

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[5] 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.

[6] The question why TVP firms pay their employees more than what they could obtain from the agricultural sector is a major and important issue. It requires a specific study. However, this study simply takes it as given.
Some simple possible explanations, however, can be provided as follows. (1) Labour productivity in the TVP sector is higher than that in the agricultural sector. (2) If workers in the TVP sector are paid below their labour productivity they would choose to shirk. (3) There are searching costs incurred when an individual moves from the agricultural sector to the TVP sector. For example, to be able to be "assigned" to a TVP firm, one might have to have a good relationship with the community leaders, this could be costly either financially or psychologically.
One might ask the further question as why marginal productivity of labour in the agricultural sector is lower than in the TVP sector. There might be quite a few reasons. One possible explanation is that in the TVP sector (1) available capital is very scarce, (2) when technology is chosen there is limited substitution between capital and labour. In other word, at its extreme case, it is a fixed proportion of input substitution. Under this circumstance, the possibility of further decreasing marginal productivity of labour in the TVP sector or absorbing more labour from the agricultural sector to increase marginal productivity of labour in the agricultural sector is very limited.

seen as a perfect monitoring mechanism with the lowest cost.

The firm's problem, therefore, is to choose the wage level in order to encourage the employees not to shirk and to induce effort from the employees in order to maximise its profit. This problem can be written as:

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

where π is profit,
p is price of output,
w is wage rate,
e is effort provided by each individual,
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:

$$pf_e = w_e\bar{L} \qquad (2)^7$$

f_e is the partial derivative of f with respect to e or the marginal average product of effort, w_e is the partial derivative of w with respect to e or the marginal wage of effort. $w_e\bar{L}$ represents marginal average 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 value of marginal average product of effort is equal to the marginal average 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 encourage individuals not to shirk and to induce effort from each individual so as to maximise the firm's profit. Second, in order to do so, 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. Now, if the assumption of homogeneity of individuals with respect to their marginal productivity of effort is relaxed, it is obvious that individuals who provide different levels of effort will receive different wage rates. Then, if as believed, the individual's productivity can be

[7] For detailed derivation, see Appendix 4B.

increased by augmentation of human capital, individuals could expect to get the market rate of return to their investment in their 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) Because the employees are paid to the level of their labour productivity, the experience-earning profile should be similar to that of the standard flexible labour market model but not the Japanese labour market model. (3) 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 the TVP.

Although the human capital model is hypothesized to be applicable to the TVP sector, the cost of, and return to, on-the-job training should be considered differently from the conventional human capital theory with respect to both general training and firm-specific training. The reason for this is that in China's rural economy the labour productivity in the agricultural sector is so low that it is close to zero and any employment opportunity in the TVP sector will bring to a new employee a net gain. Thus, his/her forgone earnings will be zero or even negative (his/her previous earnings in the agricultural sector are lower than his/her earnings during the on-the-job training period). Hence, the only thing which accounts for the cost of on-the-job training should be the firm's outlay.

Then who will bear the cost of this outlay? According to Becker's analytical logic it should be the firm due to the virtual absence of employee turnover. However, because labour productivity in the TVP and the agricultural sector are so different, even if the firm pays employees lower than their labour productivity it will still be higher than their earnings in the agricultural sector. The difference between employees' labour

productivity and their wages can be the compensation for the firm's training outlay.

The TVP wage level is normally higher than earnings in the agricultural sector no matter whether it be in the developing or the developed regions. However, the required skill level in these firms is normally pretty low so the firms' outlays are not considerable. Therefore, employees in the TVP firms will be paid slightly lower than their marginal productivity of effort during the training period and approximately equal to their spot productivity afterwards. The wage-tenure profile for the TVP employees should be similar to what has been presented in Figure 4.1 (the general training case). In other words, this is the case of a flexible labour market, except that the wage profile might be flatter than that during the training period.

The above theoretical analysis suggests that although the labour market situation for the TVP sector is quite different from the flexible labour market case, in principal the human capital model should be applicable to individual wage determination in the TVP sector[8].

The following chapters are going to test this hypothesis to determine how these human capital variables affect individual wage determination in the TVP sector.

[8] Comparing the TVP wage determination model built here to Lazear's efficiency wage model, a basic difference is found. Firms in the efficiency wage model are allowed to fire employees so long as shirking is detected. In the TVP model firms are rarely able to dismiss employees.

Appendix 4A Alen Gelb's Regression Results

	Model				
	1	2	3	4	5
County:					
Jieshou	-0.55	-0.47	-0.23		
	(-11.9)	(-12.4)	(-4.3)		
Nanhai	0.29	0.14	0.22		
	(5.8)	(3.2)	(5.8)		
Shangrao	-0.7	-0.71	-0.37		
	(-12.1)	(-13.8)	(-5.6)		
Ownership:					
Township			-0.03		
			(-0.8)		
Town			0.15		
			(3.3)		
Village			0.04		
			(0.5)		
Production team			0.18		
			(2.5)		
Joint families			0.23		
			(3.3)		
Family			-0.19		
			(-1.4)		
Individual			0.29		
			(2.8)		
Firm:					
Work force			0.06		
			(2.1)		
Profitability			0.05		
			(3.5)		
Occupation:					
Shift or group leaders		0.19	0.08		0.11
		(3.5)	(1.7)		(2.7)
Operation personnel		0.25	0.1		0.2
		(3.8)	(1.7)		(4.1)
Technical personnel		0.33	0.16		0.18
		(5.6)	(3.1)		(4.0)
Ordinary staff		0.26	0.1		0.1
		(4.1)	(1.7)		(2.2)
Middle-level staff		0.45	0.28		0.30
		(7.1)	(5.1)		(6.3)
Apprentice		-0.32	-0.1		-0.26
		(-2.4)	(-0.9)		(-2.9)
Driver		0.74	0.42		0.49
		(1.5)	(1.0)		(1.3)
Age			0.01		0.01
			(7.0)		(4.8)
Sex			-0.14		-0.14
			(-5.0)		(-5.7)
Days worked			0.02		0.01
			(14.2)		(13.0)
R^2	0.3	0.34	0.52	0.57	0.70

Note: (1) Joint venture is the base for the ownership dummies. (2) Model 4 contains only 48 firm dummies, and model 5 contains 48 firm dummies and those individual variables represented in the table.

Appendix 4B

Derivation of the first order condition of TVP's profit maximization problem:

$$\frac{\partial \pi}{\partial w} = p\frac{\partial f}{\partial e(w)\bar{L}} \bullet \frac{\partial e}{\partial w}\bar{L} - \bar{L} = 0$$

$$\therefore \quad p\frac{\partial f}{\partial e(w)} \bullet \frac{\partial e}{\partial w} = \bar{L}$$

$$\therefore \quad pf_e = w_e\bar{L}$$

PART II

AN EMPIRICAL STUDY OF WAGE DETERMINATION IN THE TVP MALE LABOUR MARKET

The hypothetical model of the TVP wage determination developed in the previous chapter suggests that the human capital model should be applicable to the TVP sector. This part of the thesis gives an empirical test of the model by investigating the TVP male labour market.

The reasons for separating the male and female labour markets are as follows:

(1) Normally, according to the literature, there are some differences of wage determination patterns for male and female labour markets, such as discontinuity of female labour market experience, and a higher rate of return to education for females than for males.

(2) Females normally earn less than males. In the TVP sector the wage gap is about 20 per cent.

(3) Because of (1) and (2), the male and female labour markets are conventionally analyzed separately. This study will conduct a comparison of the TVP wage determination with other market economies. To ensure the comparability of the study, the convention has to be followed.

5

CAN INDIVIDUAL WAGES IN THE TVP SECTOR BE EXPLAINED BY HUMAN CAPITAL THEORY?

This chapter provides a general investigation of the applicability of the human capital model to the TVP male labour market. The chapter is structured as follows. The next section briefly describes the data and specifies the models to be used. Section 2 discusses the empirical results for the total male sample and some differences between the wage determination patterns for workers and staff. Section 3 analyses whether the TVP's wage determination pattern reflects a labour productivity effect by estimating the human capital model for the piece rate group and the time rate group separately. The conclusions are presented in Section 4.

5.1 The Data and Model Specification

Data

The data used to estimate the wage equations in this chapter are from the *Workers Survey Questionnaire* which was undertaken in 49 firms from the total of 121 sample firms. There are 1174 observations on individual employees, but due to missing values the sample has been reduced to 1060 observations. In this chapter the analysis is confined to male workers, a sample of between 400 and 529 depending on the exact set of variables chosen for analysis. Among the four regions, Wuxi is used as the base for the regional dummies.

As mentioned in Chapter 3, the sample includes township- and/or village-owned enterprises as well as a small number of privately-owned enterprises. The extent of

community (township or village) control varies by region and enterprise. The level of economic development of each region also differs. It will be interesting to see whether it is possible to establish general results from a sample covering such a diversity of political and economic environments and firm structures.

In this chapter only a subset of variables has been used. The more important are the classification of employees into workers and staff, the method of payment, (either piece rate or time rate payment), the individual characteristics of age and education, and a family variable for the number of children. Most of the data are measured in the usual way but some variables require comment.

Some of the work experience data are not directly available from the *Workers Survey Questionnaire*. Data exist for age, the length of employment in a given firm (firm-specific tenure) and the length of time spent working in non-agricultural jobs. Total experience variables are constructed by adopting Mincer's approach (Mincer, 1974) which is to measure total experience, j, by

$$j=A-S-7$$

where A is age, S the years of schooling and 7 is the number of years before schooling begins. Agricultural work experience is obtained by subtracting total non-agricultural work experience, which is available in the survey, from total experience. Other non-agricultural experience (non-agricultural experience outside the current job) is obtained by subtracting firm-specific tenure from the total length of job experience in the non-agricultural sector. Because the data quality is sometimes poor, negative values of other non-agricultural experience and agricultural experience are sometimes obtained. These observations are excluded from the regressions.

Schooling data are defined in 7 levels. Each level of education corresponds to the years of schooling indicated in Table 5.1:

Table 5.1
Years of schooling corresponding to education level

Level of education	Years of schooling
illiteracy	0
4 years primary	4
6 years primary	6
junior middle school	9
senior middle school	12
Television college	15
university and above	16

Statistical characteristics of the variables for the total male sample and for each of the four regions are shown in Table 5.2:

Table 5.2
Statistical characteristics of the variables

	Total		Wuxi		Jieshou		Nanhai		Shangrao	
variables	mean	S.D.	mean	S.D.	mean	S.D.	mean	S.D.	mean	S.D.
YW	1455	948.3	1660	749.2	907.5	407.7	2499	1447	852.3	266.5
DW	4.5	2.88	4.8	2.1	3.2	1.4	7.7	4.4	2.8	0.95
LDW	1.35	0.54	1.5	0.45	1.07	0.4	1.9	0.6	0.99	0.35
EDU	8.8	2.9	8.5	2.8	9.5	2.6	7.5	2.8	8.7	2.8
AGE	30.9	10	33.8	9.5	27.8	7.8	29.5	10.5	33.8	11.3
TEXP	15.2	10.6	18.3	10.0	11.3	8.3	15.1	11.5	18.7	12.8
OJ	9.4	9.6	12.1	9.7	6.9	7.6	9.3	9.9	9.5	9.3
FT	5.8	5.1	6.1	4.8	4.4	3.9	5.8	6.3	9.2	6.8
AEXP	5.6	7.5	7.6	7.7	3.9	6.0	6.2	8.7	5.2	5.9
ONAJ	3.9	6.6	4.5	7.1	3.0	5.1	3.1	5.4	4.3	6.6
NC	1.1	1.1	0.9	0.8	1.3	1.1	0.9	0.95	2.1	1.4

Note: YW is yearly wage; DW is daily wage; LDW is daily wage in log form; EDU is years of schooling; TEXP is total experience; FT is firm tenure; AEXP is agricultural experience; OJ is other labour market experience, excluding firm tenure; ONAJ is other non-agricultural experience; NC is number of children in the family. S.D. is standard deviation. Tables below will follow these notations

Model Specification

According to many applications of the human capital model the following factors have a significant impact on individual wage determination: (i) schooling, (ii) work experience, including general labour market and firm-specific skills, (iii) occupation and (iv) family background. The basic human capital model is defined as:

Model 1:

$$ln(w)=a+b_1S+b_2TEXP+b_3TEXP^2+b_4FT+b_5FT^2+b_6RE+u$$

where w is daily wage;
S is years of schooling;
$TEXP$ is total experience;
$TEXP^2$ is total experience squared;
FT is firm-specific tenure;
FT^2 is firm-specific tenure 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 less 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.

Models 3 and 4 test the impact of occupation and the number of children in the family.

5.2 General Empirical Results

Before analysing the empirical results it may be useful to compare the emphasis of the models specified in the previous section on schooling and experience to answers given to the question "what is the key variable for wage determination in your firm?" from the *Workers Survey Questionnaire* (Table 5.3). It is apparent that employees believe that there are four variables which matter most; job tenure in the firm, occupation, work volume and skill level. It is also suggested that an individual's relationship to the firm's leaders are not thought to be important variables. These

results seem *a priori* to be consistent with a human capital model, in that stress is placed on the role of on-the-job training and productivity. But it is interesting that education and age, which might be thought to approximate general experience, are not important. A significant part of this research will focus on the relationship between the employees' judgements and the estimated results that can be derived from the data.

Table 5.3
Key variables which affect wage differences in your firm (%):

	total	workers	staff
	n=1142	n=708	n=425
age	3.1	3.1	2.9
tenure	25.0	24.2	26.3
education	1.3	1.2	1.4
occupation	24.2	26.3	20.4
work volume	23.8	22.5	26.5
skill	20.2	19.4	21.1
relationship with the leaders	2.4	3.1	1.3

Results for all employees

The ordinary least squares (OLS) results of models 1 to 4 are shown in Appendix A. A diagnostic test shows that all the four models have a heteroscedasticity problem (see Breusch-Pagan test). This will lead to inefficiency and improper estimation of the covariance matrix. To correct for the heteroscedasticity, White's consistent estimator of the covariance matrix is used (Greene, 1990).

Apart from the heteroscedasticity problem, a certain degree of multicollinearity between total experience and firm tenure is detected for models 1, 3, and 4, where none of the coefficients for firm tenure is statistically significant at conventional levels. Either firm tenure can be deleted from the equation, without affecting the explanatory power, and then the experience coefficients generally become significant, or general experience can be deleted with firm tenure performing better. This phenomenon, together with the low t-statistics and high adjusted R^2 (see Appendix A),

suggests the problem of multicollinearity between the total experience and the firm tenure[1].

To overcome the problem of multicollinearity, the total experience variable is divided into firm tenure and other job experience. That is in models 1, 3, and 4, instead of using total experience and firm tenure, other job experience and firm tenure are used[2]. The results of the modified version of the models with corrections for both heteroscedasticity and multicollinearity are shown in Table 5.4.

[1] One of the approaches for correcting multicollinearity suggested by most econometric text books is to drop one of the problem variables. However, this solution is at a cost of a potential omitted variables bias. To avoid this cost I simply break the total experience variable into other job experience and firm tenure.

[2] Using other job experience instead of total experience reduced the sample size as for some observations other job experience is negative and these data are excluded from the regression.

Table 5.4
Corrected results of models 1-4

	models			
	1	2	3	4
	n=529	n=457	n=525	n=511
Constant	1.016	1.068	1.105	1.113
	(10.69)	(9.89)	(11.50)	(11.10)
Schooling	0.011	0.007	-0.002	-0.002
	(1.63)	(0.85)	(-0.25)	(-0.30)
Other job experience (OJ)				
OJ	0.029		0.025	0.025
	(5.48)		(4.76)	(4.53)
OJ^2	-0.0006		-0.0005	-0.0005
	(-3.83)		(-3.55)	(-3.42)
Firm tenure (FT)				
FT	0.028	0.032	0.021	0.022
	(2.80)	(2.91)	(2.21)	(2.21)
FT^2	-0.0007	-0.0009	-0.0007	-0.0007
	(1.93)	(-2.15)	(-1.85)	(-1.89)
Other non-agri. exp. (ONAJ)				
ONAJ		0.023		
		(3.76)		
$ONAJ^2$		-0.0005		
		(-2.91)		
Agri. experience (AEXP)				
AEXP		0.025		
		(3.18)		
$AEXP^2$		-0.0005		
		(-2.02)		
Occupational dummies:				
Shift leader			0.095	0.099
			(1.52)	(1.53)
Operational pers.			0.106	0.124
			(1.66)	(1.90)
Technical pers.			0.140	0.127
			(1.96)	(1.78)
Ordinary staff			0.116	0.115
			(2.03)	(2.01)
Mid. level staff			0.298	0.297
			(4.71)	(4.66)
No. of childr. in the family (NC):				
				0.002
NC				(0.13)
County dummy				
Jieshou	-0.274	-0.309	-0.255	-0.266
	(-6.28)	(-6.36)	(-5.90)	(-5.86)
Shangrao	-0.441	-0.495	-0.406	-0.400
	(-8.19)	(-8.77)	(-7.16)	(-6.50)
Nanhai	0.529	0.481	0.536	0.538
	(7.70)	(6.61)	(7.81)	(7.50)
Breusch-Pagan Chi-Squared	47.02 (8)	47.64 (10)	54.44 (13)	55.14 (14)
Adjusted R^2	0.34	0.34	0.36	0.36

With corrections for heteroscedasticity and multicollinearity, most *t*-statistics improved in each of the models. The modified models seem to perform well. In terms of explanatory power there is not a large difference among them. The adjusted R^2 is comparable if not better than similar models applied to market economies but some of the explanatory power is produced by the regional dummy variables indicating that there are significant variations in the wage level across regions. Nanhai has an average wage level 50 per cent above, and Shangrao 40 per cent below, that of Wuxi. When economic development is proceeding quickly from a low wage level, variations of wages tend to increase across areas and industries and in China this phenomenon is probably exacerbated by strict control of labour mobility[3]. These regional differences are not affected when additional variables are included in the regression.

The effect of schooling: The coefficient for schooling is not statistically significant in any equation. The sign is positive in models 1 and 2 but negative in models 3 and 4. This result is consistent with that of Gelb (1990) who uses the same data base. It is also consistent with the belief of employees (Table 5.3). Only about 2 per cent of investigated employees believe that education is an important variable for wage determination. The poor performance of the education variable does not seem to be a result of the way in which it is measured. Experimentation with education measured as a series of dummy variables for different levels of schooling did not make the education effect significant. Given the emphasis that so much of the literature places on education as a force for economic development this is an interesting result.

There may be a number of explanations for the lack of a relationship between education and earnings. First, in the TVP firms many jobs are unskilled and it might be expected that education does not matter[4] in terms of increasing productivity.

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[3] To analyse the effect of regional differences on wage determinations in the TVP sector is an important and big issue. It needs a specific study. This study, however, will rather focus on the effect of human capital variables.

[4] The average level of education for workers is under 8 years and for staff it is 9.5 years.

Second, education may not be used as a screening device for jobs of this level[5]. It has been noted that 40 per cent of workers were assigned to the firm by community authorities, often to achieve income distribution objectives across families. The firm in general does not freely hire workers and therefore does not need a screening device. When the firm obtains a worker, there is time for on-the-job assessment of quality to affect future wages and perhaps, in many small villages, worker quality is known as most workers have previous agricultural experience. These conjectures will be tested later.

The effect of experience variables: The return to each of the labour market experience variables in the four models is positive and significant. The usual inverted U shaped relationship is evident.

The return to other job experience is about 2.5 to 3 per cent per year over most of the first decade of work. However, it is decreasing each year at the rate of about 0.05 to 0.06 per cent. This causes the wage rate for each individual to increase along with his/her work experience for approximately 50 years and to decrease there after.

The return to firm-specific skills is about the same as for the other job experience. However, the earnings profile is steeper than for the other job experience (individual's earnings increase along with the firm tenure for about 35-40 years). These results accord well with the questionnaire response which emphasised firm-specific experience.

In model 2 work experience is subdivided into firm-specific tenure, other non-agricultural work experience and agricultural experience. In each instance the variables are statistically significant and the patterns of coefficient signs are as

[5] Education may be important at the university graduate level. For university graduates and above, there is a regulation that they should be assigned to jobs as technical or management staff and their wage level has to be higher than that of workers. This effect can be detected when we develop a model to explain which workers become managers.

expected. Within each experience category the return to experience is about 2-3 per cent per annum during the early years. Firm-specific tenure seems to be the most important, followed by agricultural experience. The estimates of the coefficients, however, appear very similar across the groups indicating that perhaps the source of labour market experience is largely irrelevant[6]. This result is a little surprising in that one might not expect a close relationship between learning experience in agricultural and non-agricultural jobs. But one possible explanation is that within a close knit community, where workers are being transferred from one sector to another, and jobs have been allocated in part to affect the income distribution, it might be expected that at least with respect to starting wages, agricultural experience might matter. Wages in that sector were determined in part by the age of the worker. This explanation, however, needs to be examined further.

The effects of occupational dummies: Models 3 and 4 include occupational dummies with non-staff employees as the missing category. The five categories of staff employees are: shift leader, operational personnel (those who are dealing with marketing problems), technical personnel, ordinary staff (such as ordinary accountants and other low level management staff) and middle level staff (higher level management staff except the director).

The occupational classification has an independent effect on earnings, especially for mid-level staff who are paid 30 per cent more than the average non-staff employees. Other occupations seem to be paid about 10 per cent more than the average non-staff employees and there are no significant differences between these classifications[7]. These results accord well with those of the responses to the questionnaire listed in

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

[7] An F-test is used to judge whether the occupational dummies make a statistically significant contribution to the basic model. The null-hypothesis of no contribution was rejected. The occupational classification does make a contribution to the explanation of earnings.

Table 5.3. Finally, the only social variable included in the regression—the number of children of each worker—does not seem to affect wages.

Results for different occupational groups

As indicated in the above analysis, occupational dummies have a significant impact on the TVP's individual wage determination. The question which is now addressed is whether the patterns of wage determination are the same between different occupational groups.

To analyse the impact of human capital variables on wage determination for different occupational groups, the total male sample was subdivided into staff and workers. The staff category includes the shift leaders, the operational personnel, the technical personnel, the ordinary staff, and the middle level staff. The statistical characteristics for the two groups are shown in Table 5.5

Table 5.5
Statistical characteristics of the main variables for workers and staff

	total		workers		staff	
	mean	S.D.	mean	S.D.	mean	S.D.
YW	1455	948.3	1325	1046	1610	865
DW	4.5	2.88	4.2	3.2	4.8	2.4
LDW	1.35	0.54	1.24	0.6	1.47	0.5
EDU	8.8	2.9	8.0	2.8	9.7	2.8
AGE	30.9	10	27.8	9.1	34.3	9.7
TEXP	15.2	10.6	12.8	10.1	17.6	10.7
OJ	9.4	9.6	7.8	8.3	11.0	10.3
FT	5.8	5.1	5.1	4.8	6.7	5.5
AEXP	5.6	7.5	5.0	6.7	6.0	8.1
ONAJ	3.9	6.6	2.8	5.3	5.0	7.5

Table 5.5 shows that in general, staff members earn 15 per cent more than workers in terms of daily wage and 21 per cent more in terms of yearly wage (staff members work more days in the year compared with workers). Staff members are about 7 years older than workers and their education level is about 1.7 years higher. The general labour market experience of staff is 5 years (38 per cent) longer than that of workers.

This difference is accounted for as follows: firm-specific experience is 1.6 years (31 per cent) longer, agricultural experience is 1 year (20 per cent) longer, and other non-agricultural experience is 2.2 years (79 per cent) longer for staff than for workers.

Modified models 1 and 2 are estimated for the two groups[8]. The results of the estimations are shown in Table 5.6. In both instances schooling remains an insignificant variable with a negative sign but the role of experience changes significantly across groups[9].

Workers' experience effects. For workers, firm-specific tenure and other job experience matter and the sign pattern of coefficients is as expected. Firm tenure seems to be more important, increasing earnings at about three times the rate of other job experience. When experience is subdivided into the three categories of firm-specific skill, non-agricultural and agricultural experience, the sign pattern of the coefficients is as expected but the importance of firm-specific tenure increases substantially. The return is 5.7 per cent for the first decade and it is double that of other non-agricultural experience. Agricultural experience, however, is insignificant in its impact. For workers, therefore, knowledge gained by them, or about them, in the agricultural sector does not seem to affect earnings. The discussion as to why agricultural experience matters for the total male sample is irrelevant for the workers

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[8] There is a sample selectivity problem for this estimation. By separating the sample using the occupational variable, the sample is censored (i.e., is not a random sample). Therefore, OLS estimation is biased. To correct this bias, Heckman's two-stage estimation method is adopted (1979). This method involves including a correction factor (λ) in the wage equation. However, because the regressors in the wage equation are the same as in the selection criterion equation used to compute λ, there is a high degree of multicollinearity between λ and the regressors in the wage equation. Therefore, it is impossible to obtain precise estimates. A detailed description of Heckman's two-stage procedure is presented in Appendix B. The specification of the selection criterion equation and the estimated results are shown in Appendix C. From Table C1 it is noted that the general picture of the wage determination pattern for the two groups according to the selectivity correction estimation is similar to that of OLS estimation. The OLS results, therefore, are presented and discussed here.

[9] F-tests are conducted to ascertain whether the structural of the wage determination process for the workers and staff groups are the same. For model 1 $F(9, 533)=6.53$ and for model 2 $F(11, 460)=6.05$. They are both greater 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 is rejected.

group. These results seem to accord well with human capital theory and the workers' response to the questionnaire.

