Wages in Transition:

the Case of Uzbekistan

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Declaration

This thesis was written while I was studying at the Economics Program, Research School of Social Sciences at the Australian National University. The opinions expressed are my own work, unless otherwise acknowledged in the text.

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Abstract

This thesis investigates the determinants of earnings in the former Soviet republic of Uzbekistan. It represents the first in-depth investigation of earnings in this country of 23 million people, made possible by the availability of a large scale independent household survey that was carried out in mid-1995. Previously, an inquiry of this nature would have been frustrated by a lack of information at the individual level and the weak quality of official sources of data.

The basic objective of the thesis is to understand the institutional, economic and individual factors that have affected wage outcomes during the transition. The main focus is on the Uzbek case, while at the same time attempting to place and interpret this experience in a wider regional context.

PART I is devoted to providing a better understanding of the economic and institutional framework of earnings in Uzbekistan than has previously been available. It draws together a range of published and unpublished data to provide the first comprehensive evaluation of the pre- and post-transition labour market in Uzbekistan. Data limitations mean that PART I is largely descriptive.

Microeconometric analysis is undertaken in PART II. One important area of focus is the return to human capital – that is, the response of earnings to different levels of education and years of experience. The thesis establishes the stylised fact that, by comparison with economies further advanced in economic liberalisation and transition, returns to education in Uzbekistan in 1995 were not unduly low, and were of the same order of magnitude as Russia and Poland, for example. An augmented model reveals that the significance of certain regional, ethnic and sectoral factors, and the importance of gender.

The thesis contributes to the growing literature on earnings in transition by testing and utilising recent developments in Western studies with respect to the measurement and specification of key variables. Questions which are

directly addressed include the problem of measurement of female experience and the appropriate functional form of the human capital earnings model, and in particular, the specification of experience. In some respects, the results cast doubt on the usefulness of conventional techniques, at least in the circumstances of Uzbekistan. For example, non-parametric regression techniques indicate that there are substantial cohort effects in Uzbekistan, which might otherwise be neglected in cross-sectional data.

Uzbekistan exhibits a number of characteristics that are peculiar to economies in transition – in particular, the existence of wage arrears which affect almost two in five workers. Arrears could be one way for employers to shift net wages toward market-clearing levels in the face of institutional and other constraints. Decomposition indicates that arrears account for between half and two-thirds of the widening of the earnings distribution that has occurred since 1989, and in this sense may be contributing to a more efficient labour market. However there is only mixed support for the hypothesis that individual productivity (human capital) variables determine the pattern of arrears. The nature and extent of arrears suggests that political economic factors play a key role. Wage simulations are used to establish upper and lower bounds for the effect of arrears on real wage trends and levels. Because of the high price inflation, the implications are substantial, even if the delay in wage payments was limited to only one month.

The analysis raises a number of points that are relevant to the formulation of policy in Uzbekistan, and indeed to a number of countries in transition that share similar problems. These include the falls in enrolment rates at all levels of education, but most markedly at the universities; the relative earnings disadvantage being experienced by certain demographic groups, in particular those living outside the capital, and women. A general theme is the unreliability of official statistics, particularly with respect to labour market developments. There is a need to improve data for decision-making. This applies to both government departments concerned with labour market developments and living standards, as well as the international financial agencies charged with the provision of advice to government.

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Acronyms and Russian Terms

ADB	Asian Development Bank
CEE	Central and Eastern Europe
CIS	Commonwealth of Independent States
CPI	Consumer Price Index
EBRD	European Bank for Reconstruction and Development
EESU	European University Institute/ University of Essex Survey of Uzbekistan
FSU	Former Soviet Union
Goskomprognostat	State Statistical Agency of Uzbekistan
GDP	Gross Domestic Product
ILO	International Labour Organisation
IMF	International Monetary Fund
KKP	Karakalpakstan
Kolkhoz	Collective farm
Oblast	region
OECD	Organisation for Economic Cooperation and Development
PIF	Privatisation Investment Fund
PTU	Professialno-teknicheskie uchilishcha, or vocational school
Soum	national currency of Uzbekistan
GKI	State Committee on Property Privatisation
Stazh	work record
SSUZ	Teknikum, or college
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Fund
USSR	United Soviet Socialist Republics
WDR	World Development Report

Chapter 1

Introduction and Overview

1.1 Introduction

This thesis investigates the determinants of earnings in the former Soviet republic of Uzbekistan. Empirical micro-analysis is undertaken using a representative data set that was collected three years after the onset of transition. It takes place in the wake of the break-up of the Soviet Union, and in the context of a period of unprecedented economic and social change for workers in the former Communist bloc.