Table 5.6[10]:
Results of models 1 and 2 by occupation

	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)
Other job experience (OJ)				
OJ	0.015	0.031		
	(1.89)	(4.66)		
OJ^2	-0.0002	-0.0007		
	(-0.77)	(-3.96)		
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 non-agri. exp. (ONAJ)				
ONAJ			0.024	0.014
			(2.82)	(1.66)
$ONAJ^2$			-0.0005	-0.0004
			(-1.92)	(-1.20)
Agri. experience (AEXP)				
AEXP			0.012	0.026
			(1.03)	(2.92)
$AEXP^2$			-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[11]	36.31 (8)	7.05 (8)	29.96 (10)	9.21 (10)
Adjusted R^2	0.41	0.33	0.40	0.35

[10] 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 results presented in the table for the staff group use the OLS covariance matrix.

[11] 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.

Staff's experience effects. For staff the experience outcomes are different[12]. Other job experience dominates firm-specific tenure which is insignificant in its effects. Other experience has a strong inverted U effect. When experience is subdivided into three categories the most important source of experience seems to be agriculture. Other non-agricultural experience ranks second while firm-specific tenure seems unimportant. What do these results mean?

There are a number of possible interpretations. One possible reason why agricultural experience is most significant and firm tenure does not matter is that the community authority normally assigned the leaders of agricultural production teams or the brigade to be the management staff of the firm. The rank and starting wages of those leaders in the firm reflected the length of time that they led the agricultural production team. Once in the firm, pay increases for this group may be related to the performance of the firm and not tenure.

Another possibility is that staff is a more mobile group within the community. When the community sets up a new firm they assign some management or technical staff in the old firm or in the agricultural sector to the new firm. If the wage level set for the staff depended on firm tenure they would be unhappy to move. This conjecture can be reinforced by the responses to the question: "have you ever been a staff member in other TVP firms or township government before you came to this firm?" in the Director Survey Questionnaire. Some 64 per cent of the sampled firm directors gave a positive answer. This can explain why the other non-agricultural job experience is also significant for staff.

[12] Not all employees in the firm were sampled. The sampling frame has over-sampled staff which account for approximately half of the sample male employees.

A third possible explanation is that management skills learned in agriculture and other sectors are easily transferred to management in the enterprise in a way that workers' agricultural skills are not[13].

5.3 Test for Labour Productivity Effect

Our results to this point indicate that the important variables that influence the relative wages of workers and staff are all variations of job experience. Why do these variables affect an individual's wage level? Do our equations capture productivity effects or are they measuring socially determined rules of payment? It is difficult to form a judgment on this matter.

It might be possible to learn a little more by considering the form of payment adopted by the firm. Among the total sample, 40 per cent of employees are paid by piece rate which 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, our understanding of the wage payment process may be enriched. We may be able to understand better the role of schooling and experience. For example, piece rate payments may be closely related to productivity performance and it will be interesting to compare these earnings outcomes to those arising from a time rate system.

The mean values of all the variables for piece rate and time rate workers and staff[14] are presented in Tables 5.7 and 5.8. It appears that time rate workers earn less than piece rate workers, but within each group staff earn more than workers.

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[13] One might think that this outcome was a product of the estimation procedure whereby the experience relationship was effectively being estimated in three segments, each of which is flatter than the one before. Perhaps the same estimation procedure did not produce similar results for workers because they were much younger and the agricultural experience was either non existent or much shorter. However, the statistical characteristics of the experience variables shown in Table 5.5 seem to reject this possibility. It is noted there that although workers are much younger (7 years) than staff, the mean value of their agricultural experience is only one year less than staff. This will not make very much difference.

Table 5.7
Mean values for male piece rate employees

	total	workers	staff
	n=166	n=115	n=52
LDW	1.329	1.3	1.38
EDU	8.066	7.5	9.33
FT	5.55	4.98	6.8
OJ	8.08	8.44	7.3

Table 5.8
Mean values for male time rate employees

	total	workers	staff
	n=363	n=156	n=210
LDW	1.396	1.26	1.5
EDU	8.79	7.7	9.6
FT	5.93	5.1	6.59
OJ	11.08	8.9	12.76

[14] Piece rate staff are mostly shift leaders.

Table 5.9[15]
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[16]	44.60 (8)	25.03 (8)	49.3 (10)	27.9 (10)
Adjusted R^2	0.36	0.34	0.36	0.34

[15] 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, ∞)=1.88 and the critical value of F(11, ∞)=1.83, so the null hypothesis of no structural change for both models cannot be rejected.

[16] 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.

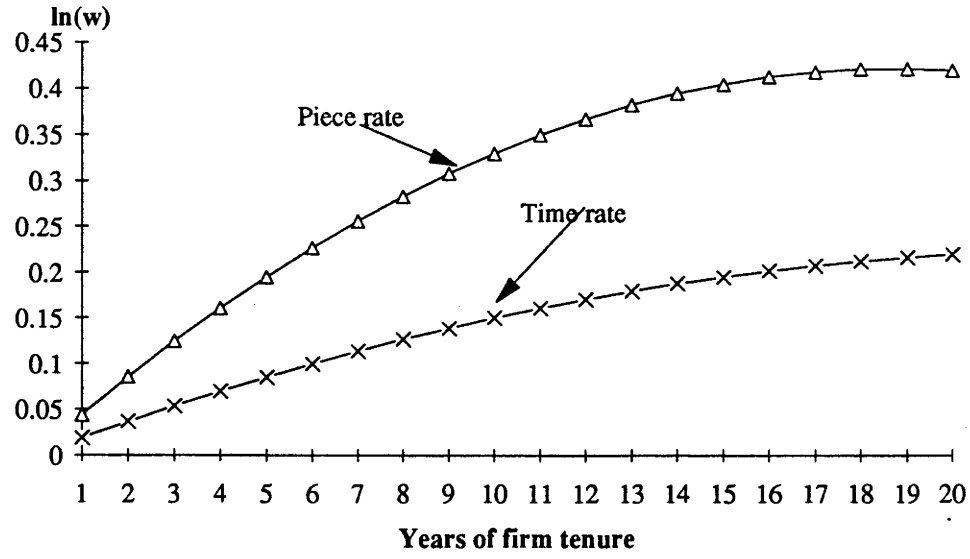
The estimated results of models 1 and 2 for piece rate and time rate male employees separately are shown in Table 5.9[17]. Once again schooling is statistically insignificant for both groups, a result that holds no matter which specification of experience is adopted. As piece rate earnings are a direct measure of productivity it appears that our earlier conjecture, that education does not affect labour productivity in the TVP sector, may be correct.

F-tests have indicated that the null-hypothesis of no structural change between two groups' wage determination patterns cannot be rejected. Some differences, however, can still be seen. (1) The effect of the firm tenure variable is significant for the piece rate group but insignificant for the time rate group (in model 1). (2) For the piece rate group firm tenure is found to play the most important role (in model 2). But it does not seem to matter for wage determination for the time rate group.

A comparison of tenure-earning profiles between the piece rate and time rate groups are shown in Figure 5.1. One possible explanation for the piece rate group to have a steeper profile compared with the time rate group might be that firm-specific training is more important for the piece rate than for the time rate. This in turn seems to suggest that the underlying technological level for the piece rate is higher than for the time rate (see Tan, 1980; Hashimoto and Raisian, 1985; Mincer and Higuchi, 1988).

[17] The matter of being in the piece rate or the time rate groups is not a free choice for the employees. As labour mobility is restricted, it rather heavily depends on the regions (particular township or village) people live and particular firm which established in the region. Therefore, as the variable of the form of payment is exogenous, there is no problem in terms on the sample being selected in the sense of sample selectivity bias. So the correction of sample selective bias is not considered in this part of analysis.

Figure 5.1
Comparison of tenure-earnings profiles between the piece rate and time rate groups



The pattern of experience variables for the piece rate group is very much like the pattern for the workers group, while the pattern for the time rate group is similar to that for the staff group. This similarity may come from the different occupational distributions of the piece rate and time rate groups. Within the time rate group 57 per cent of employees are staff, while in the piece rate group staff only account for 32 per cent. In order to capture the real difference between the patterns of wage determination for the two groups, both piece rate and time rate groups are further subdivided into staff and workers groups. The estimated results of models 1 and 2 are presented in Tables 5.10 and 5.11, respectively.

Table 5.10
Model 1 for piece rate and time rate groups by occupation

	workers		staff	
	piece rate	time rate	piece rate	time rate
	n=115	n=156	n=52	n=210
Constant	1.149	0.929	1.240	1.536
	(7.20)	(5.27)	(3.79)	(9.01)
Schooling	0.008	-0.007	-0.003	-0.009
	(0.61)	(-0.42)	(-0.14)	(-0.84)
Other job experience (OJ)				
OJ	0.003	0.021	0.080	0.027
	(0.02)	(2.02)	(4.11)	(3.57)
OJ^2	0.00003	-0.0003	-0.0024	-0.0007
	(0.07)	(-0.90)	(-3.38)	(-3.15)
Firm specific tenure (FT)				
FT	0.052	0.047	-0.003	-0.009
	(3.03)	(2.23)	(-0.11)	(-0.59)
FT^2	-0.0013	-0.0017	0.0008	0.0004
	(-1.67)	(-2.32)	(0.37)	(0.68)
County dummies:				
Jieshou	-0.401	-0.170	-0.291	-0.315
	(-5.61)	(-2.01)	(-2.51)	(-4.51)
Shangrao	-0.343	-0.368	-0.471	-0.740
	(-4.72)	(-2.41)	(-3.21)	(-7.20)
Nanhai	0.651	0.862	-0.32	0.249
	(4.50)	(6.58)	(-0.20)	(3.16)
Breusch-Pagan Chi-Squared[18]	47.3 (8)	15.4 (8)	8.3 (8)	6.5 (8)
Adjusted R^2	0.454	0.41	0.385	0.33

As was found for the total piece rate and time rate groups, education is insignificant for all sub-divided sample groups listed in Table 5.10.

In model 1 the strongest effect of other job experience is found for time rate staff. The second strongest effect is for piece rate staff. It is clear, as in our earlier results, that general experience affects staff more than ordinary workers. Once again tenure in the current firm is not significant for staff and exhibits the wrong sign pattern. For workers the sign pattern of other job experience and firm tenure is as expected. As in the earlier results, firm tenure matters most for both piece rate and time rate workers

[18] The standard errors for workers are corrected for heteroscedasticity, while for staff they are derived using the ordinary least squares covariance matrix.

and other job experience is relatively unimportant for the piece rate workers but significant for the time rate workers.

Table 5.11
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[19]	48.5 (10)	8.5 (10)	8.6 (10)	8.1 (10)
Adjusted R^2	0.42	0.40	0.366	0.34

In model 2 the ranking of the significance of the experience variables for the two workers groups is the same. Firm tenure ranks first, other non-agricultural experience is significant and ranks second, while agricultural experience is not significant. For the two staff groups the pattern of the coefficients for the experience variables is the

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

same as that reported for the total staff group. Agricultural experience is the most important experience variable.

With the exception of the county dummies it appears as though the patterns of the coefficients for the staff and workers of both piece rate and time rate groups could be the same. F-tests are conducted to see whether the wage determination process is the same for the piece rate and time rate groups for both workers and staff. For workers $F(9, 271)=1.47$ and for staff $F(9, 262)=1.29$. These statistics are both less than the critical value of $F(9, \infty)=1.88$. So the null hypothesis that the coefficients are the same for both models cannot be rejected. A pooled sample test of whether any individual coefficients were the same was also conducted. For workers, none of the coefficients for the piece rate intercept and interaction with other variables are statistically significant. For staff, other job experience seems to have a significantly different effect on wage determination for piece rate and time rate groups. The remainder of the pattern of the coefficients is the same. The detailed methodology and results of the test briefly described here are reported in Appendix D.

If piece rate payment is a good measure of labour productivity, the similarity of the pattern of the coefficients for the two groups of workers[20] suggests that time rate employees are also paid according to their labour productivity. This result accords well with the model of TVP wage determination built in Chapter 4, where it is suggested that the TVP firms pay their employees according to their marginal productivity of effort.

[20] Since there is only a small number of piece rate staff and the form of their payment is not quite clear, this part of the analysis will only consider three groups: piece rate workers, time rate workers and time rate staff.

5.4 Concluding Remarks

This chapter tested the applicability of the human capital model to the TVP male labour market. The following represents a summary of the results.

(1) Unlike most industrial and developing countries, educational background seems to play an insignificant role in individual wage determination.

(2) A number of different relationships between individual wages and the experience of the employees have been found. In general, wages increase with experience.

(3) The payment system differs between staff and workers. For staff, experience in the firm seems less important than it is for workers. It seems as though payments to staff may be related to their position in earlier jobs in both the agricultural and TVP sectors and management skills they learned from the agricultural sector and any other previous jobs. These relationships may arise from the stage of development of the TVP's wage determination system. This system seems to be a mixture of elements of the old agricultural leadership system for staff, and how that relates to their seniority position in the TVP sector, and a new market oriented payment system which relates staff's management skill they learnt previously to their wage level.

(4) For workers, it seems quite clear that their wage determination pattern is generally productivity-related, as the wage determination pattern of time rate workers is similar to that of piece rate workers.

(5) Except for the impact of education, the human capital model seems to work quite well for TVP wage determination. Since education does not play a role in the wage determination for piece rate workers, it might be concluded that education is not important in determining the TVP employees' labour productivity. If this is the case, the results obtained in this chapter seem to confirm the hypothesis proposed in

Chapter 4 that the pattern of wages in the TVP sector largely reflects productivity variations.

Appendix 5A

Basic human capital models 1-4 with total experience

	models			
	1	2	3	4
	n=563	n=453	n=558	n=560
Constant	.941	1.062	1.028	1.036
	(10.31)	(10.10)	(10.89)	(11.01)
Schooling	.009	.007	-.003	-.004
	(1.27)	(0.84)	(-0.44)	(-0.51)
Total experience (TEXP)				
TEXP	0.038		0.032	0.032
	(6.70)		(5.53)	(5.62)
$TEXP^2$	-0.0006		-0.0005	-0.0006
	(-4.86)		(-4.10)	(-4.22)
Firm tenure (FT)				
FT	0.008	0.033	0.006	0.005
	(0.67)	(2.91)	(0.58)	(0.43)
FT^2	-0.0003	-0.0009	-0.0004	-0.0003
	(-0.75)	(-2.11)	(-0.86)	(-0.75)
Other non-agri. exp. (ONAJ)				
ONAJ		0.023		
		(3.33)		
$ONAJ^2$		-.0005		
		(-1.91)		
Agricultural experience (AEXP)				
AEXP		0.024		
		(3.14		
$AEXP^2$		-0.0005		
		(-2.04)		
Occupational dummies:				
Shift leader			0.112	0.123
			(1.80)	(1.86)
Operational pers.			0.114	0.108
			(1.52)	(1.53)
Technical pers.			0.134	0.114
			(2.20)	(2.04)
Ordinary staff			0.120	0.095
			(1.46)	(1.40)
Mid. level staff			0.291	0.280
			(4.10)	(4.01)
Number of children in the family (NC):				
NC				0.0001
				(0.87)
County dummy				
Jieshou	-0.268	-0.311	-0.253	-0.251
	(-6.01)	(-6.02)	(-5.64)	(-5.61)
Shangrao	-0.426	-0.489	-0.401	-0.412
	(-6.90)	(-7.21)	(-6.36)	(-6.41)
Nanhai	0.515	0.521	0.530	0.522
	(9.61	(7.89)	(9.81)	(9.68)
Breusch-Pagan Chi-Squared	46.8 (8)	46.8 (10)	53.3 (13)	55.92 (14)
Adjusted R^2	.37	.35	.39	.38

Appendix 5B

Heckman's Two-Stage Approach for Correction of Sample Selection Bias[21]

Consider a two equation model. The first equation is the determination equation that is of primary interest (for example, wage determination). The second equation is a selector equation that determines whether data are observed for the first equation (for example, an equation for labour force participation). There is a random sample of I observations. Equations for individual i are:

$$Y_{1i}=X_{1i}\beta_1+U_{1i} \qquad (1a)$$

$$Y_{2i}=X_{2i}\beta_2+U_{2i} \qquad (i=1,...,I) \qquad (1b),$$

where X_{ji} is a $1xK_j$ vector of exogenous regressors, β_j is a $K_j x1$ vector of parameters, and

$$E(U_{ji})=0,$$
$$E(U_{ji}U_{j'i''})=\sigma_{jj'}, \quad i=i'',$$
$$=0, \quad i\neq i''.$$

Y_{1i} is observed only when $Y_{2i}\geq 0$. When estimating equation (1a) with missing data on Y_{1i} for $Y_{2i}<0$, the regression equation for the selected sample may be expressed as

$E(Y_{1i}|X_{1i}$, sample selection rule$)=X_{1i}\beta_1+E(U_{1i}|X_{1i}$ sample selection rule$)$

$$=X_{1i}\beta_1+E(U_{1i}|X_{1i},Y_{2i}\geq 0)$$
$$=X_{1i}\beta_1+E(U_{1i}|X_{1i},U_{2i}\geq -X_{2i}\beta_2)$$

From the above relation, Heckman (1979) derived

$$E(U_{1i}|X_{1i},U_{2i}\geq -X_{2i}\beta_2)=\frac{\sigma_{12}}{(\sigma_{22})^{1/2}}\lambda_i$$

$$E(U_{2i}|X_{2i},U_{2i}\geq -X_{2i}\beta_2)=\frac{\sigma_{22}}{(\sigma_{22})^{1/2}}\lambda_i$$

where $$\lambda_i=\frac{\phi(Z_i)}{1-\Phi(Z_i)}=\frac{\phi(Z_i)}{\Phi(-Z_i)}$$

where ϕ and Φ are, respectively, the density and distribution function for a standard normal variable,

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[21] The derivation outlined is based on Heckman (1979).

and $$Z_i = \frac{X_{2i}\beta_2}{(\sigma_{22})^{1/2}}.$$

λ is the inverse of Mill's ratio.

Thus the model for the selected sample may be expressed as:

$$Y_{1i} = X_{1i}\beta_1 + \frac{\sigma_{12}}{(\sigma_{22})^{1/2}}\lambda_i + v_{1i} \qquad (2a)$$

$$Y_{2i} = X_{2i}\beta_2 + \frac{\sigma_{22}}{(\sigma_{22})^{1/2}}\lambda_i + v_{2i} \qquad (2b)$$

where $E(v_{1i})=E(v_{2i})=0$.

Application of ordinary least squares to equation (2a) will yield consistent estimates, whereas the estimation of equation (1a) using the subset of data for which $Y_{2i} \geq 0$ will yield biased estimates due to the problem of omitted variables, that is λ_i would have been left out of the estimating equation.

Heckman's two-stage procedure may be implemented as follows. First, using the full sample estimate λ from probit analysis of the probability of being included in the selected sub-sample. Second, include λ as a regressor in equation (2a) fit on the selected subsample for which $Y_{2i} \geq 0$.

Appendix 5C

A probit model is estimated to determine the probability of sample inclusion (the probability of being a staff member). The following variables were entered into the model: education, firm tenure, other job experience, and county dummies. This specification is based largely upon the occupational choice model developed by Brown, Moon, and Zoloth (1980). The estimated results with sample selectivity correction are shown in Table C1. The results show that with the selectivity correction the patterns of wage determination for both workers and staff groups are similar to those without correction. However, the high degree of correlation between λ and other regressors may cause the *t*-statistics to decrease. The regression results of λ on other regressors in the wage equation are shown in Table C2. From the adjusted R^2s in Table C2, it is obvious that λ is highly correlated with the other regressors.

Table C1
Results of models 1 and 2 with sample selectivity correction

	model 1		model 2	
	workers	staff	workers	staff
	n=267	n=258	n=227	n=227
Constant	0.758	2.01	0.841	1.899
	(2.30)	(3.50)	(2.41)	(2.70)
Schooling	0.036	-0.042	0.021	-0.032
	(0.67)	(-1.19)	(0.32)	(-0.61)
Other job experience (OJ)				
OJ	0.022	0.027		
	(1.56)	(3.14)		
OJ^2	-0.0002	-0.0008		
	(-0.57)	(-4.12)		
Firm specific tenure (FT)				
FT	0.058	-0.012	0.062	-0.008
	(2.81)	(-0.63)	(2.89)	(-0.42)
FT^2	-0.0016	0.0001	-0.002	0.0002
	(-2.78)	(0.29)	(-3.01)	(0.31)
Other non-agri. exp. (ONAJ)				
ONAJ			0.029	0.010
			(2.04)	(1.01)
$ONAJ^2$			-0.0005	-0.0004
			(-1.38)	(-1.27)
Agri. experience (AEXP)				
AEXP			0.021	0.023
			(1.01)	(1.98)
$AEXP^2$			-0.0001	-0.0007
			(-0.34)	(-2.37)
County dummies:				
Jieshou	-0.248	-0.279	-0.252	-0.321
	(-2.90)	(-4.01)	(-2.32)	(-4.14)
Shangrao	-0.256	-0.621	-0.290	-0.672
	(-2.19)	(-6.46)	(-2.23)	(-6.65)
Nanhai	0.831	0.212	0.787	0.187
	(10.00)	(2.71)	(8.71)	(-2.38)
λ	-0.281	-0.252	-0.244	-0.172
	(-0.68)	(-1.02)	(-0.62)	(-0.61)
Adjusted R^2	0.41	0.34	0.40	0.35

Table C2
Test of correlations between λ and other regressors

dependent variable=λ	model 1		model 2	
	workers	**staff**	**workers**	**staff**
	n=267	n=258	n=227	n=227
Constant	-0.769	2.289	-0.752	2.297
	(-35.51)	(58.40)	(-32.44)	(60.60)
Schooling	0.131	-0.122	0.141	-0.132
	(72.21)	(-46.41)	(68.13)	(-47.50)
Other job experience (OJ)				
OJ	0.027	-0.021		
	(18.20)	(-11.49)		
OJ^2	0.00001	-0.0001		
	(0.12)	(-1.58)		
Firm specific tenure (FT)				
FT	0.036	-0.042	0.031	-0.032
	(14.12)	(-11.59)	(12.19)	(-9.68)
FT^2	0.0001	0.0003	0.00005	0.00004
	(0.11)	(1.73)	(0.52)	(0.30)
Other non-agri. exp. (ONAJ)				
ONAJ			0.024	-0.024
			(13.89)	(-12.01)
$ONAJ^2$			0.00009	0.00002
			(1.40)	(0.21)
Agri. experience (AEXP)				
AEXP			0.031	-0.022
			(16.12)	(-10.47)
$AEXP^2$			-0.0002	-0.00004
			(-2.59)	(-0.56)
County dummies:				
Jieshou	-0.141	0.110	-0.179	0.149
	(-13.31)	(6.50)	(-15.72)	(10.24)
Shangrao	-0.160	0.154	-0.191	0.170
	(-10.32)	(6.89)	(-11.58)	(8.67)
Nanhai	0.032	-0.019	0.022	-0.001
	(2.30)	(-1.12)	(1.36)	(-0.08)
Adjusted R^2	**0.96**	**0.91**	**0.97**	**0.93**

Appendix 5D

The test for the difference between the coefficients for piece rate and time rate groups for staff and workers separately is done by estimating the original model (in this case it is model 1) including a piece rate dummy and piece rate interaction terms on all other variables on data pooled across piece rate and time rate observations. The model is specified as:

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

where X_{ij} are the variables in the original model. The superscript p refers to piece rate. The coefficients for the time rate group are the β_js and for the piece rate group they are $(\beta_j+\gamma_j)$. U_i is an error term. The results are shown in Table D1.

Table D1
Pooled sample test for the difference between coefficients for piece rate and time rate groups for staff and workers separately

	staff	workers
	n=261	n=271
Constant	1.489	0.930
	(9.19)	(5.38)
Schooling	-0.812	-0.010
	(-0.71)	(-0.50)
Other job experience (OJ)		
OJ	0.028	0.021
	(3.79)	(1.68)
OJ^2	-0.0007	-0.0002
	(-3.30)	(-0.71)
Firm specific tenure (FT)		
FT	-0.010	0.047
	(-0.70)	(2.26)
FT^2	0.0004	-0.002
	(0.74)	(-2.33)
County dummies:		
Jieshou	-0.321	-0.163
	(-4.60)	(-1.90)
Shangrao	-0.734	-0.363
	(-7.39)	(-2.19)
Nanhai	0.262	0.861
	(3.30)	(8.54)
Piece rate dummy (DP)	-0.287	0.220
	(-0.71)	(0.82)
PEDU	0.005	0.020
	(0.161)	(0.68)
POJ	0.054	-0.023
	(2.10)	(-1.04)
PSOJ	-0.002	0.0003
	(-2.12)	(0.43)
PFT	0.007	0.005
	(0.13)	(0.22)
PSFT	0.0004	0.0004
	(0.18)	(0.34)
PJS	0.331	-0.234
	(0.22)	(-1.66)
PSR	0.289	0.022
	(1.32)	(0.13)
PNH	-0.287	-0.216
	(-1.25)	(-1.28)
Adjusted R^2	0.34	0.42

6

INSTITUTIONAL CHANGE, EDUCATION AND WAGE DETERMINATION

The TVP is a newly developed sector. Compared with the state-owned sector, it is more market oriented, 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 China's rural labour market had undergone a great change. As mentioned in Chapter 2, starting from a mixed working-point system for both the agricultural and manufacturing sectors, the wage determination system 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, one third of the sampled employees obtained employment through a more market oriented mechanism.

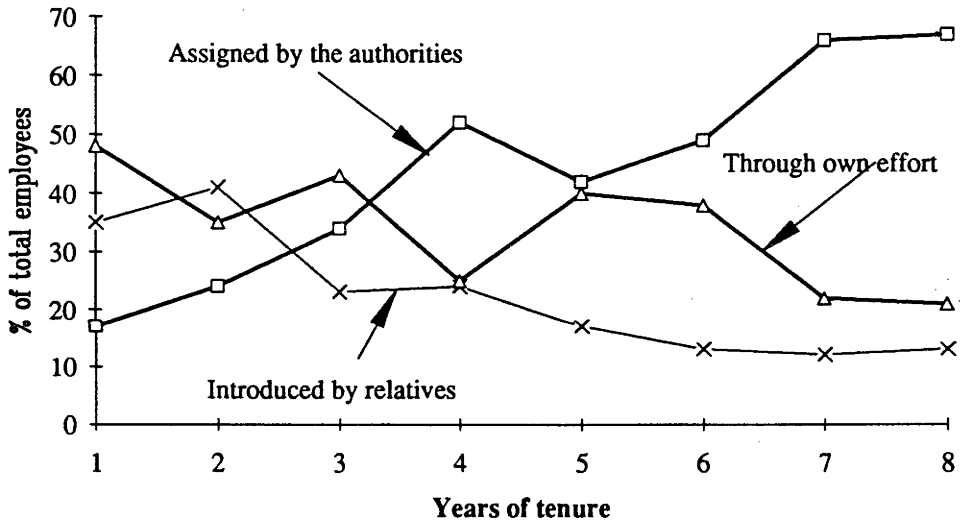
The issue discussed in this chapter is whether the institutional change leading to a greater freedom in hiring labour has impacted on the TVP wage determination procedure. In particular, we examine whether human capital variables have changed their significance in TVP wage determination along with the 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.

6.1 Institutional change and its impact on wage determination

Although the data are drawn from a 1985 cross-section, it is still possible to see the institutional transformation in the TVP labour market. Figure 6.1 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 referred 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.[1]

Figure 6.1
Institutional change of the TVP employment system



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

[1] There might be an alternative explanation for the correlation between employees' tenure and the way they got their jobs. It is that tenure of staff is greater than tenure of workers and that those staff are more likely to have been assigned to their positions by community authorities. However, this alternative can be ruled out by the fact that the staff/workers ratios for both the market and non-market groups are about the same (86.6 per cent for the market group and 83.5 per cent for the non-market group).

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, and income in the agricultural sector is lower than in the TVP sector. 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 chapter.

The basic statistical characteristics for the market and non-market groups are shown in Table 6.1. 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 6.1
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 the 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**.

According to the model developed in Chapter 4, where both quantity and quality of employment are controlled by local authorities (the non-market group), firms will still try to pay employees according to their labour productivity in order to avoid the shirking problem and to maximize profit. However, these non-market firms are unable to choose employees of given quality and they will experience difficulty matching worker's skill with the firms' technological requirements. Reform in the TVP employment system that allows firms to choose the quality of their employees will create the preconditions for a better matching of workers' attributes and the job to be done.

Accordingly, therefore, on the demand side it is a two dimensional issue. On one side, firms have different recruitment systems. On the other side, firms have different levels of technology. Under the condition that TVP firms generally pay their

employees according to labour productivity, firms with no freedom to choose the quality of labour will probably choose a more simple technology compared to those who are able to choose their employees. The reason for this is that the skill to operate a simple technology is easy to gain from work experience rather than formal education, so that a lack of freedom to choose the quality of labour will not have a significant impact on these firms' efficiency. Where the technology is more sophisticated it is more important to have the right quality of labour, and it might be expected, therefore, that the freedom to choose labour will go hand in hand with a higher level of technology. Theoretically, therefore, education should have stronger explanatory power for wage determination of the market group than for the non-market oriented group.

On the supply side people with more educational investment would try to find jobs with higher payment if they are allowed to choose their jobs. From this perspective the market oriented recruitment procedure should also produce a higher correlation between wage and education.

Table 6.2
Regression results of model 1 and model 2 for market oriented and non-market oriented groups separately

	Model 1		Model 2	
	Market (1) n=182	Non-Market (2) n=229	Market (3) n=153	Non-Market (4) n=206
Constant	0.689	1.910	0.634	1.416
	(4.24)	(8.90)	(3.23)	(9.15)
Schooling	0.039	-0.007	0.041	-0.007
	(3.13)	(-0.68)	(2.64)	(-0.61)
Other job experience (OJ)				
OJ	0.038	0.029		
	(3.13)	(3.56)		
OJ^2	-0.0007	-0.0008		
	(-1.79)	(-3.20)		
Firm tenure (FT)				
FT	0.039	0.007	0.046	-0.005
	(2.05)	(0.51)	(2.04)	(-0.29)
FT^2	-0.0007	-0.0003	-0.0008	0.0001
	(-0.86)	(-0.47)	(-0.94)	(0.17)
Other non-agri. exp. (ONAJ)				
ONAJ			0.057	0.020
			(3.47)	(1.62)
$ONAJ^2$			-0.002	-0.0009
			(-2.30)	(-1.59)
Agri. experience (AEXP)				
AEXP			0.029	0.022
			(2.14)	(2.23)
$AEXP^2$			-0.0003	-0.0007
			(-0.63)	(-2.23)
County dummy				
JS	-0.263	-0.185	-0.300	-0.234
	(-3.61)	(-3.12)	(-3.64)	(-3.92)
SR	-0.382	-0.496	-0.465	-0.524
	(-3.12)	(-6.97)	(-3.96)	(-7.33)
NH	0.323	0.690	0.169	0.671
	(2.78)	(6.72)	(1.27)	(6.35)
Breusch-Pagan Chi-Squared	6.93 (8)	23.9 (8)	18.52 (10)	22.1 (10)
Adjusted R^2	0.30	0.39	0.35	0.40

In order to test the hypothesis that the association between education and earnings is closer for the market recruitment system, the two basic human capital models specified in Chapter 5 (modified version of model 1[2] and model 2) are applied to data

[2] A certain degree of multicollinearity between total experience and firm tenure is also found for the market and non-market groups (see Appendix A for the regression results with total experience), so the modified version of model 1, which is to substitute total experience by other job experience (OJ), is used.

which are sub-divided into market oriented and non-market oriented groups. The results are presented in Table 6.2.

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. However, these tests do not inform as to which particular variable has a different impact. According to the results presented in Table 6.2, education has a positive and significant impact on wage determination of the market group, but a negative and insignificant impact on the non-market group's wage determination. Firm tenure and other non-agricultural job experience also seem to have different impacts in the market and non-market groups.

To determine which individual coefficient differences are statistically significant, pooled sample tests were conducted[3]. The results are presented in Appendix 6B. They 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).

[3] For a detailed description of the test methodology see Chapter 5, Appendix D.

The above suggest that the major difference between wage determination in the market and non-market groups is the impact of education[4].

As reported in Chapter 5, the most unusual result of the human capital model estimated for TVP male employees is that education does not have a significant impact on wage determination[5]. To explain this unusual result, several hypotheses were proposed and partially examined in Chapter 5. 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.

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 why 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 6.3

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[4] 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 attributed 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.

[5] See also Gelb (1990).

Table 6.3
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	-0.25
	(-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 6.3 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[6]. 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

[6] 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.

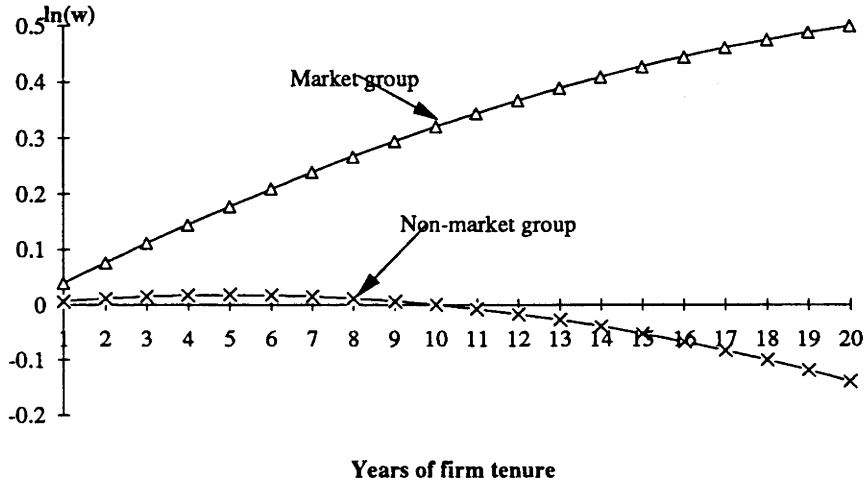
market and non-market groups suggests that education might have a significant impact on labour productivity for the market group but not for the non-market group. The reason for this might be that the underlying technological processes of the work undertaken by each group is different. Because of these 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[7].

The speculation of different underlying technologies had been employed in the market and non-market groups may be reinforced by a comparison of tenure-earnings profile between the two groups. In Chapter 4 it is explained that the steeper tenure-earnings profile for the Japanese firms compared with the firms in the United States is caused by using high technology and rapid technological change in Japan (Hashimoto and Raisian, 1985; Mincer and Higuchi, 1988). The following tenure-earnings profiles are drawn based on the estimated results revealed in Table 6.2. The much steeper tenure-earnings profile for the market group compared with the profile for the non-market group suggests that firm-specific training in this group is much greater

[7] 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-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).

than in the non-market group, which in turn suggests that the underlying technological level in this group should be higher than in the non-market group.

Figure 6.2
Comparison of tenure-earnings profiles between the market and non-market groups



6.2 Education: job assignment?

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. This issue is discussed in this and the next sections.

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. One aspect of the screening argument suggests that schooling serves to identify those individuals who are more productive in the market, which determines the individual's job assignment; in turn individual's occupational level determines earnings. Therefore, more capable people will seek more education to increase their income level. The extreme form of the screening hypothesis is that an individual's productivity is not affected by the formal schooling process (Wolpin,

1977). However, empirically it is hard to disentangle the human capital and extreme screening perspectives, in the sense that it is hard to know if it is education enhancing labour productivity or more inherently capable people having experienced higher education.

Nevertheless, it is possible to test whether education is used as job assignment and whether people's job levels are rewarded. Through the adoption of an occupational attainment model this section examines whether the TVP firms use schooling as a signal for individuals' job assignment for both the market and non-market groups.

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). Labour demand is determined by the individual's human capital, and the labour supply is expressed as a utility function which includes at least three components: income of occupations, taste 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 assignment 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 6.4. The workers group is used as a reference category.

Table 6.4
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[8]*:* (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 6.4[9], 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

[8] 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).

[9] 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.

are 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 but not on 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 variables are shown in Table 6.5. These show the impact of a small change in each of the variables on the probability of being a staff member.

Table 6.5
Marginal effects of three main variables on the probability of occupational assignment for binomial regressions

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

Table 6.5 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 Chapter 5 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 6.6:

Table 6.6
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:

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

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

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

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, other job 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 signal 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 higher 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 signal, 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.

This study up to this point seems to suggest that for the market group the effect of education seems consistent with the logic of the theory. 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[10]. 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?

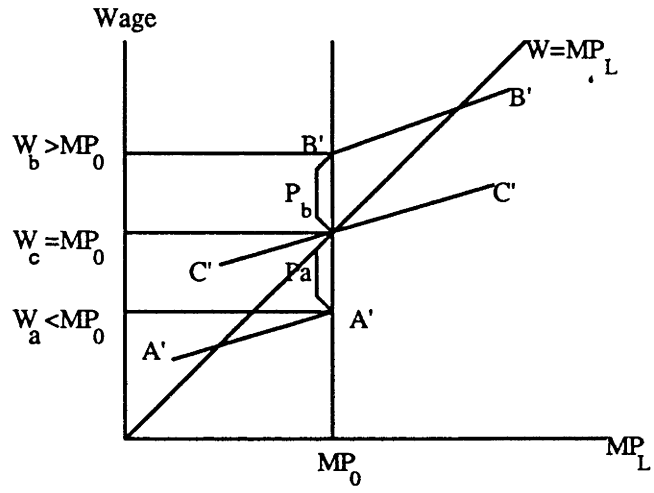
In the literature on wage determination, there is a theory of status developed by Frank (1984) which is used to explain why, in reality, individual wage differences within a

[10] 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 6.3



Suppose there is a group of people who have the same marginal productivity of labour, say MP_0 in Figure 6.3. 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 *Enterprise Director Questionnaire* 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. This suggests that the market price for status may be 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 chapter 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 Chapter 5), 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. And, more interestingly, the different roles of education on the market and non-market groups wage determination both reflect labour productivity effects.

(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. One view is that 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.

(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, individuals who invest in education can directly get a return on their investment[11]. In the old system, this relationship is somewhat indirect. The rate of return to education could be argued to be more likely to be reflected by implicit benefits.

(6) 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 cannot be directly observed from the estimation of a wage equation, and it is not productivity oriented.

[11] This conclusion does not mean that in the new 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 6A

Regression results of model 1 with total experience for market and non-market groups separately

	Market n=196	Non-Market n=357
Constant	0.650	1.082
	(4.05)	(9.25)
Schooling	0.036	-0.007
	(3.08)	(-0.82)
Total experience (TEXP)		
Texp	0.046	0.036
	(3.9)	(5.06)
$Texp^2$	-0.0008	-0.0006
	(-2.47)	(-3.93)
Firm tenure (FT)		
FT	0.011	0.006
	(0.56)	(0.47)
FT^2	-0.0002	-0.0004
	(-0.20)	(-0.77)
County dummy		
JS	-0.265	-0.299
	(-3.9)	(-4.7)
SR	-0.386	-0.435
	(-3.39)	(-5.7)
NH	0.320	0.571
	(2.90)	(9.00)
Adjusted R^2	0.316	0.402

Appendix 6B

Pooled sample tests for the differences of the coefficients between the market and non-market groups:

	Model 1 n=411	Model 2 n=359
Constant	1.291	1.416
	(8.90)	(9.15)
Schooling	-0.007	-0.007
	(-0.68)	(-0.61)
Other job experience (OJ)		
OJ	0.029	
	(3.56)	
OJ^2	-0.0008	
	(-3.20)	
Firm tenure (FT)		
FT	0.007	-0.005
	(0.51)	(-0.29)
FT^2	-0.0003	0.0001
	(-0.47)	(0.16)
Other non-agri. exp. (ONAJ)		
ONAJ		0.020
		(1.62)
$ONAJ^2$		-0.0009
		(-1.59)
Agri. experience (AEXP)		
AEXP		0.022
		(2.23)
$AEXP^2$		-0.0007
		(-2.23)
County dummy		
JS	-0.185	-0.234
	(-3.12)	(-3.92)
SR	-0.50	-0.524
	(-6.97)	(-7.33)
NH	0.690	0.671
	(6.72)	(6.35)

(continued overleaf)

Mkt. group dummy (DAP)	-0.603	-0.782
	(-2.69)	(-3.13)
AEDU	0.046	0.048
	(2.80)	(2.46)
AOJ	0.009	
	(0.63)	
AOJ^2	0.0003	
	(0.08)	
AFT	0.031	0.051
	(1.31)	(1.83)
AFT^2	-0.0004	-0.0009
	(-0.45)	(-0.86)
AONAJ		0.036
		(1.76)
$AONAJ^2$		-0.0009
		(-0.94)
AAEXP		0.006
		(0.39)
$AAEXP^2$		0.0005
		(0.89)
AJS	-0.078	-0.067
	(-0.84)	(-0.66)
ASR	0.113	0.059
	(0.89)	(0.43)
ANH	-0.368	-0.503
	(-2.28)	(-2.96)
Breusch-Pagan χ^2	31.91(17)	40.93(21)
Adjusted R^2	0.368	0.39

Appendix 6C

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 χ^2	13.797 (17)	32.53 (17)
Adjusted R^2	0.28	0.42

7

TVP WAGE DETERMINATION: COMPARISON

The previous two chapters investigated the applicability of the human capital model to TVP wage determination. The study roughly confirmed the hypothetical model about TVP wage determination built in Chapter 4. It was shown that the wage determination procedure in the TVP sector, by and large, can be explained by the human capital model, and that the TVP firms pay employees according to labour productivity. The insignificance of the impact of education on wage determination for the non-market oriented group may be due to the simplicity of the underlying technological processes these firms used.

In this chapter, two issues are investigated. First, are the results obtained by this study consistent with the other studies on Chinese wage determination? If so or not, what are the reasons? Second, is the explanatory power of the human capital model for the TVP wage determination as good as for the other industrial countries? Are there any detectable and systematic differences between our results and those of the other industrial countries? With reference to the industrial countries, is the TVP wage determination pattern more like the free market one or the life-time employment one?

7.1 Comparison with other studies on Chinese wage determination

In Chapter 4, two studies on Chinese wage determination, Gelb (1990) and Byron and Manaloto (1990), were reviewed.

Comparison with Gelb (1990)

Gelb used the same data set as is used in this study to analyse wage determination in the TVP sector. However, his methodology is slightly different. His model combines both human capital variables and the characteristics of the firm in which individuals work. His sample set also combines men and women[1].

The main differences between the findings reported in Gelb (1990) and those listed in the previous chapters can be summarised as follows:

(1) The rate of return to labour market experience is much lower in Gelb's work than is found in this study. His estimation shows that for each additional year of experience, an individual's wage increases by 1 per cent[2]. In this study it is found that for total male employees, the rate of return is 2.8 per cent per annum to firm tenure and 3 per cent to other job experience.

As age is used as a proxy for total experience in Gelb's analysis, his model can be written as follow (model 1):

Model 1: $$ln(w)=\alpha_1+\beta_1 X+u \quad (1)$$

where X is the variable of age and it can be decomposed as:

$$X=S+7+X_1+X_2 \quad (2)$$

where S=years of schooling
X_1=other job experience
X_2=firm tenure.

If we substitute equation (2) into (1), model 1 becomes:

$$ln(w)=(\alpha_1+7\beta_1)+\beta_1 S+\beta_1 X_1+\beta_1 X_2+u \quad (3)$$

Equation (3) is the model estimated in this study. Therefore, it is possible to compare Gelb's result for total experience to the results for firm tenure and other job experience in this study. If, instead of the variable of age, both firm tenure and other

[1] Gelb's main findings for the human capital variables are reported in Section 4 of Chapter 4.
[2] See Gelb's model 5 in Appendix A of Chapter 4.

job experience were included in his study, it is likely that the rate of return to both other job experience and firm tenure would be about 1 per cent. They are, obviously, lower than what have been found in this study.

The reasons for this difference might be:

(a) In Gelb's regression, 48 firm dummies are included instead of the 3 county dummies used in this study. These firm dummies not only capture the regional differences but the characteristics of firms which cannot be captured in this study. Therefore, a certain amount of the impact of experience on wage determination presented in this study might be taken over by the firm dummies in his study.

(b) Gelb's regression is estimated for the total sample. Although a female dummy is included, it can only grasp the difference in the intercept between the two gender groups. The differences in slopes are ignored. This study estimates wage equations for the two gender groups separately.

Moreover as mentioned in Chapter 4, if Mincer's measurement *j* as a proxy for total experience is used, the estimated coefficient for total experience for female tends to be biased downward. As shown in the above, Gelb's model can be rewritten as equation (3), in which X_1+X_2 is equivalent to *j*. In this case, if both men and women are included in the regression, the combined coefficient tends to be biased downward compared with the result for male employees only.

(2) Education seems to be an insignificant determinant of earnings in Gelb's study for the total sample. This result is also found in this study at the same level of aggregation. However, by using age as measurement of total experience, his estimation for education is more biased. Suppose instead of equation (1), his estimated equation is:

$$ln(w)=\alpha_1+\beta_1 X+\beta_2 S+u \qquad (4)$$

Then, if we substitute equation (2) into (4), his estimated equation becomes:

$$ln(w)=(\alpha_1+7\beta_1)+(\beta_1+\beta_2)S+\beta_1 X_1+\beta_1 X_2+u \qquad (5).$$

This implies the coefficient for X (age) has captured a part of the effect of education, while in Gelb's estimation only β_2 is reported as the effect of education.

Apart from this measurement problem, the level of aggregation used by Gelb is also a cause of concern. In this study it is found that education is not a significant determinant for the wage determination of the total male sample. But the results in Chapter 6 show that education matters for the earnings of the market-oriented group but not for the non-market group. This study also provides a possible explanation for this difference through the study of the piece rate and time rate groups separately. It is most likely that the difference in the role of education arises because of the underlying technological processes between the two groups.

To conclude, when applying similar models to Gelb's we obtained similar results. It is shown in this study, however, that many of his results are misleading and are changed when variables and data are disaggregated. These changes are important and contribute significantly to our understanding of the TVP labour market.

Comparison with Byron and Manaloto (1990)

Byron and Manaloto analysed wage determination in China's urban sector[3]. The differences of findings between their study and those reported in Chapters 5 and 6 can be attributed to the different wage determination patterns in the rural and urban industrial sectors.

The data set used in the study by Byron and Manaloto includes both men and women. Differences between the two groups are captured by a female dummy variable. The main differences between their findings and those reported above are: (1) Education is more important in determining earnings for the urban sector than for the rural

[3]In urban China, most people are employed in either state-owned or "big-collective" sectors, the latter is more like the state-owned sector.

sector. A rate of return of 4 per cent for each additional year of schooling was found in Byron and Manaloto's study. This is similar to what has been found for the market group in this study but much higher than for the total male sample in the TVP sector (1 per cent for the total male sample)[4]. (2) The male/female wage gap is bigger in the TVP sector than in the urban sector (20 per cent difference in the TVP sector[5] compared with 9 per cent in the urban sector).

One finding is common to the two sectors: the labour market experience is a more important variable than education.

7.2 Comparison of the earnings distribution in the TVP, Japan and the United States

As mentioned in Chapter 4, employment systems in the industrial economies may be grouped into two different types: lifetime employment (normally represented by Japan) and the relatively flexible employment system (as in the United States). Empirical studies have shown that human capital theory can readily explain wage determination in each of the two cases. However, the rates of return to education, total labour market experience, and especially to firm-specific training are higher for Japan than for the United States. It is usually agreed that the reason for this difference is the different underlying technological processes in the two countries (Mincer and Higuchi, 1988). Japan has had more rapid economic growth and technological change in the past decades compared with the United States. This high rate of technological change requires greater and more continuous training and retraining than in the United States.

In the hypothetical model (see Chapter 4) for the TVP wage determination it was suggested that the experience-earnings profile for the TVP employees should be

[4] See model 1 of Table 5.4 in Chapter 5 and Table 6.2 in Chapter 6.
[5] See Chapter 8.

closer to that of a flexible labour market than Japan. This section examines this proposition.

The return to education

The rate of return to education seems very different for the TVP total male observations to that of the industrial economies. First, the t-ratios for the schooling variable in all four models for the total male sample (see Table 5.4 in Chapter 5) are insignificant, and for models 3 and 4 the sign is even negative. If there is a positive rate of return to schooling the best estimate would be quite low, about 0.8 to 0.9 per cent. However, when the total male sample is sub-divided into the market and non-market groups, it is found that education has a statistically significant impact on wage determination among the market group. The rate of return is about 4 per cent.

In the United States the rate of return to schooling is about 2 to 5 per cent[6] and in Japan it is normally 10 to 20 per cent (see Hashimoto and Raisian, 1985; Mincer and Higuchi, 1988). The return to education for the TVP market group, therefore, is similar to that for the United States.

The experience-earnings profile

Mincer and Higuchi (1988) estimate earnings equations for both the United States and Japan. The simple version of their estimated model is:

$$ln(w) = \alpha_0 + \alpha_1 E + \alpha_2 E^2 + \alpha_3 X + \alpha_4 X^2 + \alpha_5 T + \alpha_6 T^2 + u$$

where E=years of schooling, X=total experience, and T=firm tenure.

In Hashimoto and Raisian's study on the United States and Japanese wage determination, total experience (Mincer's definition, *j*) and firm tenure are used as proxies for general training and firm-specific training. Their estimated model is about

[6] The rates of return to education are reported to be close to 7 to 10 in U.S. in some other studies (see, for example, Psacharopoulos, 1985).

the same as the one Mincer and Higuchi used. Two minor differences are: (1) instead of years of schooling they used dummies for each level of education; (2) in addition to the experience variables and their squared terms, they have a total experience and a firm tenure interaction term. Apart from these differences, Hashimoto and Raisian estimated their earnings equations using data disaggregated by size of firms (small, medium and large).

The coefficients for total experience and firm tenure estimated in Mincer and Higuchi's and in Hashimoto and Raisian's studies are shown in Table 7.1 and Table 7.2, respectively.