Analysis of the structure and determinants of earnings casts light on key aspects of the transition process and outcomes. It was widely expected that the demise of central planning would reverse the economic stagnation which characterised the latter part of the communist period. It was hoped that liberalisation would raise living standards generally by increasing efficiency and unleashing previously repressed individual productive capacity and initiative.

A primary avenue through which such changes were expected to take place was the labour market and, in particular, with respect to the level and structure of wages, especially given theapparently high levels of human capital that characterised the former Soviet Union and Eastern Europe. For example, it was expected that university graduates would enjoy a wider range of choices as to where to live and where to work, including the possibility

of entrepreneurship and capital accumulation, and receive higher rates of remuneration.

The basic objective of the thesis is to understand the institutional, economic and individual factors that have affected wage outcomes during the transition. Throughout the thesis the main focus is on the former Soviet republic of Uzbekistan, but at the same time attempts to place and interpret this experience in a wider regional and international context.

The subject of earnings obviously has direct implications for the well-being of individuals and households in Uzbekistan. The study also has wider policy implications for debates about alternative approaches to transition from a command economy.

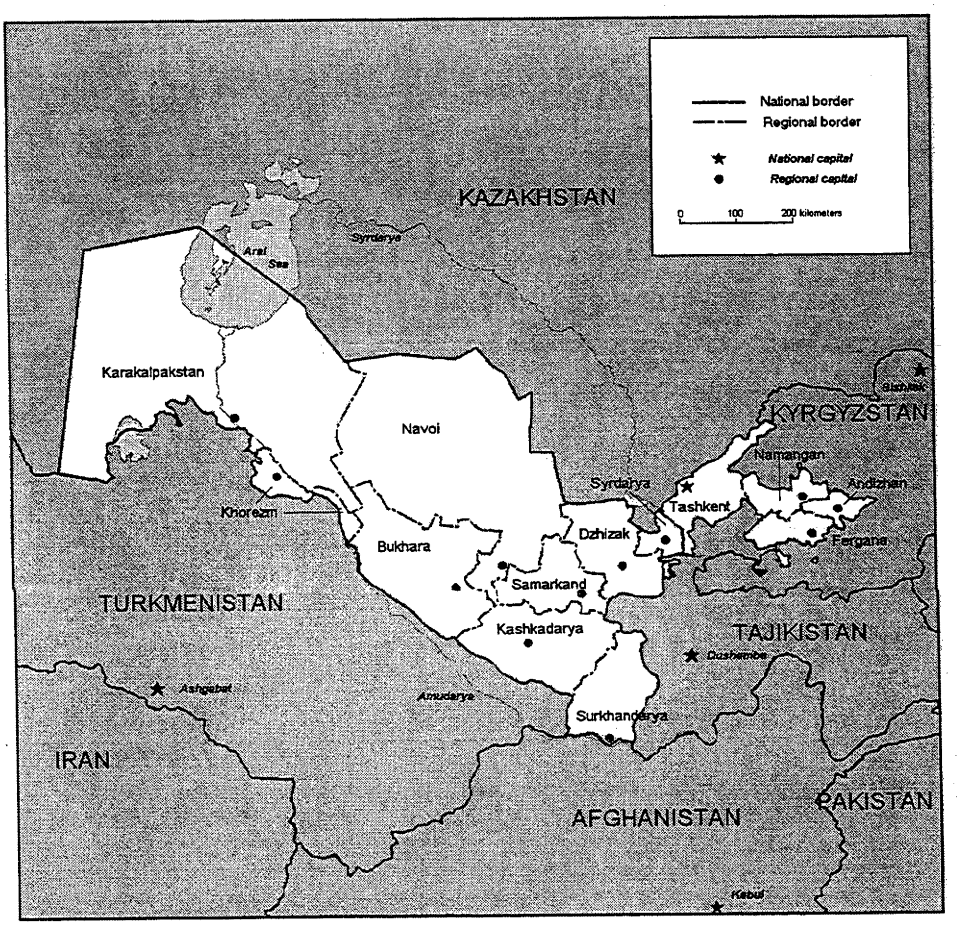
This thesis represents the first in-depth investigation of earnings in Uzbekistan. Previously, an inquiry of this nature would have been frustrated by a lack of information at the individual level and the low quality of official sources of data. The analysis here has been made possible by the availability of a large scale independent household survey that was carried out in mid-1995, the details of which are described below.