Table 7.1
The rate of return to experience in the United States and Japan
(Mincer and Higuchi)

	TEXP	$TEXP^2$	FT	FT^2
Japan	0.039	-0.0007	0.063	-0.0008
	(8.87)	(-6.85)	(14.80)	(-5.89)
United States	0.024	-0.0004	0.023	-0.0004
	(14.33)	(-10.96)	(14.16)	(-7.24)

Table 7.2[7]
The rate of return to experience in the United States and Japan
(Hashimoto and Raisian)

	United States		Japan	
	small firm	**large firm**	**small firm**	**large firm**
TEXP	0.050	0.037	0.038	0.021
	(22.2)	(16.4)	(15.4)	(4.9)
TEXP²	-0.001	-0.0007	-0.0005	-0.0003
	(-21.5)	(-13.0)	(-12.4)	(-4.1)
FT	0.020	0.012	0.061	0.069
	(4.8)	(4.3)	(9.1)	(11.7)
FT²	-0.0006	-0.0003	-0.0003	-0.0013
	(-4.0)	(-3.6)	(-0.8)	(-5.6)
TEXP×FT	0.0003	0.0003	-0.0012	-0.00001
	(1.8)	(2.3)	(-6.1)	(-0.1)

Unfortunately, it has been found in the previous chapters that total experience and firm tenure are highly correlated in the TVP wage equation. To circumvent the problem of multicollinearity, other job experience was used in the earnings equation instead of total experience.

To compare the rate of return to experience in the United States and Japan to that in the TVP firms, the earnings equation for the TVP sector is re-estimated using total experience and firm tenure[8]. The rates of return to total experience and firm tenure

[7] In this table, only the results for small and large firms are reported. The reason for choosing these two categories is that the small firms are similar to the TVP firms in terms of firm size, while the large firms in Japan are commonly regarded as representative of the lifetime employment system. The similar results found for these two types of firms seem to reinforce the suggestion that even in the small Japanese firms, long-term employment relationships are pursued (for a detailed analysis about the steeper tenure-earnings profile in Japan, see Chapter 4).

[8] OLS estimates are still BLUE in the presence of the problem of multicollinearity. The only consequence of this is that the variances of the coefficients will be large so that the observed *t*-ratios will be low (see Stewart and Wallis, 1986). Furthermore, according to Koutsoyiannis (1977), "if the purpose of the estimation is to forecast the values of the dependent variable, then we may include the intercorrelated variables and ignore the problems of multicollinearity, provided that we are certain that the same pattern of intercorrelation of the explanatory variables will continue in the period of prediction." Therefore, comparing the results for the TVP sector with the problem of multicollinearity to the other studies will still give us sensible insights.

for the TVP total male employees and for the staff and workers separately are shown in Table 7.3[9].

Table 7.3
The rate of return to experience in the TVP sector

	total	workers	staff
TEXP	0.038	0.020	0.045
	(6.7)	(3.07)	(5.71)
$TEXP^2$	-0.0006	-0.0002	-0.0009
	(-4.86)	(-1.73)	(-5.05)
FT	0.008	0.033	-0.015
	(0.67	(2.23)	(-1.17)
FT^2	-0.0003	-0.0014	0.0004
	(-0.75)	(-2.21)	(0.76)

The comparison of the effects of total experience and firm tenure on wage determination in Japan and the United States to that in the TVP sector can be shown by the total experience-earnings and tenure-earnings profiles. The usual way of deriving the experience-earnings profile is as follows: (1) Evaluate the starting wage at the mean values of all variables. (2) Compute the effect of change in total experience or firm tenure on wage by setting the variables of experience at various years while keeping the other variables at their mean values and computing the new wage level.

However, it is impossible to derive the profiles for the United States and Japan in this normal way as the whole set of mean values of the explanatory variables in the regression were not reported. In this study, therefore, the profiles are derived by ignoring the effect of the other variables and simply looking at the effect of total experience or firm tenure on wage determination. In other words, when the total

[9] The estimated results for the total male sample with total experience and firm tenure have been reported in Appendix A in Chapter 5. The results for the male staff and workers separately are presented in Appendix A in this chapter.

experience-earnings profile is derived, the estimated earnings equation is assumed to be:

$$ln(w)=\beta_1 TEXP+\beta_2 TEXP^2$$

Similarly, the equation for the firm tenure profile is assumed to be:

$$ln(w)=\beta_1 FT+\beta_2 FT^2$$

The comparison of the total experience-earnings and firm tenure-earnings profiles for the United States, Japan and the TVP sector are shown in Figures 7.1 and 7.2, respectively[10].

[10] Mincer and Higuchi's estimations are used for Figures 7.1 and 7.2.

Figure 7.1
Comparison of total experience-earnings profiles

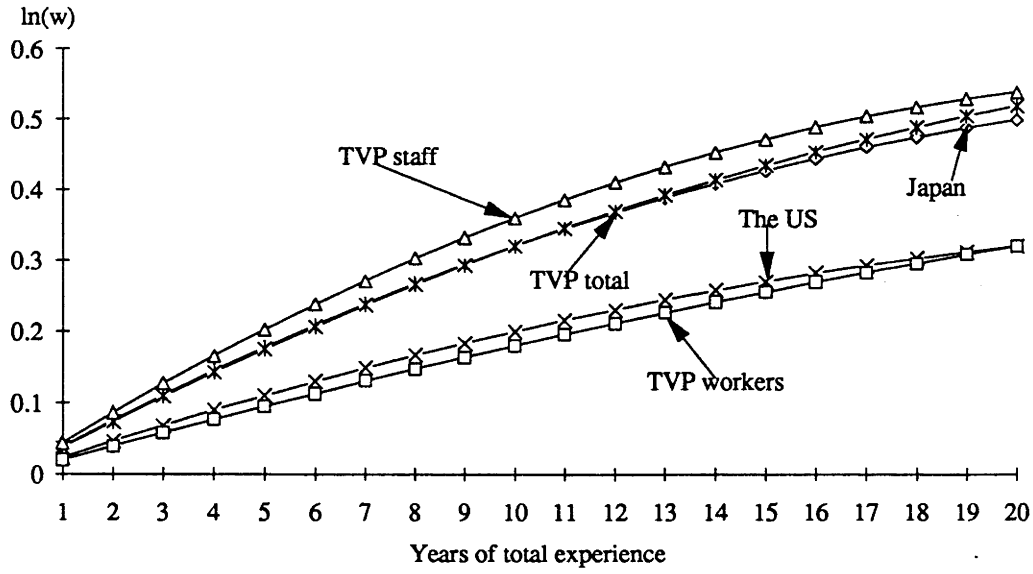
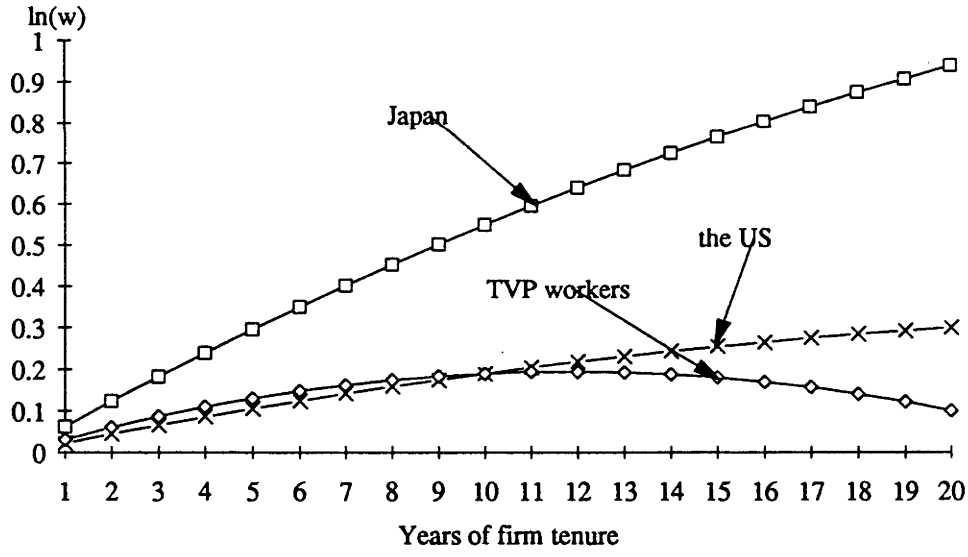


Figure 7.2
Comparison of firm tenure-earnings profiles



The total experience-earnings profile for the TVP sector, aggregating both staff and workers, is virtually the same as that for Japan and much steeper than that for the United States. For staff alone the relationship is steeper than that for Japan. For workers the profile is similar to that of the United States (see Table 7.1). The return to firm tenure for the TVP staff is negative, and for the total sample is very low.

Figure 7.2 only compares the profile for the TVP workers to those for Japan and the United States. The relationship for the TVP workers is similar to that for the United States but far away from the Japanese one. Therefore, it can be concluded that the effect of experience on wage determination for the TVP workers is more like the United States case than the Japanese one[11].

This result accords well with the proposition drawn from the hypothetical model of TVP wage determination. The reason why the TVP workers' profiles more closely resemble that of the United States rather than that of Japan might be because the TVP firms pay their workers according to their spot labour productivity. Compared with Japan, the United States employment model is closer to that of the general training case, where employees are paid according to their spot labour productivity.

As Japan is characterised by rapid technological change, more investment in firm-specific training and retraining are required. This in turn requires that employers hold their specialized employees to minimize training costs. Similarly, employees prefer to stay with the specific firm so they can maximize the benefit from their specialized skill. This process generates a steep tenure-earnings profile to ensure that the employees and employers attach to each other. This tenure-earnings profile is higher than the tenure-productivity profile during the training period and lower than that afterwards. Therefore, lifetime employment is an endogenous variable for the Japanese economy which has been created by the wage determination system.

Lifetime employment is also an important feature of the TVP sector, but the outcome is generated by a different process. The community authority controls the firms' employment levels and the only alternative jobs for the employees are in the agricultural sector. Although lifetime employment is similar to that of Japan, the

[11] The profiles for the TVP staff seem to be an anomaly. However, they are consistent with the conclusion drawn in Chapter 5 that the wage determination system for the TVP staff group seems, to a certain extent, to carry on the rewards gained under the old agricultural leadership system.

relationship with the wage determination process is different. In the TVP sector, the wage is not used as an instrument to ensure that the employees stay with the firm but as a tool to induce effort from individuals. If this is true then the payment system must be more similar to that of the flexible market one, where it reflects labour productivity.

7.3 Conclusions

The findings from the above comparisons can be summarised as follows:

(1) The main differences between Gelb's study and the analyses reported in Chapters 5 and 6 seem to come from the differences in the underlying methodology.

(2) The wage determination patterns for urban China and the TVP sector are quite similar.

(3) The wage determination pattern of TVP workers is closer to that of the United States rather than that of Japan.

Appendix 7A

Results of model 1 with total experience for workers and staff separately

	workers	staff
	n=289	n=270
Constant	0.946	1.343
	(7.40)	(9.15)
Schooling	-0.005	-0.011
	(-0.47)	(-1.12)
Total experience (TEXP)		
TEXP	0.020	0.045
	(3.07)	(5.71)
$TEXP^2$	-0.0002	-0.0009
	(-1.73)	(-5.05)
Firm specific tenure (FT)		
FT	0.033	-0.015
	(2.23)	(-1.17)
FT^2	-0.014	0.0004
	(-2.21)	(0.76)
County dummies:		
Jieshou	-0.209	-0.291
	(-3.74)	(-5.02)
Shangrao	-0.214	-0.658
	(-2.287)	(-8.35)
Nanhai	0.799	0.207
	(8.44)	(2.97)
Breusch-Pagan Chi-Squared	36.02 (8)	4.40 (8)
Adjusted R^2	0.43	0.37

PART III

FEMALE WAGE DETERMINATION AND THE GENDER WAGE DIFFERENTIAL

There is a significant gender wage differential in both industrial and developing economies. This is evidenced by the following table:

Female/male wage ratio in some of the industrial and developing countries

	wage ratio	date	definition
Industrial countries			
US	64.7	1987	
Britain	69.5	1984	hourly wage
Australia	78.2	1985	hourly wage
Japan	51.8	1985	monthly wage
Developing countries			
Hong Kong	76.8	1985	daily wage
Korea	47.8	1985	monthly wage
Singapore	68.6	1985	hourly wage
China: TVP	77.8	1985	daily wage

Note: Data for Britain, Australia, Japan, Hong Kong, Korea and Singapore are calculated according to Table 16 of ILO Statistical Yearbook, 1986; data for the United States are from Hawke (1991) and is from the 1987 Current Population Survey.

Part II has examined wage determination in the TVP male labour market. This part of the thesis intends to analyse female wage determination. In particular, the structural difference of wage determination between male and female labour markets (Chapter 8), and the impact of gender wage discrimination on individual wage determination, both in terms of within occupational wage discrimination (Chapter 9) and discrimination of occupational distribution (Chapter 10), are examined.

8

DIFFERENCES IN THE STRUCTURE OF WAGE DETERMINATION BETWEEN MEN AND WOMEN

Female employees account for about 45 per cent of the total sample. The mean values and standard deviations of the wage, schooling, total experience, firm tenure and some other variables for the gender groups are shown in Table 8.1.

Table 8.1
Statistical characteristics of the variables by gender

	total		workers		staff	
	men	women	men	women	men	women
YW	1455	1125	1325	1083	1610	1286
	(948.3)	(692.2)	(1046)	(686.06)	(865)	(695.9)
DW	4.5	3.5	4.2	3.4	4.8	3.8
	(2.88)	(1.88)	(3.2)	(1.89)	(2.4)	(1.84)
LDW	1.35	1.15	1.24	1.13	1.47	1.23
	(0.54)	(0.46)	(0.6)	(0.45)	(0.5)	(0.51)
EDU	8.8	8.09	8.0	7.8	9.7	9.0
	(2.9)	(2.83)	(2.8)	(2.80)	(2.8)	(2.74)
AGE	30.9	27.3	27.8	26.3	34.3	31.2
	(10)	(7.88)	(9.1)	(7.53)	(9.7)	(8.00)
TEXP	15.2	12.2	12.8	11.4	17.6	15.1
	(10.6)	(8.36)	(10.1)	(8.21)	(10.7)	(8.30)
OJ	9.4	7.8	7.8	7.4	11.0	9.2
	(9.6)	(7.12)	(8.3)	(6.97)	(10.3)	(7.55)
FT	5.8	4.4	5.1	4.0	6.7	6.0
	(5.1)	(3.83)	(4.8)	(3.38)	(5.5)	(4.92)
AEXP	5.6	5.5	5.0	5.3	6.0	6.1
	(7.5)	(6.54)	(6.7)	(6.54)	(8.1)	(6.51)
ONAJ	3.9	2.2	2.8	1.9	5.0	3.2
	(6.6)	(4.01)	(5.3)	(3.38)	(7.5)	(5.75)

Note: (1) Standard deviations are in parentheses;
(2) All the variable notations follow those used in Table 5.2 of Chapter 5.

The female-male daily wage ratio is calculated from the data in Table 8.1 to be 77.8 per cent (85 per cent in logarithm of the daily wage) for the total sample, and the average male wage is 28.6 per cent higher than that of women. The female-male

earnings ratio for workers is slightly higher than for staff. These ratios are 81 per cent and 79.2 per cent, respectively.

In general, women are about 3 years younger than men in the sample. However, they have approximately the same years of schooling as their male co-employees (8.8 *vs.* 8.1). Hence, their total experience is about 3 years less than men. While the other job experience, other non-agricultural experience and firm tenure of women are shorter than for men, women have about the same years of agricultural experience as men.

There are several features which have been discovered when the male wage determination is investigated (refer to Part II):

(1) Education seems to play an insignificant role in total male employees' wage determination. However, it has a significant impact on the earnings of the market group.

(2) Agricultural experience is very significant in staff wage determination, while firm tenure plays an important role in workers' wage determination.

(3) The time rate workers' wage structure is similar to that of the piece rate workers and differs from the time rate staff's wage structure.

This Chapter investigates whether the same wage determination structure applies to the female labour market in the TVP sector.

8.1 A comparison of the structure of wage determination between total male and female employees

To understand whether the structure of wage determination for women is similar to that for men, separate regressions are estimated for the total male and female observations. The results are shown in Table 8.2.

Table 8.2
Regression results of models 1 to 4 for men and women separately

	models							
	1		2		3		4	
	female n=427	male n=529	female n=346	male n=457	female n=423	male n=525	female n=411	male n=511
Constant	0.719	1.016	0.716	1.068	0.754	1.105	0.741	1.113
	(8.28)	(10.69	(7.73)	(9.89)	(8.53)	(11.50)	(8.13)	(11.10)
Schooling	0.022	0.011	0.018	0.007	0.018	-0.002	0.018	-0.002
	(3.10)	(1.63)	(2.22)	(0.85)	(2.51)	(-0.25)	(2.51)	(-0.30)
Other job experience (OJ)								
OJ	0.018	0.029			0.019	0.025	0.022	0.025
	(2.02)	(5.48)			(2.09)	(4.76)	(2.46)	(4.53)
OJ^2	-0.0003	-0.0006			-0.0003	-0.0005	-0.0004	-0.0005
	(-0.75)	(-3.83)			(-0.83)	(-3.55)	(-1.15)	(-3.42)
Firm tenure (FT)								
FT	0.058	0.028	0.058	0.032	0.055	0.022	0.054	0.022
	(4.52)	(2.80)	(3.98)	(2.91)	(4.23)	(2.21)	(4.11)	(2.21)
FT^2	-0.002	-0.0007	-0.002	-0.0009	-0.0017	-0.0007	-0.0017	-0.0007
	(-2.84)	(-1.93)	(-2.43)	(-2.14)	(-2.89)	(-1.85)	(-2.85)	(-1.89)
Oth. non-agri. exp. (ONAJ)								
ONAJ			0.028	0.023				
			(2.40)	(3.76)				
$ONAJ^2$			-0.0008	-0.0005				
			(-1.35)	(-2.91)				
Agri. experience (AEXP)								
AEXP			0.017	0.025				
			(1.52)	(3.18)				
$AEXP^2$			-0.0001	-0.0005				
			(-0.12)	(-2.21)				
Occupational dummies:								
Shift leader					-0.110	0.095	-0.136	0.100
					(-1.62)	(1.52)	(-1.91)	(1.53)
Operational personnel					-0.048	0.106	-0.059	0.124
					(-0.66)	(1.66)	(-0.80)	(1.90)
Technical personnel					0.243	0.140	0.248	0.127
					(2.45)	(1.96)	(2.44)	(1.78)
Ordinary staff					-0.075	0.116	-0.043	0.115
					(-0.76)	(2.03)	(-0.42)	(2.01)
Middle level staff					0.197	0.298	0.211	0.297
					(1.95)	(4.71)	(2.10)	(4.66)
Number of children (NC)								
NC							-0.017	0.002
							(-0.75)	(0.13)
County dummies:								
JS	-0.254	-0.274	-0.214	-0.309	-0.247	-0.255	-0.228	-0.266
	(-5.92)	(-6.28)	(-4.55)	(-6.36)	(-5.74)	(-5.90)	(-5.05)	(-5.86)
SR	-0.467	-0.441	-0.459	-0.495	-0.443	-0.406	-0.415	-0.400
	(-6.07)	(-8.19)	(-5.10)	(-8.77)	(-5.81)	(-7.16)	(-5.34)	(-6.49)
NH	0.235	0.529	0.197	0.481	0.253	0.536	0.260	0.538
	(4.47)	(7.70)	(3.29)	(6.61)	(4.79)	(7.81)	(4.74)	(7.50)
Breusch-Pagan χ^2	37.9 (8)	47.0 (8)	38.8 (10)	47.6 (10)	51.2 (13)	54.4 (13)	52.3 (14)	55.1 (14)
Adjusted R^2	0.35	0.34	0.34	0.34	0.37	0.36	0.36	0.36

In addition to these separate regressions, a set of F-tests is conducted. The results suggest that for all four models, wage determination patterns for women are different from those for men. Pooled data tests are also applied and provide detailed information on coefficient differences for each particular variable for men and women. The results are displayed in Appendix A[1]. They suggest that:

(1) The coefficient for schooling in all the models is statistically significant and positive for women. As indicated earlier, education is not significant for men. The rate of return to education for women is approximately 2 per cent for each additional year of schooling[2]. Pooled data tests indicate that the coefficient for education has statistically different effects on male and female wage determination for two of the four models (see Appendix A).

(2) Other job experience is important for both men and women, but the nature of the relationship appears to be different. For women the relationship is a positive linear one (the coefficient of the quadratic term is insignificant), but for men it is quadratic. The profile appears steeper for men than for women. This pattern is consistent across all models. However, pooled data tests suggest that these difference are not significant.

(3) The coefficients for firm tenure are statistically significant for both men and women, and both relationships appear to be quadratic. The slope of the profile is steeper for women than for men. And this difference is statistically significant.

(4) The results for model 2 indicate that, in comparison with wage determination in the male labour market, firm tenure is a more important experience variable than

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[1] F-tests are: for model 1 $F(9, \infty)=9.82>1.88$, for model 2 $F(11, \infty)=6.2>1.75$, for model 3 $F(14, \infty)=5.95>1.67$, and for model 4 $F(15, \infty)=5.62>1.67$. As for all four models the test statistics are greater than the critical values, the null-hypotheses of no structural change can be rejected.

[2] Although the coefficient of schooling for women is still very low, the difference between rate of return to education for men and women is statistically significant so that it is worthwhile to analyse.

either other non-agricultural job experience or agricultural experience in the female labour market. But the difference is not statistically significant.

(5) The occupational dummies for shift leader, operational personnel and ordinary staff for women have negative (but insignificant) effects on wage determination which is contrary to that for men.

In summary, the most important structural difference of wage determination between total men and women is the impact of education on wages.

It is usual for returns to education to be higher for women than for men. Carnoy and Marenbach (1975) found that the rates of return to education have often been higher for women than for men in the United States. The same result was also found by Gwartney and Long (1978). Psacharopoulos' (1985) review of the rate of return to education for 56 countries shows that in developing countries the rate of return for women exceeds that for men. Chua (1984) found similar results in Malaysia.

Three reasons can be advanced to explain this phenomenon. First, when Mincer's definition of total experience *j* is used as a proxy for work experience, it ignores the discontinuity of women's labour market experience. Therefore the coefficient of schooling tends to be overestimated for women (see Chapter 4 for detailed analysis).

In industrial countries, women normally have a long layoff period when they have children. However, this is not usual in developing countries, especially in rural areas. Moreover, China has had a "one family one child" policy for about ten years. This would reduce the female time out of the labour market. Furthermore, before 1985 in urban China, women normally only had 56 days away from work when they bore a child. The period of layoff in rural China is shorter than in urban areas. The discontinuity of total labour market experience[3], therefore, is quite minor for women

[3] In our case it is other job experience, which is obtained by subtracting firm tenure from total experience.

in the TVP sector. This suggests that the upward bias of the schooling coefficient for women cannot be the main reason for the higher rate of return to education to women. The empirical results support this view. There are a number of methods suggested to overcome the problem of inaccuracies resulting from the use of the Mincer experience proxy in the female earnings equation. Unfortunately, actual labour market experience is not available in the data set used in this study. However, it is possible to adjust female other job experience by considering their possible marital status[4], the number of children and other relevant issues. The estimated results with an adjusted labour market experience variable compared with those with the unadjusted data are shown in Appendix B. With an adjusted other job experience proxy the rate of return to education for women is even higher than that estimated with the unadjusted other job experience proxy.

A second reason why women earn a higher return to education has been suggested by Psacharopoulos (1985) who explains the higher rate of return to education for women by the fact that educated women tend to work more weeks per year and a greater number of hours than uneducated women[5].

This is unlikely to be an important explanation for the higher rate of return to education for women compared with men in the TVP sector. The dependent variable used in the wage equation in this study is the daily wage in log form. Compared with either the weekly or yearly wage, it provides relatively accurate information for computing the rate of return to education. Besides, according to the data, there is no

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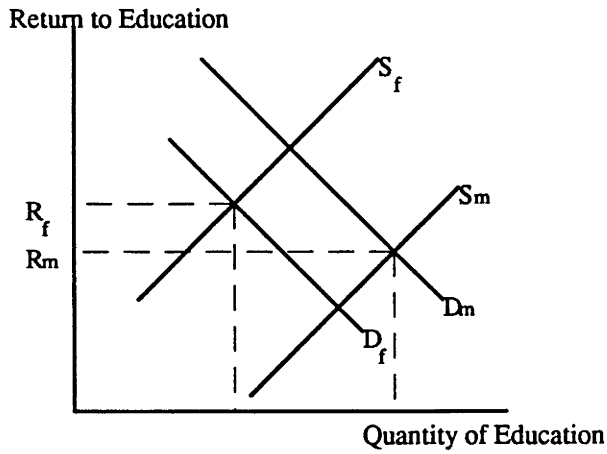
[4] As marital status is not available in the data set, it is captured by the variable of age. For details on the adjustment, see Appendix B.

[5] The basic idea behind Psacharopoulos' explanation can be presented using the following example. Suppose there are two education levels, primary school and high school. The wage level for both men and women for high school graduates is $2.00 per hour, while for the primary school graduates it is $1.50 per hour. However, women high school graduates work 52 weeks a year and 40 hours per week and women primary school graduates work 40 weeks per year and 35 hours per week. For men of both high school and primary school graduates the labour market participation is the same. Under this situation, the estimated rate of return to education will be higher for women than for men as the opportunity cost of education for women is lower than that for men ($2100 for women and $3120 for men). But if hourly wage data are available, this will not be a serious problem.

real difference in labour market participation between highly-educated women and less-educated women[6]

A third reason for the higher rate of return to education for women may be derived from differences in the demand for and supply of education between men and women (Sloane, 1985). As illustrated in Figure 8.2, in the education market, there are upward-sloping supply curves for education showing that as individuals increase their investment in education, the costs of funds increase. The downward-sloping demand curves indicate that, as individuals increase their investment in education, there will be deceasing rates of return. It is reasonable to suppose that in the developing countries women have a lower demand for education, say D_f in Figure 8.2, than men (D_m). With identical supply curves, the rate of return to education should be higher for men than for women. However, it is also possible that the supply of education for women is less than that for men. In these circumstances, the rate of return to education for women might be lower, equal to, or even higher than that for men, depending upon the relative positions of the supply curves for women.

Figure 8.2
Demand for and supply of education



[6] The average days worked per week for those who have 9 years or less than 9 years education is very close to that of those who have 12 years or more than 12 years education. For the former it is 6.46 and for the latter it is 6.49.

The different situations of demand for and supply of education for men and women may be a more suitable explanation for the fact that the rate of return to education is higher for women than for men. In this regard the most telling fact is that men are given preference over women for education in rural China. According to Knight and Li (1991), on average, men received more years of education than women in China. The national mean difference of the years of education between men and women is 2.3 years. This gender difference is larger in the rural (2.5 years) than in the urban areas (1.8 years). Although the years of education is about the same for men and women in our sample, the rate of return to education is determined by the entire situation of supply of and demand for education for women in rural China.

This explanation, however, does not seem to be strong enough. There might be some other reasons at this stage, for example, firms' demand for male and female education might be different, and this will bring different rate of return to education for men and women.. Further research is needed to establish the relative importance of these explanations.

Further research is needed to enrich our knowledge about the difference between the role of education on male and female wage determinations.

8.2 A comparison of wage structure for male and female workers and staff separately

The second important difference between male and female wage determination is that the coefficient for firm tenure is much higher for women than for men. This difference is statistically significant (see Appendix A). This result may be caused by the difference between men and women in the staff-workers ratio. Table 8.1 indicates that the staff-workers ratio is much higher for men than for women. The results presented in Chapter 5 suggest that firm tenure is more important for the worker group.

However, by comparing the regression results for male and female workers and staff separately it is shown that there are differences in the wage determination patterns of male and female staff. First, firm tenure is an insignificant determinant of male staff wage determination but is significant for the female staff group (see Table 8.3). Second, the ranks of the various labour market experience variables in male and female staff wage determination are slightly different. For the male staff group, agricultural experience is the most significant determinant of their wage structure, other non-agricultural experience ranks second, and firm tenure is insignificant. For the female staff group, other non-agricultural experience is the most important determinant. Agricultural experience is marginally significant (Table 8.4). Although a F-test shows that there is a structural change between the male and female workers, a pooled data test reveals that the difference is mostly attributable to one of the county dummies. For the staff group the F-test indicates that there is a structural change between the wage determination patterns for male and female staff and the pooled data analysis suggests that the significant difference is attributable to two main variables: firm tenure and other non-agricultural experience (see Appendix C)[7].

[7] F-tests are conducted which show that, in general, within each of the workers and staff groups, there is a structural change between men and women for both model 1 and model 2. For the staff group, $F(9,\infty)=4.17$ for model 1 and $F(11,\infty)=3.03$ for model 2. For the workers group, $F(9,\infty)=9.39$ for model 1 and $F(11,\infty)=5.62$ for model 2.

Table 8.3
Model 1 for male and female workers and staff separately

	workers		staff	
	male	female	male	female
	n=271	n=339	n=262	n=92
Constant	0.967	0.716	1.466	0.714
	(7.56)	(7.26)	(9.96)	(2.99)
Schooling	-0.001	0.023	-0.009	0.018
	(-0.08)	(2.81)	(-0.87)	(1.07)
Other job experience (OJ)				
OJ	0.015	0.016	0.031	0.027
	(1.89)	(1.48)	(4.66)	(1.48)
OJ^2	-0.0002	-0.0003	-0.0007	-0.0005
	(-0.77)	(-0.58)	(-3.96)	(-0.74)
Firm tenure (FT)				
FT	0.049	0.055	0.0002	0.063
	(3.47)	(3.86)	(0.02)	(2.08)
FT^2	-0.002	-0.0017	0.0001	-0.002
	(-2.91)	(-2.51)	(0.23)	(-1.28)
County dummies				
Jieshou	-0.219	-0.230	-0.300	-0.352
	(-3.70)	(-4.94)	(-4.96)	(-3.01)
Shangrao	-0.222	-0.401	-0.648	-0.650
	(-2.87)	(-4.42)	(-7.80)	(-4.30)
Nanhai	0.821	0.252	0.211	0.192
	(8.22)	(4.39)	(2.93)	(1.36)
Breusch-Pagan Chi-Squared	36.31 (8)	54.09(8)	7.05 (8)	3.26 (8)
Adjusted R^2	0.41	0.31	0.33	0.39

Table 8.4
Model 2 for male and female staff and workers separately

	workers		staff	
	male	female	male	female
	n=230	n=274	n=230	n=74
Constant	1.012	0.742	1.494	0.770
	(7.23)	(6.91)	(9.22)	(3.14)
Schooling	-0.014	0.016	-0.003	0.009
	(-1.09)	(1.72)	(-0.29)	(0.45)
Firm tenure (FT)				
FT	0.057	0.059	-0.002	0.053
	(3.86)	(3.62)	(-0.13)	(1.61)
FT^2	-0.002	-0.002	0.0002	-0.0014
	(-3.39)	(-2.34)	(0.32)	(-0.88)
Other non-agri. exp. (ONAJ)				
ONAJ	0.024	0.012	0.014	0.062
	(2.82)	(0.92)	(1.66)	(2.74)
$ONAJ^2$	-0.0005	0.0001	-0.0004	-0.002
	(-1.92)	(0.17)	(-1.20)	(-2.32)
Agri. experience (AEXP)				
AEXP	0.012	0.010	0.026	0.036
	(1.03)	(0.26)	(2.92)	(1.75)
$AEXP^2$	-0.0002	0.0002	-0.0007	-0.0009
	(-0.35)	(0.26)	(-2.36)	(-1.02)
County dummies				
Jieshou	-0.212	-0.195	-0.347	-0.305
	(-3.21)	(-3.73)	(-5.35)	(-2.50)
Shangrao	-0.256	-0.385	-0.694	-0.686
	(-2.96)	(-3.44)	(-8.07)	(-4.33)
Nanhai	0.774	0.235	0.189	-0.027
	(7.35)	(3.61)	(2.44)	(-0.15)
Breusch-Pagan Chi-Squared	29.96 (10)	50.54 (10)	9.21 (10)	2.76 (10)
Adjusted R^2	0.40	0.30	0.35	0.40

These results have ruled out the possibility that the reason for the experience variables having different impacts on wage determination within the total sample of men and

women is that the staff/workers ratio is higher for men than for women. More specifically, it might be concluded that the major difference of wage determination between men and women is attributable to the difference between the two staff groups. Female staff's wage structure is similar to that of both male and female workers but is different from that of male staff.

8.3 A comparison of male and female wage structures for the piece rate and time rate groups separately

In the male labour market, the wage structure for time rate workers is similar to that for piece rate workers rather than similar to that for time rate staff. It is important to know whether this pattern carries across to the female labour market.

Table 8.5 shows the regression results for female piece rate and time rate staff and workers separately, from which the following facts are observed:

(1) Firm tenure is a statistically significant determinant of wages for both female piece rate and time rate workers. Although the rate of return to firm tenure is quite high for female time rate staff, its t-ratio is not significant.

(2) Similar to the male labour market, other job experience is not statistically significant in piece rate and time rate workers' wage determination, while it is quite important for time rate staff's wage determination.

(3) Education has a significant effect on the wages of both female piece rate workers and time rate workers, while it is insignificant for the wage determination of time rate staff.

To sum up, it seems that as was reported for the male labour market, the pattern of wage determination for female time rate workers is also close to that of piece rate workers. However, F-tests for structural change between piece rate and time rate workers, and between the time rate staff and time rate workers, indicate that the null-

hypothesis of no structural change cannot be rejected in either case[8]. This suggests that, unlike in the male labour market, the wage determination pattern for the female time rate workers is not statistically different from that for the female time rate staff, and it is also similar to that for the female piece rate workers.

Table 8.5
Model 1 for female piece rate and time rate workers and staff separately[9]

	piece rate	time rate	
	workers n=180	workers n=155	staff n=62
Constant	0.485	0.810	0.846
	(2.91)	(6.81)	(2.93)
Schooling	0.029	0.021	0.004
	(2.37)	(1.86)	(0.19)
Other job experience (OJ)			
OJ	0.019	0.017	0.050
	(1.10)	(1.59)	(2.26)
OJ^2	-0.0004	-0.0003	-0.0013
	(-0.50)	(-0.81)	(-1.65)
Firm tenure (FT)			
FT	0.128	0.038	0.062
	(3.56)	(2.40)	(1.49)
FT^2	-0.0078	-0..0007	-0.0027
	(-3.11)	(-1.03)	(-1.24)
County dummies:			
Jieshou	-0.220	-0.251	-0.397
	(-2.77)	(-4.51)	(-2.79)
Shangrao	-0.292	-0.738	-0.871
	(-2.59)	(-8.08)	(-3.90)
Nanhai	0.320	0.196	0.308
	(3.71)	(2.42)	(1.63)
Breusch-Pagan Chi-Squared	30.22 (8)	25.07 (8)	8.52 (8)
Adjusted R^2	0.26	0.45	0.45

[8] The F-test for structural change between the female piece rate and time rate workers is $F(9,\infty)=1.55$. The result for the time rate workers and staff is $F(9,\infty)=1.02$. These test statistics are both less than the critical value of 1.88. Therefore, in both cases, the null-hypothesis of no structural change can not be rejected.

[9] In this table, the results for piece rate staff are not reported. The reason is that the sample size is too small (26 observations) to get sensible results.

8.4 The market and non-market groups separately

According to Chapter 6, the major differences in the structure of wage determination between the market and non-market male groups are the impacts of education and firm tenure. Education is significant in determining the earnings of the market group, as is firm tenure. For the non-market group, neither education nor firm tenure are significant. However, other job experience is very important in determining wages.

To understand whether the comparison of the wage structures of the market and non-market groups in the female labour market yields conclusions similar to the same pair-wise comparison in the male labour market, the results of separate estimations for the male and female market and non-market groups are reported in Table 8.6.

Table 8.6
Model 1 for male and female market and non-market groups separately

	market		non-market	
	women n=137	men n=182	women n=174	men n=229
Constant	0.601	0.689	1.067	1.91
	(3.50)	(4.24)	(7.07)	(8.90)
Schooling	0.032	0.039	0.015	-0.007
	(2.19)	(3.13)	(1.51)	(-0.68)
Other job experience (OJ)				
OJ	0.006	0.038	0.025	0.029
	(0.30)	(3.13)	(2.29)	(3.56)
OJ^2	0.0002	-0.0007	-0.0005	-0.0008
	(0.21)	(-1.79)	(-1.26)	(-3.20)
Firm tenure (FT)				
FT	0.083	0.039	-0.029	0.007
	(2.96)	(2.05)	(-1.62)	(0.51)
FT^2	-0.0027	-0.0007	0.002	-0.0003
	(-2.19)	(-0.86)	(2.50)	(-0.47)
County dummies:				
Jieshou	-0.287	-0.263	-0.211	-0.185
	(-3.95)	(-3.61)	(-2.92)	(-3.12)
Shangrao	-0.381	-0.382	-0.594	-0.496
	(-2.39)	(-3.12)	(-8.81)	(-6.97)
Nanhai	0.175	0.323	0.428	0.690
	(1.82)	(2.78)	(4.78)	(6.72)
Breusch-Pagan Chi-Squared	24.13 (8)	6.93 (8)	32.93 (8)	23.92 (8)
Adjusted R^2	0.32	0.30	0.42	0.39

Comparing the results for the female market group to those for the female non-market group, it is noted that: (1) Similar to the situation in the male labour market, education plays an important role in wage determination for the female market group but is insignificant in the wage equation estimated for the non-market group in the female labour market. (2) Other job experience is insignificant in determining earnings for the female market group but is significant for the female non-market group. (3) Firm tenure is significant for the female market group's wage determination but insignificant for that of the non-market group. An F-test shows that there is a structural change of wage determination between the female market and non-market groups[10]. However, a pooled data test indicates that apart from firm tenure, the differences presented above are not statistically significant (see Appendix D for a pooled data test).

8.5 Conclusion

In this chapter we investigated the level of the gender wage differential and the differences in the structure of wage determination between men and women. The results are remarkably consistent with conjectures that may be made on the basis of knowledge of the male labour market in the TVP sector. The above analysis indicates that:

(1) In the TVP sector, female employees earn approximately 20 per cent less than men. This wage differential is higher for staff than that for workers.

(2) In general both the return to education and the returns to labour market experiences are higher for women than for men.

(3) The structure of wage determination for women is slightly different from that for men, that is, education has a significant effect on female wage determination but its effect is insignificant in total male wage determination. Apart from this difference,

[10] $F(9,\infty)=3.31$, which is greater than the critical value of 1.88.

the impacts of the different experience variables on wage determination for the female staff group are different from those for male staff.

(4) The situation for the piece rate and time rate wage determination in the female labour market is similar to that in the male labour market. That is, in the female labour market, the wage structure for the time rate workers group is also close to that for the piece rate workers group. However, the disparity of the wage determination patterns for the time rate workers and staff is not statistically significant in the female labour market.

(5) The difference of wage determination patterns between the female market and non-market groups is similar to that in the male labour market.

Appendix 8A

Pooled sample test for the differences of the coefficients for the two gender groups

	models			
	1	2	3	4
	n=952	n=799	n=944	n=918
Constant	1.017	1.069	1.108	1.115
	(10.69)	(9.89)	(11.51)	(11.11)
Schooling	0.011	0.007	-0.002	-0.002
	(1.66)	(0.88)	(-0.24)	(-0.29)
Other job experience (OJ)				
OJ	0.029		0.025	0.025
	(5.45)		(4.75)	(4.52)
OJ^2	-0.0006		-0.0005	-0.0005
	(-3.81)		(-3.55)	(-3.42)
Firm tenure (FT)				
FT	0.027	0.032	0.021	0.021
	(2.74)	(2.83)	(2.12)	(2.12)
FT^2	-0.0007	-0.0009	-0.0006	-0.0007
	(-1.89)	(-2.09)	(-1.79)	(-1.82)
Other non-agri. exp. (ONAJ)				
ONAJ		0.023		
		(3.75)		
$ONAJ^2$		-0.0005		
		(-2.91)		
Agri. experience (AEXP)				
AEXP		0.025		
		(3.17)		
$AEXP^2$		-0.0005		
		(-2.01)		
Occupational dummies:				
Shift leader (SL)			0.096	0.101
			(1.53)	(1.55)
Operational personnel (OP)			0.107	0.125
			(1.66)	(1.90)
Technical personnel (TP)			0.141	0.128
			(1.97)	(1.80)
Ordinary staff (OS)			0.118	0.117
			(2.06)	(2.04)
Middle level staff (MS)			0.300	0.299
			(4.73)	(4.68)
No. of children in the family (NC)				
NC				0.002
				(0.10)

(continued overleaf)

County dummies:				
Jieshou	-0.277	-0.311	-0.258	-0.268
	(-6.30)	(-6.37)	(-5.95)	(-5.90)
Shangrao	-0.437	-0.491	-0.403	-0.395
	(-8.02)	(-8.58)	(-7.00)	(-6.34)
Nanhai	0.529	0.481	0.536	0.538
	(7.71)	(6.61)	(7.81)	(7.50)
Female dummy	-0.299	-0.353	-0.353	-0.373
	(-2.32)	(-2.48)	(-2.70)	(-2.75)
FEDU	0.011	0.011	0.020	0.021
	(1.13)	(0.98)	(1.92)	(1.95)
FOJ	-0.011		-0.007	-0.002
	(-1.04)		(-0.62)	(-0.22)
FOJ^2	0.0003		0.0002	0.0001
	(0.71)		(0.50)	(0.16)
FFT	0.030	0.026	0.033	0.033
	(1.86)	(1.40)	(2.04)	(1.96)
FFT^2	-0.001	-0.0009	-0.001	-0.001
	(-1.42)	(-1.06)	(-1.51)	(-1.47)
FONAJ		0.005		
		(0.35)		
$FONAJ^2$		-0.0003		
		(-0.48)		
FAEXP		-0.008		
		(-0.55)		
$FAEXP^2$		0.0005		
		(0.82)		
FSL			-0.206	-0.237
			(-2.22)	(-2.45)
FOP			-0.155	-0.183
			(-1.59)	(-1.85)
FTP			0.103	0.120
			(0.84)	(0.97)
FOS			-0.193	-0.161
			(-1.70)	(-1.37)
FMS			-0.101	-0.086
			(-0.85)	(-0.72)
FNC				-0.019
				(-0.65)
FJS	0.019	0.094	0.008	0.037
	(0.32)	(1.38)	(0.14)	(0.58)
FSR	-0.025	0.036	-0.036	-0.016
	(-0.27)	(0.33)	(-0.37)	(-0.16)
FNH	-0.293	-0.284	-0.282	-0.277
	(-3.39)	(-3.02)	(-3.26)	(-3.07)
Breusch-Pagan Chi-Squared	96.2 (17)	95.2 (21)	115.9 (27)	117.4 (29)
Adjusted R^2	0.37	0.37	0.39	0.39

Note: All the terms with F in front are the female interaction terms on the other variables.

Appendix 8B

Comparison of regression results for the model with adjusted and unadjusted other job experience for model 1

	unadjusted	adjusted
	n=427	n=427
Constant	0.719	0.713
	(8.28)	(8.07)
Schooling	0.022	0.023
	(3.10)	(3.19)
Other job experience (OJ)		
OJ	0.018	0.018
	(2.02)	(1.93)
OJ^2	-0.0003	-0.0003
	(-0.75)	(-0.62)
Firm tenure (FT)		
FT	0.058	0.060
	(4.52)	(4.69)
FT^2	-0.002	-0.0018
	(-2.84)	(-2.90)
County dummies:		
Jieshou	-0.254	-0.256
	(-5.92)	(-5.97)
Shangrao	-0.467	-0.468
	(-6.07)	(-6.08)
Nanhai	0.235	0.234
	(4.47)	(4.45)
Breusch-Pagan Chi-Squared	37.91 (8)	38.85 (8)
Adjusted R^2	0.35	0.35

Note: The other job experience is adjusted as follows:

(1) for women aged less than 20, the adjusted total experience is equal to the unadjusted total experience because by China's Marriage Law, women cannot marry until 20 years old;

(2) for women aged between 20 and 26, the adjusted total experience is calculated as unadjusted total experience minus 0.5 year. This is because the policy of "one family one child" was implemented towards the end of the 1970s. Women married after that until 1985 were aged 20 to 26. I assume that women in this age group have 1 or 2 children, so the maximum layoff is about half of one year;

(3) for women aged between 26 and 35, the adjusted total experience is calculated as unadjusted total experience minus 1 year, and for women older than 35 it is calculated as unadjusted total experience minus 2 years.

Appendix 8C

Model 1 and 2 for data pooled across men and women

	models			
	1		2	
	workers n=606	staff n=354	workers n=504	staff n=304
Constant	0.968	1.466	1.015	1.494
	(7.55)	(9.87)	(7.24)	(9.26)
Schooling	-0.0002	-0.009	-0.013	-0.003
	(-0.02)	(-0.86)	(-1.03)	(-0.29)
Other job experience (OJ)				
OJ	0.014	0.031		
	(1.84)	(4.62)		
OJ^2	-0.0002	-0.0007		
	(-0.72)	(-3.92)		
Firm tenure (FT)				
FT	0.048	0.0002	0.055	-0.002
	(3.36)	(0.02)	(3.71)	(-0.13)
FT^2	-0.0017	0.0001	-0.0019	0.0002
	(-2.86)	(0.23)	(-3.31)	(0.32)
Other non-agri. exp. (ONAJ)				
ONAJ			0.024	0.014
			(2.81)	(1.67)
$ONAJ^2$			-0.0005	-0.0004
			(-1.92)	(-1.21)
Agri. experience (AEXP)				
AEXP			0.011	0.026
			(1.00)	(2.93)
$AEXP^2$			-0.0001	-0.0007
			(-0.32)	(-2.37)
County dummies:				
Jieshou	-0.223	-0.299	-0.218	-0.347
	(-3.75)	(-4.91)	(-3.26)	(-5.37)
Shanrao	-0.208	-0.648	-0.244	-0.694
	(-2.64)	(-7.73)	(-2.74)	(-8.10)
Nanhai	0.820	0.211	0.774	0.190
	(8.22)	(2.90)	(7.34)	(2.45)
Female dummy	-0.253	-0.75	-0.274	-0.724
	(-1.56)	(-2.72)	(-1.55)	(-2.45)
FEDU	0.024	0.027	0.030	0.013
	(1.68)	(1.39)	(1.89)	(0.53)
FOJ	0.0018	-0.004		
	(0.13)	(-0.20)		
FOJ^2	-0.0001	0.0002		
	(-0.20)	(0.31)		

(continued overleaf)

FFT	0.006	0.063	0.003	0.055
	(0.32)	(1.93)	(0.14)	(1.50)
FFT^2	0.00001	-0.002	0.0001	-0.0015
	(0.02)	(-1.30)	(0.09)	(-0.92)
FONAJ			-0.012	0.047
			(-0.74)	(1.93)
$FONAJ^2$			0.0006	-0.0019
			(0.75)	(-1.82)
FAEXP			-0.0018	0.010
			(-0.10)	(0.43)
$FAEXP^2$			0.0003	-0.0002
			(0.43)	(-0.24)
FJS	-0.010	-0.053	0.019	0.042
	(-0.14)	(-0.41)	(0.22)	(0.30)
FSR	-0.185	-0.001	-0.130	0.008
	(-1.52)	(-0.01)	(-0.89)	(0.04)
FNH	-0.568	-0.019	-0.538	-0.217
	(-4.94)	(-0.12)	(-4.34)	(-1.09)
Breusch-Pagan Chi-Squared	97.84 (17)	10.31 (17)	83.44 (21)	12.60 (21)
Adjusted R^2	0.38	0.38	0.37	0.40

Appendix 8D

Pooled data test for female market and non-market groups
(n=311)

variables	coefficients	variables	coefficients
Constant	1.067	**Market dummy**	-0.466
	(7.82)		(-2.12)
Schooling	0.015	MEDU	0.168
	(1.51)		(0.95)
Other job experience (OJ)			
OJ	0.025	MOJ	-0.018
	(2.29)		(-0.80)
OJ^2	-0.0005	MOJ^2	0.0007
	(-1.26)		(0.77)
Firm tenure (FT)			
FT	-0.029	MFT	0.111
	(-1.62)		(3.37)
FT^2	0.002	MFT^2	-0.0047
	(2.50)		(-3.21)
County Dummies:			
Jieshou	-0.211	MJS	-0.076
	(-2.92)		(-0.74)
Shangrao	-0.594	MSR	0.213
	(-8.81)		(1.23)
Nanhai	0.428	MNH	-0.253
	(4.78)		(-1.93)
Breusch-Pagan Chi-Squared	58.27 (17)		
Adjusted R^2	0.43		

Note: All the terms with M in front are the market interaction terms on the other variables.

9

DECOMPOSITION OF GENDER WAGE DIFFERENTIALS WITHOUT CONSIDERING OCCUPATIONAL SEGREGATION

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, that is unequal pay for equal work, and discrimination in the distribution of the male and female work forces across occupations.

This chapter assesses the influence of gender wage discrimination (without considering gender occupational segregation) on individual wage determination in the TVP sector.

9.1 Methodologies for estimating wage discrimination without considering gender occupational segregation

Estimating wage discrimination within an occupation

Gary Becker (1957), in *The Economics of Discrimination*, first defined the "discrimination coefficient" to measure the pure discrimination effect. His definition for the market discrimination coefficient is presented as:

$$MDC=(W_m/W_f)-(W_m/W_f)^0$$

where W_m and W_f are the equilibrium wage rates of men and women, respectively, and W_m^0 and W_f^0 are the equilibrium wage rates without discrimination for males and females, respectively.

In the extreme case, where men and women are perfect substitutes, $W_m^0=W_f^0$ and so the market discrimination coefficient becomes:

$$MDC=(W_m-W_f)/W_f$$

The main problem for estimating Becker's MDC is to estimate $(W_m/W_f)^0$. This is unobservable. Blinder (1973), however, developed a simple approach to enable the female/male wage differential to be decomposed into the portion due to differing individual characteristics, such as the differences in education and experience, and the portion due to discrimination.

Assume that the wage equations for the male *(m)* and female *(f)* groups are as follows:

$$\ln W_i^m = \beta_0^m + \sum_{j=1}^{n} \beta_j^m X_{ji}^m + u_i^m \qquad (1)$$

$$\ln W_i^f = \beta_0^f + \sum_{j=1}^{n} \beta_j^f X_{ji}^f + u_i^f \qquad (2)$$

where X is a vector of human capital variables and the βs are coefficients.

From equations 1 and 2, the estimated difference in the mean logarithms of male and female wages can be derived as:

$$R = (\hat{\beta}_0^m - \hat{\beta}_0^f) + (\sum_{j=1}^{n} \hat{\beta}_j^m \overline{X}_j^m - \sum_{j=1}^{n} \hat{\beta}_j^f \overline{X}_j^f) \qquad (3)$$

where the intercept term is typically attributed to discrimination (Thurow, 1969), and the slope term is further decomposed as:

$$\sum_{j=1}^{n} \hat{\beta}_j^m \overline{X}_j^m - \sum_{j=1}^{n} \hat{\beta}_j^f \overline{X}_j^f = \sum_{j=1}^{n} \hat{\beta}_j^m (\overline{X}_j^m - \overline{X}_j^f) + \sum_{j=1}^{n} \overline{X}_j^f (\hat{\beta}_j^m - \hat{\beta}_j^f) \qquad (4)$$

The first term in the above equation evaluates the impact of endowment differences between men and women on their wage differential. The second term captures a portion of the differential attributable to differing coefficients.

In summary, Blinder's decomposition of the wage differential may be written as follows:

$$R = \underbrace{(\hat{\beta}_0^m - \hat{\beta}_0^f)}_{U} + \underbrace{\sum_{j=1}^{n} \bar{X}_j^f (\hat{\beta}_j^m - \hat{\beta}_j^f)}_{C} + \underbrace{\sum_{j=1}^{n} \hat{\beta}_j^m (\bar{X}_j^m - \bar{X}_j^f)}_{E} \qquad (5)$$

where the terms U and C are the portions of the differential attributable to discrimination, and the term E is the portion of the differential attributable to differing endowments.

Problems in estimating wage discrimination by using Blinder's approach

Several problems are associated with the estimation of wage discrimination using Blinder's (and also Oaxaca's) approach:

First, according to Oaxaca (1973), Mincer (1974), Blinder (1976) and Rosenzweig and Morgan (1976), the proxy of labour market experience (Mincer's approach: *j=age-5-S*) used in the estimating equation for women tends to over-estimate actual labour market experience. Therefore, the regression results for women will be biased and cannot represent their true wage structure. However, a number of methods have been used to eliminate this problem. Rummery (1989) summarized three of these methods. They are:

> *(i) Partitioning the female sample and focusing on single women who have more continuous labour force participation (e.g. Rosenzweig and Morgan, 1976).*
>
> *(ii) Using worker characteristics such as marital status as crude measures of time out of the labour force (e.g. Fuchs, 1971; Oaxaca, 1973).*
>
> *(iii) Imputing actual experience measures, either by ad hoc means or on the basis of behavioural models of labour force participation (e.g. Chapman and Miller, 1983; Zabalza and Arrufat, 1985).*

The method to be used in a study depends on data availability.

Second, there is an index number problem. Blinder's method implicitly (Oaxaca in his paper actually explicitly) assumes that if there was no discrimination either (1) the wage structure currently faced by women would also apply to men, or (2) the wage structure currently faced by men would also apply to women. Following Sloane's (1985) explanation, in the former case, the predicted male average earnings in the absence of discrimination (female structure as non-discriminatory norm) will be given by:

$$ln\overline{W}_e^m = lnW^f(\overline{X}^m) = \hat{\beta}_0^f + \sum_{j=1}^{n} \hat{\beta}_j^f \overline{X}_j^m$$

where lnW^f is the female wage equation and $\overline{X}^m$ is a vector of mean values of regressors of men. The second case involves predicting female average earnings assuming that the wage function for males would be the one that prevails in the absence of discrimination (male structure as non-discriminatory norm). In this instance the predicted female wage will be given by:

$$ln\overline{W}_e^f = lnW^m(\overline{X}^f) = \hat{\beta}_0^m + \sum_{j=1}^{n} \hat{\beta}_j^m \overline{X}_j^f$$

where lnW^m represents the male wage equation and $\overline{X}^f$ is a vector of mean values of independent variables of women.

Using Blinder's notation for the case of the female structure as the non-discriminatory norm, the above relationship can be written as:

$$U + C^f = ln\overline{W}_e^m - ln\overline{W}^m$$

$$E^f = ln\overline{W}^f - ln\overline{W}_e^m$$

where the superscript f in C^f and E^f represents the female weighted estimation. Similarly, when a male wage structure is used as a non-discriminatory norm, the decomposition of the wage differential between men and women can be presented as:

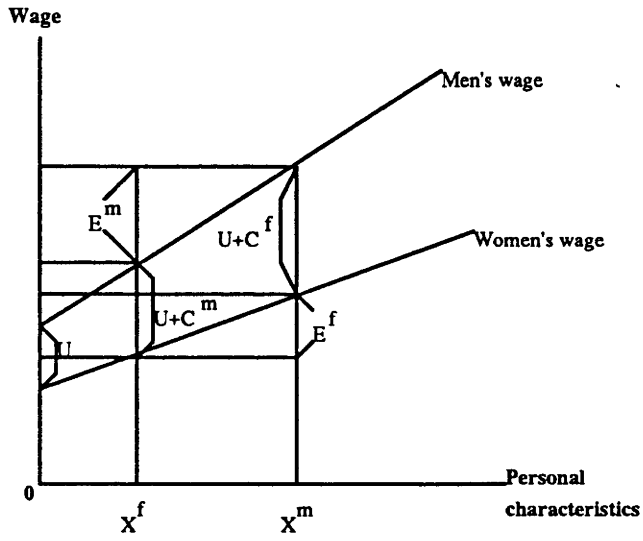
$$U + C^m = ln\overline{W}_e^f - ln\overline{W}^f$$

$$E^m = ln\overline{W}^m - ln\overline{W}_e^f$$

and the superscript m in C^m and E^m represents the male weighted estimation.

The differences between these two estimations can be illustrated using the following diagram from Sloane (1985):

Figure 9.1
The Index Number Problem



As Sloane points out, provided the male earnings function lies above the female function and is of steeper slope, for which there is generally some empirical evidence, the female weighted estimation of discrimination will always be larger than the male weighted estimation.

Thus, the question of which estimation should be used arises. Blinder's and Oaxaca's assumptions suggest two possible answers: (1) Assuming the male wage structure prevails in the absence of discrimination, discrimination implies an aversion to the female group but no favouritism towards the male group. In this case, men will be paid according to their labour productivity and women will be paid less than their labour productivity. Therefore, the male weighted estimation should be used. (2) Assuming the female wage structure would prevail in the absence of discrimination, discrimination implies favouritism towards men while women will be paid according to

their labour productivity. In this case, the elimination of discrimination implies that female weighted estimations should be used.

However, the basic assumptions of Blinder's and Oaxaca's approach have been criticized. Cotton (1988) points out that the main flaw in their decomposition procedure is the failure to portray adequately the most critical of Becker's original conditions, that is, the wage structure that would prevail in the absence of discrimination. He argued that if it is assumed that women would receive the same wage in the absence of discrimination, women would have no particular economic reason for desiring an end to such discrimination since their wages would be unaffected by the change and the only other effect would be to lower male wages. On the other hand, if it is assumed that the male wage structure would prevail in the absence of discrimination, men would have no motivation to end discrimination since their own wage would not be affected thereby. Hence, Cotton suggested that in reality, not only is the group discriminated against undervalued, but the preferred group is overvalued, and the undervaluation of the one subsidizes the overvaluation of the other. Thus, the male and female wage structures are both functions of discrimination and we would not expect either to prevail in the absence of discrimination[1].

He then suggested a new approach to decompose the gender wage differential which is shown in the following formula:

$$ln\overline{W}^m - ln\overline{W}^f = \sum_j \beta_j^* (\overline{X}_j^m - \overline{X}_j^f) + \sum_j \overline{X}_j^m (\hat{\beta}_j^m - \beta_j^*) + \sum_j \overline{X}_j^m (\beta_j^* - \hat{\beta}_j^f)$$

where β^* represents the non discriminatory wage structure. However, β^* is still unobservable. Hence, Cotton made three strong assumptions: (1) in the absence of

[1]I am not quite convinced of Cotton's argument about Oaxaca's and Blinder's assumptions. In the case of employee discrimination, when the female wage is undervalued, then although males have no motivation to end discrimination, females do. The market clearing level of the female wage will be determined by the demand situation for females. In the case of employer discrimination, the end of discrimination depends on neither men nor women. Therefore, Cotton's argument is irrelevant here. When the male wage is overvalued, females might also have a motivation to end discrimination if psychological effects are important. In this case the market clearing level of the female wage is also determined by the demand for female labour.

discrimination men would receive a lower average wage than they currently receive and women would receive a higher average wage. That means:

$$\sum_j \hat{\beta}_j^m \overline{X}_j^m > \sum_j \beta_j^* \overline{X}_j^* > \sum_j \hat{\beta}_j^f \overline{X}_j^f$$

(2) β^* is specified as a linear function of $\hat{\beta}^m$ and $\hat{\beta}^f$; (3) it is assumed that the non-discriminatory wage structure will be closer to the one which accounts for the majority rather than the minority.

According to these assumptions Cotton estimates β^* as

$$\hat{\beta}^* = f^m \hat{\beta}^m + f^f \hat{\beta}^f$$

where f^m and f^f are the proportions of men and women in total employees.

Most authors provide both male weighted and female weighted estimations so as to show the range of the discrimination effect. Some take a simple average of male and female weighted estimations to give a single measure (Sloane, 1985), while Cotton (1988) suggests that a weighted average of male and female weighted estimations will be more accurate than the other estimations[2].

---

[2] In my view, Oaxaca's assumptions seem reasonable in terms of mathematical relativity. When we compare the wage differential between men and women, one of them has to be the standard to which the other can be compared. In this case both statements of overvaluation of the male wage and of undervaluation of the female wage are acceptable, depending on which is chosen to be the standard. However, when the estimation concerns economics, one of Oaxaca's assumptions is impossible in a competitive setting. With employer discrimination, if the female wage reflects female labour productivity and the male wage is overvalued, employers have to pay something more than the value of marginal productivity to men. In this case it is only possible for an employer to employ men (who are the employees he favours) if women (the group of employees he is averse to) are paid less than their labour productivity. In this case the gap between female labour productivity and the female wage can subsidize the overvaluation of male wage. This is the case described by Cotton (1988). In the case of employee discrimination where women and men are not fully substitutable, employers will also undervalue the female wage in order to subsidize the male wage. However, in both cases, the numbers of women and men employed have to be equal or the former greater than latter, otherwise employers will lose.
The assumption that the male wage structure is that which would prevail in the absence of discrimination is reasonable both in terms of mathematics and economics.

9.2 Wage discrimination without considering differences in occupational distribution

The above analysis gives a qualitative view about how the pay of women and men differs. However, it does not tell how much of the difference in their pay is due to different labour productivity and how much of it is due to discrimination. In this section the question is answered by adopting the approaches proposed by Blinder (both male and female weighted estimations) and Cotton.

One of the weaknesses of Blinder's approach is that if important explanatory variables are omitted from the wage regression, the decomposition of the wage differential will be biased (Sloane, 1985). To avoid the possibility of over- or under-estimation of discrimination, both models 1 and 3 are used.

Discrimination for total employees. According to Table 8.1 in Chapter 8, the overall differential in the mean value of the natural logarithm of the daily wage between men and women is *1.35-1.15=0.20*. However, as the data size used for each particular model is different, the overall wage differentials are not the same for different models. For model 1, $ln(W)^m=1.375$, $ln(W)^f=1.149$, and therefore the overall wage differential for the gender groups is *1.375-1.149=0.226*. For model 3, $ln(W)^m=1.374$, $ln(W)^f=1.150$, and the overall wage differential is 0.224. The mean values and coefficients for models 1 and 3 are presented in Appendix A, Tables A1 and A2, respectively.

Tables 9.1 and 9.2 summarize the earnings differential attributable to endowments and that attributable to coefficients.

Table 9.1[3]
Structural analysis of the male/female wage differential (model 1)

	male		female		Cotton		
	$\beta^m(X^m-X^f)$	$X^f(\beta^m-\beta^f)$	$\beta^f(X^m-X^f)$	$X^m(\beta^m-\beta^f)$	$\beta^*(X^m-X^f)$	$X^m(\beta^m-\beta^*)$	$X^f(\beta^*-\beta^f)$
Schooling	0.005348	-0.09049	0.010744	-0.09589	0.007758	-0.04283	-0.05007
OJ	0.06867	0.085759	0.04289	0.11154	0.057154	0.049825	0.047451
OJ^2	-0.04616	-0.03232	-0.02308	-0.0554	-0.03585	-0.02475	-0.01788
FT	0.03824	-0.13419	0.080069	-0.17602	0.056925	-0.07863	-0.07425
FT^2	-0.01953	0.035177	-0.04708	0.062729	-0.03184	0.028021	0.019463
Jieshou	-0.00521	-0.00529	-0.00483	-0.00567	-0.00504	-0.00253	-0.00293
Shangrao	-0.00393	0.002558	-0.00415	0.002784	-0.00403	0.001244	0.001415
Nanhai	-0.04158	0.070816	-0.0185	0.047739	-0.03127	0.021325	0.039183
Sub-total	-0.00415	-0.06798	0.036052	-0.10818	0.013807	-0.04832	-0.03761
U	0.2977		0.2977		0.2977		
C	-0.06798		-0.10818		-0.08594		
D=U+C	0.22972		0.18952		0.211763		
E	-0.00415		0.036052		0.013807		
Total	0.22557		0.225572		0.22557		
D/Total	1.018		0.840175		0.938791		
E/Total	-0.018		0.159825		0.061209		

Note: E represents the amount attributable to the endowment differential; *C* represents the amount attributable to the coefficient differential; *D* represents the total differential attributed to discrimination; and *D+E* is the total gender wage differential.

[3] Total wage differentials calculated in Table 8.10 and 8.11 are slightly different from the actual total differentials (0.22557 vs 0.226 for model 1 and 0.2242 vs 0.224 for model 3). The difference derives from rounding errors. This explanation is also applicable for the case of Appendix B, where the total wage differentials are calculated for workers and staff separately.

Table 9.2
Structural analysis of the male/female wage differential (model 3)

	male		female		Cotton		
	$\beta^m(X^m-X^f)$	$X^f(\beta^m-\beta^f)$	$\beta^f(X^m-X^f)$	$X^m(\beta^m-\beta^f)$	$\beta^*(X^m-X^f)$	$X^m(\beta^m-\beta^*)$	$X^f(\beta^*-\beta^f)$
Schooling	-0.00091	-0.16332	0.00876	-0.17299	0.003405	-0.07719	-0.09045
OJ	0.059341	0.050586	0.044095	0.065832	0.052538	0.029374	0.028015
OJ^2	-0.0417	-0.02223	-0.02566	-0.03827	-0.03455	-0.01707	-0.01231
FT	0.02904	-0.14709	0.073883	-0.19193	0.049049	-0.08564	-0.08146
FT^2	-0.01761	0.035973	-0.04521	0.063574	-0.02993	0.028367	0.019922
SL	0.002669	0.014556	-0.00311	0.020335	8.99E-05	0.009073	0.008061
OP	0.004438	0.006227	-0.00202	0.012688	0.001555	0.005661	0.003449
TP	0.013506	-0.00244	0.023464	-0.0124	0.017949	-0.00553	-0.00135
OS	0.008245	0.004976	-0.00537	0.018593	0.00217	0.008296	0.002756
MS	0.013735	0.004791	0.009073	0.009454	0.011655	0.004219	0.002654
Jieshou	-0.00475	-0.0023	-0.00459	-0.00246	-0.00468	-0.0011	-0.00127
Shangrao	-0.00357	0.003743	-0.0039	0.004066	-0.00372	0.001814	0.002073
Nanhai	-0.04146	0.068231	-0.01958	0.046355	-0.03169	0.020684	0.037786
Sub-total	0.020973	-0.14828	0.04983	-0.17714	0.033849	-0.07904	-0.08212
U	0.3515		0.3515		0.3515		
C	-0.14828		-0.17714		-0.16116		
D=U+C	0.20322		0.17436		0.190342		
E	0.020973		0.04983		0.033849		
Total	0.224193		0.22419		0.224191		
D/Total	0.906451		0.777733		0.849017		
E/Total	0.093549		0.222267		0.150983		

The above estimates obtained using Blinder's approach indicate that without occupational dummies, the proportion of the wage differential due to discrimination is 84 per cent (female weighted estimation) and 102 per cent (male weighted estimation) and the endowment differential accounts for 16 per cent and -2 per cent for female and male weighted estimations, respectively. If occupational dummies are included in the regression, the endowment differential accounts for 22 per cent and 9 per cent for female and male weighted estimations, respectively. Discrimination accounts for 78 per cent (female weighted) and 91 per cent (male weighted) of the total wage differential.

The proportion of the wage differential which is attributable to coefficient differences and the proportion due to endowment differences using different approaches can be summarized as follows:

Table 9.3
Summary of decomposed wage differential for total employees

	model 1		model 3	
	discrimination	endowments	discrimination	endowments
Blinder (M)	101.8%	-1.8%	90.65%	9.35%
Blinder (F)	84.02%	15.98%	77.77%	22.23%
Simple average	92.91%	7.09%	84.21%	15.79%
Cotton	93.88%	6.12%	84.90%	15.10%

The ratios of discrimination to endowments wage effects estimated using various methods are all much higher than the ratio for US white men and women (66 per cent) obtained by Blinder (1973) and the ratio for Malaysia (50 per cent to 70 per cent) obtained by Chua (1984)[4] .

For workers and staff separately. As reported in Chapter 8, the wage gap between men and women for the staff group is larger than that for the workers group. It is worth noting whether the differences in the wage gap for the workers and staff groups mostly comes from the endowment differential or the coefficient differential. These calculations are based on the basic human capital model 1. The wage differential between male and female staff is $ln(W)^m$-$ln(W)^f$=1.475-1.217=0.258. For workers, $ln(W)^m$-$ln(W)^f$=1.281-1.129=0.152. The results of the structural analysis of the gender wage differential for workers and staff separately are displayed in Appendix B. The proportions due to discrimination and endowment differentials calculated using various methods are summarized in Table 9.4.

[44] Chua calculated Malaysian wage discrimination by adopting Oaxaca's approach which is similar to Blinder's approach.

Table 9.4
Summary of decomposed wage differential for workers and staff separately

	workers		staff	
	discrimination	endowments	discrimination	endowments
Blinder (M)	140.31%	-40.31%	105.88%	-5.88%
Blinder (F)	107.11%	-7.11%	91.27%	8.73%
Simple average	123.71%	-23.71%	98.54%	1.46%
Cotton	121.86%	-21.86%	102.08%	-2.08%

The analysis for staff and workers separately shows that although the gender wage gap for the workers group is smaller than that for the staff group, wage discrimination for the workers is more serious than that for staff.

For piece rate workers. It is interesting to know whether wage discrimination is serious in determining the wage differential between male and female piece rate workers. The total log wage differential between male and female piece rate workers is *1.31-1.129=0.181*. The calculated decomposition of the wage differential is presented in Table 9.5.

Table 9.5
Summary of decomposed wage differential between male and female piece rate workers

	discrimination	endowments
Binder (M)	210.4%	-110.4%
Blinder (F)	288.9%	-188.9%
Simple average	249.7%	-149.7%
Cotton	258.3%	-158.3%

Surprisingly, the estimated portion which can be attributed to discrimination is extremely high among male and female piece rate workers. This suggests that the TVP firms might set a different wage rate for each piece produced by men and women. It is similar to the case of the old work-point system, where there was a well-known unwritten rule for evaluation of working-points between men and women. The rule

was that women would receive one or two points less than men even if they did the same job and made the same contribution.

9.3 Conclusion

In this chapter we investigated the degree of wage discrimination (without considering the difference in occupational attainment between men and women which will be analysed in the next chapter) in the TVP sector. The main findings can be summarized as follows:

(1) Ignoring any difference in occupational attainment between men and women, wage discrimination in the TVP sector is greater than that found in the United States and Malaysia.

(2) Within the TVP sector, wage discrimination is more serious for workers than for staff, though the wage differential is larger for the staff group than that for the workers group.

(3) Wage discrimination is extremely serious for the piece rate workers. This suggests that TVP firms pay a different rate for each piece produced by men and women.

Appendix 9A

Table A1
Mean values and coefficients for men and women separately (model 1)

	β^m	β^f	β^*	$\beta^m-\beta^f$	$\beta^m-\beta^*$	$\beta^*-\beta^f$	X^m	X^f	X^m-X^f
Constant	1.0164	0.7187	0.883417	0.2977	0.132983	0.164717			
Schooling	0.0111	0.0223	0.016103	-0.0112	-0.005	-0.0062	8.5614	8.0796	0.4818
OJ	0.0293	0.0183	0.024386	0.011	0.004914	0.006086	10.14	7.7963	2.3437
OJ^2	-0.00058	-0.00029	-0.00045	-0.00029	-0.00013	-0.00016	191.03	111.44	79.59
FT	0.0277	0.058	0.041235	-0.0303	-0.01354	-0.01676	5.8091	4.4286	1.3805
FT^2	-0.00073	-0.00176	-0.00119	0.00103	0.00046	0.00057	60.902	34.152	26.75
Jieshou	-0.2744	-0.2544	-0.26547	-0.02	-0.00893	-0.01107	0.2836	0.2646	0.019
Shangrao	-0.4413	-0.4667	-0.45265	0.0254	0.011346	0.014054	0.1096	0.1007	0.0089
Nanhai	0.529	0.2354	0.397849	0.2936	0.131151	0.162449	0.1626	0.2412	-0.0786

Table A2
Mean values and coefficients for men and women separately (model 3)

	β^m	β^f	β^*	$\beta^m-\beta^f$	$\beta^m-\beta^*$	$\beta^*-\beta^f$	X^m	X^f	X^m-X^f
Constant	1.1054	0.7539	0.948561	0.3515	0.156839	0.194661			
Schooling	-0.0019	0.0183	0.007113	-0.0202	-0.00901	-0.01119	8.5638	8.0851	0.4787
OJ	0.0253	0.0188	0.0224	0.0065	0.0029	0.0036	10.128	7.7825	2.3455
OJ^2	-0.00052	-0.00032	-0.00043	-0.0002	-8.9E-05	-0.00011	191.33	111.13	80.2
FT	0.0215	0.0547	0.036314	-0.0332	-0.01481	-0.01839	5.781	4.4303	1.3507
FT^2	-0.00067	-0.00172	-0.00114	0.00105	0.000469	0.000581	60.547	34.26	26.287
SL	0.0948	-0.1105	0.003195	0.2053	0.091605	0.113695	0.09905	0.0709	0.02815
OP	0.1064	-0.0485	0.037284	0.1549	0.069116	0.085784	0.08191	0.0402	0.04171
TP	0.1401	0.2434	0.186192	-0.1033	-0.04609	-0.05721	0.12	0.0236	0.0964
OS	0.1159	-0.0755	0.030497	0.1914	0.085403	0.105997	0.09714	0.026	0.07114
MS	0.2984	0.1971	0.2532	0.1013	0.0452	0.0561	0.09333	0.0473	0.04603
Jieshou	-0.2552	-0.2466	-0.25136	-0.0086	-0.00384	-0.00476	0.2857	0.2671	0.0186
Shangrao	-0.4059	-0.4427	-0.42232	0.0368	0.01642	0.02038	0.1105	0.1017	0.0088
Nanhai	0.5363	0.2533	0.410025	0.283	0.126275	0.156725	0.1638	0.2411	-0.0773

Appendix 9B

Table B1

Mean values and coefficients for male and female workers and staff separately

Workers	β^m	β^f	β^*	$\beta^m-\beta^f$	$\beta^m-\beta^*$	$\beta^*-\beta^f$	X^m	X^f	X^m-X^f
Constant	0.9673	0.71566	0.827464	0.25164	0.139836	0.111804			
Schooling	-0.00087	0.02317	0.012489	-0.02404	-0.01336	-0.01068	7.631	7.8289	-0.1979
OJ	0.01469	0.01638	0.015629	-0.00169	-0.00094	-0.00075	8.679	7.4336	1.2454
OJ^2	-0.00018	-0.00028	-0.00024	0.0001	5.56E-05	4.44E-05	142.78	103.79	38.99
FT	0.04928	0.055	0.052459	-0.00572	-0.00318	-0.00254	5.07	4.0324	1.0376
FT^2	-0.0017	-0.00166	-0.00168	-4E-05	-2.2E-05	-1.8E-05	48.613	27.602	21.011
Jieshou	-0.2186	-0.23	-0.22493	0.0114	0.006335	0.005065	0.31365	0.28319	0.03046
Shangrao	-0.222	-0.401	-0.32147	0.179	0.09947	0.07953	0.11808	0.10029	0.01779
Nanhai	0.8206	0.2516	0.504407	0.569	0.316193	0.252807	0.17712	0.27139	-0.09427
Staff	β^m	β^f	β^*	$\beta^m-\beta^f$	$\beta^m-\beta^*$	$\beta^*-\beta^f$	X^m	X^f	X^m-X^f
Constant	1.466	0.71393	1.270537	0.75207	0.195463	0.556607			
Schooling	-0.00867	0.01847	-0.00162	-0.02714	-0.00705	-0.02009	9.519	8.978	0.541
OJ	0.031335	0.02742	0.030317	0.003915	0.001018	0.002897	11.676	9.1957	2.4803
OJ^2	-0.00074	-0.00052	-0.00068	-0.00023	-5.8E-05	-0.00017	240.33	141.09	99.24
FT	0.00024	0.062947	0.016538	-0.06271	-0.0163	-0.04641	6.6298	5.88	0.7498
FT^2	0.000114	-0.00189	-0.00041	0.002005	0.000521	0.001484	74.324	57.793	16.531
Jieshou	-0.2991	-0.3519	-0.31282	0.0528	0.013723	0.039077	0.2481	0.18478	0.06332
Shangrao	-0.6484	-0.64966	-0.64873	0.00126	0.000327	0.000933	0.0992	0.0978	0.0014
Nanhai	0.21068	0.19179	0.20577	0.01889	0.00491	0.01398	0.145	0.1304	0.0146

Table B2

Structural analysis of the male/female wage differential for workers and staff

	male		female		Cotton		
Workers	$\beta^m(X^m-X^f)$	$X^f(\beta^m-\beta^f)$	$\beta^f(X^m-X^f)$	$X^m(\beta^m-\beta^f)$	$\beta^*(X^m-X^f)$	$X^m(\beta^m-\beta^*)$	$X^f(\beta^*-\beta^f)$
Schooling	0.000172	-0.18821	-0.00459	-0.18345	-0.00247	-0.10194	-0.08362
OJ	0.018295	-0.01256	0.0204	-0.01467	0.019465	-0.00815	-0.00558
OJ^2	-0.00702	0.010379	-0.01092	0.014278	-0.00918	0.007934	0.004611
FT	0.051133	-0.02307	0.057068	-0.029	0.054431	-0.01612	-0.01025
FT^2	-0.03572	-0.0011	-0.03488	-0.00194	-0.03525	-0.00108	-0.00049
Jieshou	-0.00666	0.003228	-0.00701	0.003576	-0.00685	0.001987	0.001434
Shangrao	-0.00395	0.017952	-0.00713	0.021136	-0.00572	0.011745	0.007976
Nanhai	-0.07736	0.154421	-0.02372	0.100781	-0.04755	0.056004	0.068609
Subtotal	-0.0611	-0.03896	-0.01077	-0.08929	-0.03313	-0.04962	-0.01731
U	0.25164		0.25164		0.25164		
C	-0.03896		-0.08929		-0.06693		
D=U+C	0.21268		0.16235		0.184712		
E	-0.0611		-0.01077		-0.03313		
Total	0.15158		0.15158		0.151582		
D/Total	1.403087		1.071052		1.218562		
E/Total	-0.40309		-0.07105		-0.21856		

(continued overleaf)

Staff	$\beta^m(X^m-X^f)$	$X^f(\beta^m-\beta^f)$	$\beta^f(X^m-X^f)$	$X^m(\beta^m-\beta^f)$	$\beta^*(X^m-X^f)$	$X^m(\beta^m-\beta^*)$	$X^f(\beta^*-\beta^f)$
Schooling	-0.00469	-0.24366	0.009992	-0.25835	-0.00087	-0.06714	-0.18033
OJ	0.07772	0.036001	0.06801	0.045712	0.075196	0.01188	0.026644
OJ^2	-0.07344	-0.03175	-0.05111	-0.05407	-0.06763	-0.01405	-0.02349
FT	0.00018	-0.36872	0.047198	-0.41573	0.0124	-0.10805	-0.27289
FT^2	0.001885	0.115875	-0.03126	0.14902	-0.00673	0.03873	0.085759
Jieshou	-0.01894	0.009756	-0.02228	0.0131	-0.01981	0.003405	0.007221
Shangrao	-0.00091	0.000123	-0.00091	0.000125	-0.00091	3.25E-05	9.12E-05
Nanhai	0.003076	0.002463	0.0028	0.002739	0.003004	0.000712	0.001823
Subtotal	-0.01511	-0.47991	0.022439	-0.51746	-0.00535	-0.13449	-0.35518
U	0.75207		0.75207		0.75207		
C	-0.47991		-0.51746		-0.48967		
D=U+C	0.27216		0.23461		0.262403		
E	-0.01511		0.022439		-0.00535		
Total	0.25705		0.257049		0.257053		
D/Total	1.058782		0.912705		1.020813		
E/Total	-0.05878		0.087295		-0.02081		

10

THE DETERMINANTS AND ROLE OF OCCUPATIONAL SEGREGATION

The gender wage differential and the differences between the wage determination patterns of men and women (without considering the difference in occupational attainments) were analysed in Chapters 8 and 9. However, economic theory claims that differences in occupational attainment play an important role in the explanation of gender wage differentials. In this chapter, two major issues concerning occupational attainment will be addressed. The first concerns the determinants of female occupational attainment and whether they are similar to those of male occupational attainment. The second is whether the difference in occupational attainment between men and women has an impact on the gender wage differential in the TVP sector. A comparison of wage discrimination between the TVP sector and other developing and industrial countries will also be undertaken in this chapter.

10.1 Methodology for estimating wage discrimination by considering occupational segregation

Blinder's approach (1973) (Chapter 9) is mainly focused on wage discrimination without considering the difference in occupational attainment between men and women. He incorporated occupational dummy variables into the wage equation to mitigate the impact of the different occupational distributions of the gender groups on the gender wage differential.

Prior to the model of Brown, Moon and Zoloth (1980), few studies tried to incorporate differences in occupational distribution between men and women into the conventional decomposition developed by Blinder (1973) and Oaxaca (1973). Some

studies, such as Zellner (1972) and Stevenson (1975), did attempt to estimate the effect of occupational discrimination on wage differentials. However, these studies make only a simple adjustment for differences in average productivity between men and women.

Brown, Moon and Zoloth's (1980) model is more comprehensive. They decomposed the total wage differential between men and women into components related to within-occupation wage differences, denoted wages, and occupational discrimination, denoted occupations, as follows[1]:

$$\begin{aligned}\overline{W}^m - \overline{W}^f &= \sum_j (P_j^m \overline{W}_j^m - P_j^f \overline{W}_j^f) \\ &= \sum_j (P_j^m \alpha_j^m - P_j^f \alpha_j^f) + \sum_j (P_j^m \overline{X}_j^m \beta_j^m - P_j^f \overline{X}_j^f \beta_j^f) \\ &= \underbrace{\sum_j P_j^f (\alpha_j^m - \alpha_j^f) + \sum_j P_j^f (\overline{X}_j^m \beta_j^m - \overline{X}_j^f \beta_j^f)}_{WAGES} + \underbrace{\sum_j (\overline{X}_j^m \beta_j^m + \alpha_j^m)(P_j^m - P_j^f)}_{OCCUPATION}\end{aligned}$$

where: j as a subscript represents occupations;
P_j^m is the proportion of male observations in the jth occupation;
P_j^f is the proportion of female observations in the jth occupation;

The component of the wage differential labelled "wages" was further decomposed by Brown, Moon and Zoloth into a portion due to differences in productivity *(PD)* and a portion attributable to discrimination *(WD)* between men and women as follows:

$$WAGES = \underbrace{\sum_j P_j^f \overline{X}_j^f (\beta_j^m - \beta_j^f)}_{(WD)} + \underbrace{\sum_j P_j^f \beta_j^m (\overline{X}_j^m - \overline{X}_j^f)}_{(PD)}$$

Similarly, the component labelled "occupations" was further decomposed into a portion relating to differences in the structure of occupational attainment between men and women *(OD)* and a portion relating to differences in qualifications for the occupation *(QD)* as follows:

$$OCCUPATION = \underbrace{\sum_j \overline{W}_j^m (P_j^m - \hat{P}_j^f)}_{(QD)} + \underbrace{\sum_j \overline{W}_j^m (\hat{P}_j^f - P_j^f)}_{(OD)}$$

[1] In their paper the decomposed term "wages" is different from that shown here. Instead of $(x_j^m \beta_j^m - x_j^f \beta_j^f)$, their formula is $(x_j^f \beta_j^m - x_j^m \beta_j^f)$. The detailed derivation is shown in appendix A.

where the new term $\hat{P}_j^f$ represents the proportion of women in the sample who would be in occupation j if women faced the same occupational structure as men. Thus the full model becomes:

$$\overline{W}^m - \overline{W}^f = \underbrace{\sum_j P_j^f(\alpha_j^m - \alpha_j^f)}_{(I)} + \underbrace{\sum_j P_j^f \overline{X}_j^f(\beta_j^m - \beta_j^f)}_{(WD)} + \underbrace{\sum_j P_j^f \beta_j^m(\overline{X}_j^m - \overline{X}_j^f)}_{(PD)}$$
$$+ \underbrace{\sum_j \overline{W}_j^m(P_j^m - \hat{P}_j^f)}_{(QD)} + \underbrace{\sum_j \overline{W}_j^m(\hat{P}_j^f - P_j^f)}_{(OD)}$$

Brown, Moon and Zoloth defined *I* and *WD* as unjustified differences in within-occupation wages, *PD* as the justifiable within-occupation wage differential, and *QD* and *OD* as the justifiable and unjustifiable portions of occupational segregation, respectively. Terms that are justifiable capture the wage differentials due to differences in characteristics between men and women, while those which are unjustifiable capture the wage differential due to discrimination.

The way Brown, Moon and Zoloth estimated wage discrimination can be summarised as follows:

(1) Estimate a wage equation for men only for each occupational group to get the coefficients β_j^m and α_j^m;

(2) Use the multinomial (or binomial) logit model (which is used depends on how many occupational groups there are) of occupational attainment to estimate $\hat{P}_j^f$ (proportion of women in occupation *k* if they faced the same structure of occupational attainment as men);

(3) Estimate the predicted average wage for women *(TW)* if they attained occupations and received wages within occupations according to the same occupational and wage-attainment structures as men using the formula:

$$TW = \sum_j \hat{P}_j^f(\overline{X}_j^f \beta_j^m + \alpha_j^m)$$

The predicted average wage for women minus the actual average wage for women divided by the total actual wage difference between men and women is the proportion

of the wage differential between men and women due to endowment differences. The rest of the wage differential is due to discrimination.

(4) They also estimated two partial wage discrimination coefficients[2] :

PW_1 is the partially adjusted wage due to endowment differences within occupations and is defined as:

$$PW_1 = \sum_j P_j^f (\overline{X}_j^f \beta_j^m + \alpha_j^m)$$

while PW_2 is the partially adjusted wage due to differences in occupational distributions between men and women and is given by:

$$PW_2 = \sum_j \hat{P}_j^f (\overline{X}_j^f \beta_j^f + \alpha_j^f) = \sum_j \hat{P}_j^f \overline{W}_j^f$$

Brown, Moon and Zoloth's method is superior to Blinder's and Oaxaca 's where the occupational distributions of the gender groups differ appreciably. Since there is a big difference of occupational distribution between men and women in the TVP sector, Brown, Moon and Zoloth's approach is adopted.

10.2 Comparison of women's occupational attainment with men's

The determinants of occupational attainment for men were estimated in Chapter 6. The results show that three main variables (education, other job experience and firm tenure) are very important in determining an individual's occupation for both the binomial and the multinomial logit models.

To capture whether the pattern of determinants of occupational attainment for women is similar to that for men, both binomial and multinomial logit models have been

[2] These two partial adjustments normally do not sum to the total unexplained portion because of an index number problem (see Section 1 of Chapter 6).

estimated for women. The comparison of the results of the binomial model for women with those for men is presented in Table 10.1.

Table 10.1[3]
Comparison of binomial logit estimated results of female and male occupational attainment
(0=workers, 1=staff)

	women		men	
	coefficient	t-ratio	coefficient	t-ratio
Constant	-3.850	-6.00	-5.153	-9.03
Schooling	0.219	4.03	0.435	8.95
OJ	0.050	2.63	0.085	6.65
FT	0.139	4.35	0.115	5.37
Jieshou	-0.745	-2.18	-0.393	-1.61
Shangrao	-0.125	-0.29	-0.397	-1.18
Nanhai	-1.261	-3.12	0.094	0.31

Note[4]: (1) Total male sample=531. Total female sample=424.
(2) Likelihood ratio=294.35, χ^2=145.84, pseudo R^2=0.20 (male binomial logit model).
(3) Likelihood ratio=188.12, χ^2=56.82, pseudo R^2=0.131 (female binomial logit model).

The marginal effects of the three main variables for women are also estimated[5]. They are shown in Table 10.2 together with those for men.

Table 10.2
Marginal effects of three main variables for women and men

	women	men
Schooling	0.0504	0.0726
OJ	0.0102	0.0210
FT	0.0328	0.0276

Tables 10.1 and 10.2 demonstrate that all three main variables (education, other job experience and firm tenure) have important impacts on determining who will become a staff member for both male and female groups. This implies that both male and female employees who are better educated, have longer firm tenure and other job

[3] The total male samples for the binomial and multinomial logit models in Chapter 6 are different from those reported in this Chapter. The reason is that in Chapter 6 a group of people who got their job through introduction by their relatives and friends is excluded from the total male sample.
[4] The methodology for calculating the Chi-Squared and pseudo R^2 is reported in footnote 9, Chapter 6.
[5] The method of estimation can be found in Chapter 5.

experience are more likely to be in the staff group. Comparing the marginal effects of these three variables for men to those for women, it appears that both education and other job experience are more important determinants for male occupational attainment, while firm tenure is more important for female occupational attainment.

Multinomial logit results for women and men for four occupational levels[6] are shown in Table 10.3, where the workers group is used as the reference category. Table 10.4 presents occupational rankings by size of coefficient on the three main variables

Table 10.3
Multinomial results of female and male occupational attainment
(workers=0)

	shift leader		ordinary staff		middle level staff	
	women	men	women	men	women	men
Constant	-3.750	-4.478	-5.427	-6.475	-7.082	-7.757
	(-4.13)	(-5.54)	(-5.74)	(-9.48)	(-5.33)	(-7.96)
Schooling	0.082	0.274	0.314	0.489	0.304	0.508
	(1.04)	(3.97)	(3.98)	(8.70)	(2.91)	(6.59)
OJ	0.037	0.030	0.052	0.104	0.085	0.094
	(1.30)	(1.45)	(1.99)	(7.30)	(2.26)	(4.69)
FT	0.100	0.070	0.108	0.109	0.294	0.184
	(2.17)	(2.26)	(2.31)	(4.37)	(4.90)	(5.89)
Jieshou	-0.305	-0.576	-0.737	-0.112	-1.313	-0.991
	(-0.56)	(-1.41)	(-1.58)	(-0.40)	(-1.74)	(-2.27)
Shangrao	0.682	-0.231	-0.324	-0.047	-17.861	-1.984
	(1.22)	(-0.44)	(-0.48)	(-0.12)	(-0.004)	(-2.46)
Nanhai	-0.529	0.506	-10.28	0.121	-19.395	-0.946
	(-0.94)	(1.24)	(-1.85)	(0.35)	(-0.008)	(-1.57)

Note: (1) t-ratios are shown in parentheses.
(2) For female sample
total=473, workers=366, shift leaders=30, ordinary staff=50, middle level staff=22;
(3) For male sample
total=531, workers=271, shift leaders=53, ordinary staff=157, middle level staff=50.
(3) Likelihood ratio=520.68, χ^2=186.38, pseudo R^2=0.16 (male multinomial logit model).
(4) Likelihood ratio=265.90, χ^2=89.84, pseudo R^2=0.14 (female multinomial logit model).

[6] The reason for summing over the original six levels of occupation into four levels is that the sample size is too small for female technical personnel (n=12), operational personnel (n=21) and ordinary staff (n=18).

Table 10.4[7]
Occupational rankings by size of coefficient on education, other job experience and firm tenure

Women	S.L.	O.S.	M.S.
Schooling	3	1	2
Other job exp.	3	2	1
Firm tenure	3	2	1
Men	**S.L.**	**O.S.**	**M.S.**
Schooling	3	2	1
Other job exp.	3	1	2
Firm tenure	3	2	1

Tables 10.3 and 10.4 show that a person with more education and with longer other job experience and firm tenure is more likely to be in a higher position in this administrative hierarchy for both men and women, though education and other job experience are not statistically significant determinants for female shift leaders. This picture implies that the pattern of occupational attainment among women is quite similar to that for men.

10.3 The impact of occupational attainment on the gender wage gap

The approach used by Brown, Moon and Zoloth (1980) to decompose the gender wage differential into differences in endowments and wage discrimination by considering differences in occupational distribution between men and women has been presented in Section 10.1. Their approach will be adopted here to determine (1) whether and to what extent the differences in occupational attainment between men and women is due to the difference in endowments of men and women and to what extent it is due to discrimination in occupational distribution; (2) whether and by how much this difference of occupational distribution between men and women has an impact on the gender wage differential in the TVP sector.

[7] For detailed explanation of the table, see Chapter 6.

Women's predicted occupational attainment

By calculating the predicted female occupational distribution the question of whether and to what extent the differences in occupational attainment between men and women is due to the difference in endowments of men and women and to what extent it is due to discrimination of occupational distribution can be answered.

The general procedures which were used to calculate the predicted female occupational distribution can be summarized as follows (Brown, Moon and Zoloth, 1980):

(1) The parameters of the occupational attainment model for male observations are obtained by using binomial or multinomial logit models;

(2) The female data are then substituted into the estimated equation(s) producing for each woman a (vector of) predicted probabilities of belonging to each occupation;

(3) The predicted probabilities of being in each occupation are summed over observations to produce the predicted occupational distribution of women.

The first step of the above procedure was undertaken in Chapter 6 (the results are also presented in Table 10.1 for the binomial logit model and Table 10.3 for the multinomial logit model in this chapter).

Binomial results. By substituting female data into the estimated male binomial logit model and summing over the predicted probabilities of being in each occupation, a simulated occupational distribution of women is obtained. Table 10.5 exhibits the actual occupational distribution of men and women and the predicted distribution for women assuming women are treated the same as men in terms of occupational choice.

Table 10.5
Predicted occupational distribution (binomial logit model)

	women's actual occupational distribution	women's predicted occupational distribution	men's actual occupational distribution
Workers	336 (79.2%)	259 (61.2%)	270 (50.9%)
Staff	88 (20.8%)	165 (38.8%)	260 (49.1%)
Staff/Workers	26.2%	63.7%	96.3%

Table 10.5 shows that by treating women in the same way as men in terms of their occupational attainment, the proportion of women predicted to be staff will be 18 per cent higher than it actually is. However, it is still 10 per cent lower than the actual proportion of males in this category (see the figures in the parentheses). This result suggest that there is discrimination against women in terms of occupational distribution in the TVP sector.

Multinomial results. A multinomial logit model is also adopted to see which particular levels of staff women would be predicted to attain. The actual and predicted occupational attainment for females and the actual male occupational distribution are presented in Table 10.6.

Table 10.6
Predicted occupational distribution (multinomial logit model)

	women's actual occupational distribution		women's predicted occupational distribution		men's actual occupational distribution	
	frequency	%	frequency	%	frequency	%
Workers	338	79.3	261	61.2	271	51.0
Shift leader	30	7.0	43	10.2	53	10.0
Ordinary staff	38	8.9	94	22.0	157	29.6
Middle level staff	20	4.8	28	6.5	50	9.4

The prediction of the female occupational distribution based upon the multinomial logit regression results suggests that, in the absence of discrimination, there would be a shift from female workers to female staff groups (about 18 per cent). The majority

of the shift that does occur is from the workers group to the ordinary staff group (about a 13 per cent increase in the ordinary staff group). However, even with the absence of discrimination, the predicted female staff membership is still 10 per cent lower than that for men. This seems to suggest that the different occupational distributions of men and women are partly due to the endowment differentials between the two, and partly due to occupational segregation between gender groups. The binomial and the multinomial results are consistent with each other.

Calculation of discrimination by considering differences of occupational distribution

All the elements which are needed when calculating wage discrimination according to Brown, Moon and Zoloth's approach have been derived in the previous sections. This sub-section intends to answer the second question raised, that is whether and by how much differences of occupational distribution between men and women impact on the gender wage differential in the TVP sector.

Before calculating the decomposition of the wage differential, it is worth noting two important points.

First, Brown, Moon and Zoloth (1980) suggest two different techniques. One is to estimate wage functions for each occupation and gender category and then use the results obtained to calculate *I*, *WD*, *PD*, *QD* and *OD* (defined in Section 10.1) and sum them to obtain the total gender wage differential. By dividing the sum of *I* and *WD* by the total gender wage differential, the proportion of the within-occupational wage differential that is unjustifiable is obtained. Similarly, *PD* over the total wage differential is equal to the proportion of the within-occupational wage differential that is justifiable; *QD* and *OD* over the total wage differential are, respectively, equal to the justifiable and unjustifiable portions of occupational segregation. This can be called **the decomposition technique.**

Brown, Moon and Zoloth did not adopt this technique. Instead they calculated a total predicted female wage (*TW*) and two partially adjusted predicted female wages (PW_1 and PW_2) using the formulae presented in Section 10.1. This technique only considers a male estimated wage function and a female actual and predicted occupational attainment. This can be called **the women predicted wage technique.**

The weaknesses of this technique are as follows: when calculating PW_1 the inter-occupational wage discrimination is not considered; but when calculating PW_2, the within-occupational wage discrimination is not considered. With these calculations, therefore, it is still impossible to judge exactly how much of the total gender wage differential is due to the differences in occupational attainment and how much is due to the within-occupational wage differences. The only result that can be deduced from the calculation of PW_1 and PW_2 is the relative importance of occupational segregation *versus* wage discrimination within occupations.

Brown, Moon and Zoloth adopted the second technique, while some others adopted the first technique (Miller, 1987; Hawke, 1991). This study uses the decomposition technique.

Second, two different sets of calculated results, distinguished by the use of male and female mean values of regional dummies, are reported in this study. This strategy is adopted because there is a big difference between the regional distributions of men and women (see Table 10.7) and regional distribution has a relatively large impact on an individual's wage determination. Consequently, the use of the female mean values of the three regional dummies in estimating the female predicted average wage will distort the results. One way to avoid this problem is to further decompose the estimation according to the four regions (calculate each occupational group's predicted female average wage for each region separately). This method would require a larger sample for each region than is available in this study. An alternative approach must, therefore, be used to avoid this regional distortion. One alternative is

to use male mean values of the three regional dummies to calculate female predicted wages so that the effect of the difference of regional distribution can be ignored. This methodology is used in this study. However, one shortcoming of this alternative is that the decompositions do not sum to the total gender wage differential. In this study, both the results with and without the regional effect are reported.

Table 10.7
Difference of regional distribution between men and women (%)

	staff								workers	
	total		shift leader		ordinary staff		middle level staff			
	men	women	men	women	men	women	men	women	men	women
Wuxi	50%	58%	43%	40%	46%	58%	70%	85%	39%	34%
Jieshou	25%	19%	21%	20%	29%	21%	18%	15%	31%	29%
Shangrao	10%	10%	11%	20%	12%	8%	4%	0	12%	10%
Nanhai	15%	13%	25%	20%	13%	13%	8%	0	18%	27%
Total	260	88	53	30	157	38	50	20	268	334

Binomial results:

The decomposition of gender wage differentials for the binomial case (using the decomposition formula presented in Section 10.1) is presented in Table 10.8. The calculation is based on the results of wage equations estimated for female and male workers and staff separately (see Table 8.3 in Chapter 8) and mean values of all the variables for male and female workers and staff (presented in Appendix B)

Table 10.8
Decomposition of gender wage differentials (binomial case)[8]

	Female regional dummy		Male regional dummy	
	value	% of total	value	% of total
Total LDW differential	0.2225	100.0	0.2568	100.0
Intra-occupational	0.1677	75.4	0.2020	78.7
Justifiable (PD)	-0.0566	-25.4	0.0167	6.5
Unjustifiable (I+WD)	0.2243	100.8	0.1853	72.2
Inter-occupational	0.0547	24.6	0.0547	21.3
Justifiable (QD)	0.0199	9.0	0.0199	7.7
Unjustifiable (OD)	0.0348	15.6	0.0348	13.6
Total justifiable	-0.0376	-16.4	0.0366	14.3
Total unjustifiable	0.2591	116.4	0.2201	85.7

The above results suggest that the gender wage differential in the TVP sector mainly comes from within-occupational wage discrimination (72 per cent to 100 per cent). A relatively small amount comes from discrimination of occupational attainment (14 to 16 per cent).

As noted above, the difference between the regional distributions of male and female observations plays a very important role when calculating the decomposition of the gender wage differential. If the regional distribution is kept constant, the proportion of the gender wage differential due to discrimination (unjustifiable) is 86 per cent, while if the difference of regional distributions between men and women is also considered this ratio is increased sharply to 116 per cent. The main conclusion obtained from both estimations, however, does not change: within occupational wage discrimination is much more serious than occupational segregation.

Multinomial results:

[8] In this table and Table 10.9, the total wage differentials reported in column 3 are not the actual differentials but the ones adjusted for regional effects (see page 210 about the methodology of the adjustment). In column 4, the percentage of decompositions are presented, where the adjusted total wage differentials are presented as 100 per cent.

Table 10.9 presents the results of decomposition of gender wage differentials for five occupational groups (multinomial case).

Table 10.9
Decomposition of gender wage differentials (multinomial case)

	Female regional dummy		Male regional dummy	
	value	% of total	value	% of total
Total LDW differential	0.2231	100.0	0.2515	100.0
Intra-occupational	0.1707	76.5	0.1991	79.2
Justifiable (PD)	-0.0501	-22.5	0.0191	7.6
Unjustifiable (I+WD)	0.2208	99.0	0.1800	71.6
Inter-occupational	0.0524	23.5	0.0524	20.8
Justifiable (QD)	0.0213	9.6	0.0213	8.5
Unjustifiable (OD)	0.0311	13.9	0.0311	12.3
Total justifiable	-0.0288	-12.9	0.0404	16.1
Total unjustifiable	0.2519	112.9	0.2111	83.9

Calculations based upon the disaggregated occupational grouping brings some changes to the decomposition results. The most important change is that with the inter-occupational wage differential, the proportion attributable to discrimination decreases slightly (from 14-16 per cent to 12-14 per cent). At the same time the portion attributable to endowment differences increases (from 7-8 per cent to 8-9 per cent). These results suggest that the inter-occupational wage differential is attributable to both differences in productivity between men and women and occupational segregation.

Both binomial and multinomial results seem to suggest that, on average, about 80 per cent of the total wage differential can be attributed to discrimination. Of this, over 90 per cent can be attributed to the within-occupational wage discrimination (about 70 per cent of the total wage differential).

10.4 Comparison with other developing and industrial countries

A number of studies dealing with decomposition of the gender wage differential are available for developing countries, but most have adopted Blinder's or Oaxaca's approach. Many studies based on Brown, Moon and Zoloth's approach are available for industrial countries.

Comparison with developing countries

Chua (1984) presents a decomposition of the gender wage differential for Malaysia. Oaxaca's decomposition approach was adopted. Her results show that with occupational dummies and other human capital variables included in the estimating equation, the proportion of the gender wage differential due to discrimination was 36 and 54 per cent for male weighted and female weighted estimations, respectively[9]. The simple average of these estimations was 45 per cent.

By using Blinder's approach, it was found that in the TVP sector, the proportion of the gender wage differential due to discrimination is 84 per cent for the simple average estimation (see Table 8.12 in Chapter 8). Comparison of this finding with Chua's results suggests that within-occupational wage discrimination in the TVP sector was nearly double that in the Malaysian labour market.

Comparison with industrial countries

By using the decomposition technique Miller (1987) and Hawke (1991) conducted similar studies for the United Kingdom, Australia and the United States. Their results are summarized in Table 10.10.

[9] The data set used for her study is from the Malaysian Household Income Survey 1973 and the Malaysian Labour Force Survey 1974.

Table 10.10
Summary of decomposition of gender wage differential for UK, US and Australia

	UK (Miller)		US (Hawke)		Australia (Hawke)	
	value	%	value	%	value	%
Total wage diff.	0.495	100	157.05	100	109.27	100
Intra-occupational	0.433	87.34	185.95	118.4	109.60	100.3
Justifiable	0.191	38.6	22.30	14.2	35.29	32.3
Unjustifiable	0.242	48.9	163.65	104.2	74.30	68.0
Inter-occupational	0.062	12.6	-28.93	-18.4	-0.33	-0.3
Justifiable	0.134	27.1	0.13	0.1	8.09	7.4
Unjustifiable	-0.072	-14.5	-29.05	-18.5	-8.41	-7.7
Total justifiable	0.325	65.6	22.43	14.3	43.38	39.7
Total unjustifiable	0.170	34.4	134.6	85.7	65.89	60.3

The number of occupational groups used in Miller's study is 6 and in Hawke's study it is 5 for the US case and 8 for the Australian case. The results obtained in this study which are most comparable to their studies are the multinomial results.

Comparing the results obtained in this study using the decomposition technique (columns 2 and 4 in Table 10.9) with the research by Miller and Hawke, it is clear that[10]: (1) If the portion attributable to intra-occupational discrimination is higher than 72 or 99 per cent it is much higher than the case in the UK and Australia and slightly lower than that in the US. (2) The portion attributable to inter-occupational discrimination in the TVP sector (a positive value less than 13 per cent) seems higher than in any of the three countries but is not as large as the portion due to intra-

[10] The difference between my results and those of Miller and Hawke may be partly due to the different nature of the occupational groupings and number of occupational categories used. (1) In their studies, the "western standard" occupational classifications are used, such as professionals, clerical and trades. While in this study the occupational classification used is based on the job hierarchy within the firms. The degree of substitution between the occupational classifications in this study (say, ordinary staff and middle level staff) may be different from those in their studies (say clerical and trades). (2) The number of occupational categories used in this study is 4 which is less than that used in their studies. These differences, presumably , affect the measured degree of occupational segregation and the wage decomposition. The degree and the direction of these effects, however, are unpredictable and untestable.

occupational discrimination. (3) The total wage differential attributable to discrimination for the TVP sector seems higher than that for Britain and Australia in each estimation.

To sum up, the overall picture of the gender wage differential in the TVP sector seems to be as follows: within-occupational discrimination is very serious, both compared with developing and developed countries; discrimination of occupational distribution is also greater than other developed countries. But compared with intra-occupational discrimination it is, however, less serious.

To explain why there is greater within-occupational discrimination but less discrimination of occupational distribution, it is necessary to recall the situation of TVP's employment and wage decision-making. As illustrated in Chapter 3, above 50 per cent of employees are assigned to their current job by the township or village authorities while more than half of employees' wages are determined by the firm leaders rather than by community authorities. It can be concluded that 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.

A local government, township or village authority represents both the interests of local people and of higher level governments. Community authorities, thus, have dual objectives. As a representative of local government, they aim to fulfil economic, political and sometimes ideological targets set by the central and provincial governments. As a representative of local people, they want to increase local employment and income levels. One of the political and ideological targets set by the communist government in China is equality of opportunities and income. Since traditional Chinese culture treats women extremely unfairly, the government has paid greater attention to improving the position of women in society. It is not unusual to hear in China that there is a government (or Communist Party) regulation that there

has to be a given percentage of women in some important positions. Sometimes there is a serious attempt to reach this kind of target. Generally speaking, women have equal opportunity in terms of occupational attainment and income distribution in state-owned enterprises where both decisions of employment and wages are made by the government. In rural township and village enterprises, community authorities have incentive to implement this kind of government policy (which determines the promotion of the officials in the community authorities). At the same time, they are more or less affected by the traditional culture. Therefore, when they make decisions of occupational distribution, they would try to not strongly discriminate against women. Nevertheless, the fact that occupational discrimination is more serious in the TVP sector than in other industrial countries reflects the impact of traditional culture on the policy implementators.

Within-occupational wage determination mainly depends on the directors' tastes. 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. Discrimination in income distribution against women can be traced back to the old commune system. Under the commune system, income was distributed according to working-points evaluations among the members of the production team. However, there was a well-known unwritten rule for the evaluation of working-points between men and women which was that women would receive one or two points less than males even if they did the same job and made the same contribution. The TVP sector appears to have followed the same rules for their wage determination. The extraordinary serious discrimination within the piece rate group reinforces this impression.

(2) The TVP firms have monopsony power[11]. 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. Therefore no matter how low (so long as it is higher than what is paid in the agricultural sector) the wage paid to the employees they have to accept it. Given the tradition of discrimination, employers in the TVP sector might have a special dislike of female employees. If this is the case, they pay a lower wage to female employees than to males employees. The women have to accept the situation. Because there is no labour market competition, this wage discrimination can be sustained for a very long period.

10.5 Conclusion

Several issues have been studied in this chapter. The following points can be made in conclusion:

(1) The determinants of occupational attainment for women are similar to those for men;

(2) Within-occupational discrimination in the TVP sector is high compared with other developing and industrial countries;

(3) Discrimination of occupational attainment is not as high as within-occupational discrimination;

(4) The above phenomena can be explained by decision-making with respect to employment and wage level in the TVP sector. Township and village governments have decision-making power over occupational distribution. They implement equal

[11] The monopsony power expressed here is slightly different from the one in Madden's (1975) model (see section 4.3 in Chapter 4). In the TVP sector, labour supply is controlled by the local community authorities. Therefore, instead of an upward sloping labourer supply curve, the firms face an upward sloping effort supply curve and a vertical labourer supply curve. So long as the wage is set above agricultural income, employees will choose to stay in the TVP sector. Given the effect of traditional culture, female employees will not shirk as they are paid a lower rate compared to their male co-workers.

opportunity policy in determining the TVP occupational distribution. TVP firms make decisions of wage levels, and the directors of these firms may have a special dislike of women.

Appendix 10A

Detailed derivation of total wage differential between men and women:

$$
\begin{aligned}
\overline{W}^m - \overline{W}^f &= \sum_j (P_j^m \overline{W}_j^m - P_j^f \overline{W}_j^f) \\
&= \sum_j (P_j^m \hat{\alpha}_j^m - P_j^f \hat{\alpha}_j^f) + \sum_j (P_j^m \hat{\beta}_j^m \overline{X}_j^m - P_j^f \hat{\beta}_j^f \overline{X}_j^f) \\
&= \sum_j P_j^f \hat{\alpha}_j^m + \sum_j P_j^m \hat{\alpha}_j^m - \sum_j P_j^f \hat{\alpha}_j^f - \sum_j P_j^f \hat{\alpha}_j^m + \sum_j (P_j^m \hat{\beta}_j^m \overline{X}_j^m - P_j^f \hat{\beta}_j^f \overline{X}_j^f) \\
&= \sum_j P_j^f (\hat{\alpha}_j^m - \hat{\alpha}_j^f) + \sum_j (P_j^m - P_j^f) \hat{\alpha}_j^m + \sum_j (P_j^m \hat{\beta}_j^m \overline{X}_j^m - P_j^f \hat{\beta}_j^f \overline{X}_j^f) \\
&= \sum_j P_j^f (\hat{\alpha}_j^m - \hat{\alpha}_j^f) + \sum_j (P_j^m - P_j^f) \hat{\alpha}_j^m + \sum_j (P_j^m \hat{\beta}_j^m \overline{X}_j^m - P_j^f \hat{\beta}_j^m \overline{X}_j^m) + \sum_j (P_j^f \hat{\beta}_j^m \overline{X}_j^m - P_j^f \hat{\beta}_j^f \overline{X}_j^f) \\
&= \sum_j P_j^f (\hat{\alpha}_j^m - \hat{\alpha}_j^f) + \sum_j (P_j^m - P_j^f) \hat{\alpha}_j^m + \sum_j P_j^f (\hat{\beta}_j^m \overline{X}_j^m - \hat{\beta}_j^f \overline{X}_j^f) + \hat{\beta}_j^m \overline{X}_j^m (P_j^m - P_j^f) \\
&= \sum_j P_j^f (\hat{\alpha}_j^m - \hat{\alpha}_j^f) + \sum_j P_j^f (\hat{\beta}_j^m \overline{X}_j^m - \hat{\beta}_j^f \overline{X}_j^f) + \sum_j (P_j^m - P_j^f)(\hat{\alpha}_j^m + \hat{\beta}_j^m \overline{X}_j^m)
\end{aligned}
$$

The second term of the formula derived above is different from that shown in Brown, Moon and Zoloth's paper. The above formula suggest that there is a typing error in their paper.

Appendix 10B

Mean values and standard deviations of dependent and independent variables for four occupational groups

	workers		S.L.		O.S.		M.S.	
	men	women	men	women	men	women	men	women
LDW	1.279	1.131	1.457	1.048	1.423	1.216	1.653	1.513
	(0.58)	(0.45)	(0.46)	(0.57)	(0.46)	(0.43)	(0.47)	(0.44)
Schooling	7.627	7.831	8.903	7.933	9.682	9.605	9.755	9.65
	(2.69)	(2.80)	(2.37)	(2.98)	(2.87)	(2.50)	(2.70)	(2.37)
OJ	8.634	7.433	8.365	9.233	12.879	8.711	11.33	10.05
	(8.25)	(6.98)	(8.78)	(7.17)	(11.19)	(7.74)	(7.81)	(8.07)
OJ^2	142.42	103.89	145.5	134.97	290.3	134.13	188.02	162.85
	(257.2)	(172.3)	(237.5)	(166.6)	(428.8)	(200.9)	(225.01)	(256.1)
FT	5.030	4.039	6.231	5.467	6.140	5.105	8.388	8.300
	(4.78)	(3.38)	(4.17)	(4.37)	(5.20)	(4.69)	(7.31)	(5.59)
FT^2	48.09	27.69	55.89	48.333	64.48	47.47	122.71	98.600
	(122.3)	(62.84)	(74.9)	(73.99)	(129.8)	(89.37)	(217.9)	(137.6)
JS	0.317	0.285	0.212	0.200	0.287	0.211	0.184	0.150
	(0.47)	(0.45)	(0.41)	(0.41)	(0.45)	(0.41)	(0.39)	(0.37)
SR	0.119	0.101	0.096	0.200	0.121	0.079	0.041	0
	(0.32)	(0.30)	(0.30)	(0.41)	(0.33)	(0.273)	(0.20)	0
NH	0.179	0.270	0.250	0.200	0.134	0.132	0.082	0
	(0.38)	(0.44)	(0.44)	(0.41)	(0.34)	(0.343)	(0.28)	0

Note: (1) S.L.=Shift leader; O.S.=Ordinary staff; M.S.=Middle level staff.
(2) Figures presented in parentheses are standard deviations.

Appendix 10C

Regression results of model 1 for four occupational groups separately

	workers		S.L.		O.S.		M.S.	
	men n=268	women n=337	men n=52	women n=30	men n=157	women n=38	men n=49	women n=20
Constant	0.967	0.721	1.248	0.624	1.390	0.419	1.795	2.172
	(7.53)	(7.30)	(3.22)	(1.64)	(7.43)	(1.16)	(4.47)	(3.67)
Schooling	-0.001	0.023	-0.003	-0.008	-0.005	0.040	-0.009	-0.039
	(-0.10)	(2.81)	(-0.09)	(-0.25)	(-0.37)	(1.49)	(-0.39)	(-1.21)
Other job exp. (OJ)								
OJ	0.015	0.017	0.060	0.015	0.030	0.024	0.004	0.055
	(1.86)	(1.52)	(2.85)	(0.38)	(3.64)	(0.90)	(0.17)	(1.32)
OJ^2	-0.0002	-0.0003	-0.0019	0.0002	-0.0007	-0.0004	0.00002	-0.0019
	(-0.74)	(-0.61)	(-2.55)	(0.10)	(-3.11)	(-0.37)	(0.03)	(-1.64)
Firm tenure (FT)								
FT	0.050	0.055	0.018	0.123	0.004	0.106	-0.019	-0.115
	(3.45)	(3.82)	(0.35)	(2.07)	(0.21)	(2.04)	(-0.59)	(-1.40)
FT^2	-0.0017	-0.0017	0.0002	-0.0047	-0.0002	-0.0053	0.0008	0.0052
	(-2.90)	(-2.50)	(0.08)	(-1.25)	(-0.30)	(-1.89)	(0.78)	(1.62)
County dummy								
Jieshou	-0.216	-0.235	-0.444	-0.270	-0.250	-0.232	-0.309	-0.556
	(-3.63)	(-5.05)	(-3.13)	(-1.27)	(-3.28)	(-1.35)	(-1.92)	(-1.46)
Shangrao	-0.221	-0.405	-0.502	-0.615	-0.655	-0.356	-0.987	
	(-2.81)	(-4.47)	(-2.36)	(-3.25)	(-6.54)	(-1.44)	(-3.67)	
Nanhai	0.823	0.253	0.109	0.302	0.190	0.308	0.743	
	(8.24)	(4.40)	(0.81)	(1.05)	(1.94)	(1.46)	(3.36)	
Breusch--Pagan χ^2	35.3 (8)	54.4 (8)	8.2 (8)	3.4 (8)	2.8 (8)	5.8 (8)	5.5 (8)	10.3 (8)
Adjusted R^2	0.41	0.32	0.35	0.62	0.32	0.32	0.43	0.07

11

CONCLUSIONS

This thesis has examined individual wage determination in the TVP sector in the period of economic evolution towards a market economy. The emphasis has been placed on the applicability of the human capital model. This chapter summarizes the main findings of the thesis and its contributions to enriching our understanding of the TVP labour market. It also provides some possible directions for further research.

11.1 The main findings

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 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.

Model for wage determination in the TVP sector

The human capital model is based on the assumption that there is a free labour market. To be able to analyse wage determination in this special mixed labour market that the TVP sector represents, a model for wage determination in the TVP sector is formed. The model posits 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. In this model the wage 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, this model hypothesized that the human capital model should be applicable to individual wage determination within the TVP sector.

Empirical analysis of wage determination in the TVP male labour market

Empirical analysis was conducted for both the male and female labour markets with 1985 cross-section data[1]. The basic human capital model is specified to test the impact of human capital variables (schooling, other job experience, firm tenure, agricultural experience, other non-agricultural experience) and some other personal characteristics (occupation, number of children in the family) on individual wage determination in the TVP sector.

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. When other job experience is further disaggregated into agricultural experience and non-agricultural experience, the estimates of the coefficients appear very similar across the experience variables. This indicates that perhaps the source of labour market experience is largely irrelevant. This 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 the situation becomes clearer.

[1] The data were collected by the Institute of Economics at the Chinese Academy of Social Sciences and the World Bank in 1986-1987.

For workers, firm tenure and other non-agricultural experience are statistically significant, with firm tenure having the most important 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 have been proposed: (1) 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 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.

Education. The most unusual result for the male labour market analysis is an insignificant effect of education on individual wage determination. The poor performance of the education variable appeared for both the analysis of the total male sample and the analysis based on data disaggregated into workers and staff groups. A question naturally arises as to whether this unusual result reflects a labour productivity effect or socially determined rules of payment.

Fortunately, among our sample, 40 per cent of employees are paid by piece rate and their earnings can be considered as a direct measure of labour productivity. The results suggest that education is an insignificant determinant of the wage level for the time rate and the piece rate groups.

It is this result that leads us to the following explanation. In the TVP firms many jobs are unskilled, and therefore it might be expected that education does not matter in terms of increasing labour productivity.

However, a further analysis displays a new picture. When the institutional change of employment system in the TVP sector is considered, our understanding of the role of education in TVP wage determination is enriched.

In the sample, among those who had 8 years tenure (being employed at 1978) about 70 per cent of employees 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.

The total male sample is disaggregated into market (those who found their jobs through their own efforts) and non-market groups (those who were assigned to their jobs). Wage equations are estimated for the two groups separately. The most interesting result for these estimations is that education is significant for the market group but insignificant for the non-market group.

This result raises a concern about why education is significant for the market group but not for the non-market group. Does this reflect labour productivity effects? To examine these questions, both the market and non-market groups are sub-divided into piece rate and time rate groups. The estimation results 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.

One reason why education might have a significant impact on labour productivity for the market group but not for the non-market group is 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.

The type of model we have in mind is as follows. 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 those 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.

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

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 literature on human capital, 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[2] logit model. This model tests whether education plays a significant role in TVP occupational assignment.

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. The results for a multinomial logit model (which further disaggregate the staff group into five sub-groups) suggest the same conclusion: 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.

Does the level of occupation in the TVP sector has a positive effect on earnings? This question then is examined by estimating a wage equation with occupational dummies

[2] 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.

for both the market and non-market groups. The 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. 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 their earnings.

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 invested 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 impossible to measure these non-wage benefits in these data and incorporate them into the regression.

One survey question, however, can partly provide support for the relationship between high 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 in 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.

Comparison. A comparison of the earnings distribution in the TVP sector with those in Japan and the United States reveals the following picture: (1) The rate of return to education for men in total in the TVP sector seems very different from that of the industrial economies. However, for the market group, education is a significant determinant of earnings and the rate of return is about the same as for the United States. (2) In terms of the lifetime employment system the TVP sector seems more like Japan, but the TVP workers' experience-earnings profile is more like the United States. The reason for this is the different roles that the wage plays in the TVP sector and in Japanese firms.

As Japan is characterised by rapid technological change, more investment in firm-specific training and retraining is required. This in turn requires that employers hold their specialized employees to minimize training costs. Similarly, employees prefer to stay with the specific firm so they can maximize the benefit from their specialized skill. This process generates a steep tenure-earnings profile to ensure that the employees and employers attach to each other.

Lifetime employment is also an important feature of the TVP sector, but the outcome is generated by a different process. The community authority controls the firms'

employment levels and the only alternative jobs for the employees are in the agricultural sector. Although lifetime employment is similar to that of Japan, the relationship with the wage determination process is different. In the TVP sector, the wage is not used as an instrument to ensure that the employees stay with the firm but rather as a tool to induce effort from individuals. If this is true then the payment system must be more similar to that of the free market (the United States), where it reflects labour productivity.

Female wage determination and the gender wage differential

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 structural differences of wage determination between the male and female labour markets and the role of pay discrimination.

Difference of male and female wage determination patterns. The most important difference between the two markets is the effect of education. It has a significant impact on female wage determination but is insignificant in total male wage determination. One explanation might be the different situations of demand for, and supply of, education for men and women. When supply of education is less for one group than for the other group, the rate of return to education will be higher for the former group than for the latter. In this regard the most telling fact is that men are given preference over women for education in rural China. According to Knight and Li (1991), on average, men received more years of education than women in China. The national mean difference of the years of education between men and women is 2.3 years, while in rural areas it is 2.5 years.

However, this conjecture is not very strong. There might be some other reasons, for example, firms' demand for male and female education might be different, and this

will bring different rate of returns to education for men and women. Further research is needed to establish the relative importance of these explanations.

Regarding the disaggregation across staff and workers groups, it is observed that there is no real difference between the wage determination patterns for male and female workers. Nevertheless, there is a significant difference between the effect of the experience variables on male and female staff wage determinations. For female staff, firm tenure and non-agricultural experience are more important determinants of their wage level, while for male staff, agricultural experience is the most important variable.

The situation for piece rate and time rate wage determination in the female labour market is similar to that in the male labour market. That is, in the female labour market, the wage structure for the time rate workers group is closer to that for the piece rate workers group than to that for the time rate staff group. Moreover, the difference of wage determination patterns between the female market and non-market groups is similar to that in the male labour market.

Decomposition of gender wage differential. 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.

The overall picture of the gender wage differential in the TVP sector seems to be as follows: the within-occupational wage discrimination is greater, both compared with developing and industrial countries; the discrimination of occupational distribution is not as serious as intra-occupational discrimination.

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.

A local government, township or village authority represents both the interests of local people and of higher level governments. Community authorities, thus, have dual objectives. As a representative of local government, they 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 traditional Chinese culture treats women extremely unfairly, the government has paid greater attention to improving the position of women in society. It is not unusual to hear in China that there is a government (or Communist Party) regulation that there should be a given percentage of women in some important positions. Sometimes there is a serious attempt to reach this kind of target. Generally speaking, women have equal opportunity in terms of occupational attainment and income distribution in state-owned enterprises where both decisions of employment and wages are made by the government. 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 do not strongly discriminate against women.

Within-occupational wage determination mainly depends on the directors' tastes. 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. Discrimination in income distribution against women can be traced back to the old commune system, where there was a well-known unwritten rule for the evaluation of working-points between men and women. Women would receive one or two

points less than males even if they did the same job and made the same contribution. The TVP sector appears to have followed the same rules for their wage determination. The extraordinary serious discrimination within the piece rate group reinforces this impression.

(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. Therefore no matter how low the wage paid to the employees they have to accept it (so long as it was higher than agricultural income). Given the tradition of discrimination, employers in the TVP sector might have a special dislike of female employees. If this is the case, they pay a lower wage to female employees than to males employees. The women have to accept this situation. Because there is no labour market competition, this wage discrimination can be sustained for a very long period.

11.2 Issues for further research

This dissertation has examined individual wage determination in the TVP sector in 1985. It enriched our understanding of the TVP labour market in several aspects. However, due to limitations on the data available, some important issues have not been analysed.

Regional differences of wage determination

China is a large country. The dispersion of economic development and institutions in different regions is very wide. The data used in this study were collected in four different counties. As described in Chapter 1, these four counties represent different levels of rural industrialization and different degrees of administrative control or different ownership structures.

These differences apparently have a significant impact on wage determination. The regression results in each case in this study show that county dummies are always very significant. It is noticed that compared with Wuxi county, the wage levels in Jieshou and Shangrao are about 25 to 50 per cent lower, while in Nanhai county it is about 40 to 50 per cent higher.

Nevertheless, incorporating county dummies into earnings equations can only measure the difference in wage levels. The difference in the pattern of wage determination is not captured. There are two equivalent ways to examine the impact of regional differences on wage determination:

(1) Incorporate regional dummies and their interaction terms on all other variables in a wage equation estimated on the total sample.

(2) Estimate wage equations for each county separately.

To get sensible results for a wage equation one needs a relatively large sample. However, the sample size used in this study is not big enough to enable an examination of the regional effect on wage determination. Nevertheless, the role of regional differences in wage determination in the TVP sector is a very important issue for further research.

The role of firms' characteristics in wage determination

Gelb (1990) estimated a wage equation for the TVP sector using 48 firm dummies alone as independent variables. The adjusted R^2 in his estimation is 57 per cent. This means that the firms' characteristics alone can explain over half of the variation in wages in the TVP labour market.

The characteristics of the firms which might have an impact on individual's wage determination include firm size, profitability, ownership structure, technological level (labour/capital ratio) and industrial specification. These data are available in the Quantitative Questionnaire. However, it is impossible for us to identify each

individual's firm specification. Being aware of the important role of firms' characteristics on wage determination, research should be conducted to analyse the role of firms' characteristics on wage determination in further depth when data are available.

Impact of reform on liberalization of the TVP labour market

This study is confined to the period of 1985 by the limitation of the data available. Since 1985, the TVP sector has undergone a remarkable change. The TVP labour market, presumably, has been further liberalized.

If it is possible, a new survey on the development of the TVP sector should be conducted. And a research project based on this new survey data will definitely enrich our understanding of the current TVP labour market. Moreover, a comparison between this study and the new study will throw light on how the TVP labour market has been liberalized since 1985.

Apart from these insights into the TVP labour market, a comparison between wage determination in the TVP sector in 1985 (this study) and in the state-owned sector will also be of interest. Compared with the state-owned sector, the TVP sector, since economic reform, is a more market oriented sector. Although reform in the state-owned sector has been undertaken for more than 10 years, labour market reform is much slower than the other set of reforms as it is an area of particular political sensitivity (White, 1985). It is suspected that even in the current period of liberalization, the labour market in the state-owned sector is not as market oriented as the TVP labour market in 1985. A comparison between a study of the current labour market in the state-owned sector and this study will provide a general view about how liberalized the labour market in the state sector is, and in which direction it is heading.

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