1.2 The Country

Uzbekistan is large (about 45 million square hectares), and its geography ranges from remote desert and mountain ranges, to the densely populated Fergana basin. Regional differentiation is an important dimension of living standards in Uzbekistan (Coudouel, Marnie, Micklewright and Scherbakova 1997). Uzbekistan is divided into 13 administrative regions, known as oblasts, a system of government that derives from the Soviet period. This is shown in Figure 1.1.

Table 1.1 lists the oblasts, their total populations, population density per square kilometre and the proportion living in rural areas as at January 1, 1996. It reveals the predominantly rural nature of every oblast ex-

Figure 1.1: Regions of Uzbekistan



cept the capital city, though the rural share varies from about 52 percent in Karakalpakstan, to over 70 percent in three oblasts including Fergana. There is a huge range in terms of population density, even excluding the capital city, from only six and eight people per square kilometre in Navoi and Karakalpakstan, up to 338 in Fergana.

Table 1.1: Population by region, 1996

	Total (000)	population density	% rural
Uzbekistan	22,912.1	49.6	61.8
Karakalpakstan	1,414.9	8.3	51.8
Andijan	2,034.3	464.6	70.1
Bukhara	1,335.4	32.7	67.7
Dzijak	886.1	41.6	68.2
Kashkadarya	1,971.9	65.8	74.0
Navoi	745.2	6.6	59.8
Namagan	1,780.4	215.1	62.2
Samarkand	2,479.9	145.0	71.6
Surhandarja	1,578.4	71.6	79.6
Sirdaya	629.9	121.0	69.3
Tashkent oblast	2,249.4	148.0	58.7
Fergana	2,487.6	337.7	70.8
Khorezm	1,223.5	185.6	75.4
Tashkent City	2,095.2	6,382.4	0.0

Uzbekistan's polity remains highly centralised, and that there is far less regional variation than in Russia, for example.[1] The political regime is based on Presidential authoritarianism. While some powers are formally subject to *Oliy Majlis* (parliamentary) confirmation, the President's authority is essentially untrammeled.[2]

[1]This is partly due to simple geographic size differences, but also to institutional factors. Stewart (1997) analyses the extensive decentralisation that has taken place in Russia; Commander and Yemtsov (1997) show the significant differences in labour market experiences among the 89 oblasts of the Russian Federation.

[2]Indeed the country is unusual among transition countries in the conspicuous absence of political liberalisation. One index of democratic rights based on the extent of political

1.3 Motivation

This topic is of interest for several reasons. First, and perhaps most importantly from the perspective of economists, the thesis provides a case study of the impact of dramatic macro-economic and structural changes on earnings outcomes. The pace and extent of change that has been experienced in the former republics of the Soviet Union during the 1990s is highly unusual. The transition from a centralised command system reveals the nature of individual responses in the face of massive economic and structural change, and this is of interest in itself. Not surprisingly, then, the transition process has been the subject of a number of studies from a labour market perspective,[3] and there is growing literature on transition related to other spheres of economic interest.[4]

The second main reason for interest in the topic is that the paucity of the previously available information has limited understanding of the processes of transition in Uzbekistan. Despite the burgeoning literature on transition, the region of Central Asia has received comparatively little attention from academics and the international financial agencies, as the focus has been on the European parts of the former Soviet bloc.[5] This represents a continuation

participation and the freedom of individuals to develop independent views and institutions (Murrell 1996) suggests that while most transition countries enjoyed a dramatic expansion of political freedom since 1989, the people of Uzbekistan, along with their Tajik and Turkmen neighbours, had suffered a dramatic erosion of such rights, from the Soviet average of 25 at the end of perestroika era in 1989, down to zero in 1994. See also Human Rights Watch/Helsinki (1996).

[3] An overview of studies of the labour market in transition is provided by Svenjar (forthcoming) in the Handbook of Labor Economics. See also Commander and Corricelli (1995), which contains a range of country studies, and Rutkowski (1995) for an overview.

[4] The literature of the economics of transition is, by now, voluminous. Recent work which also provide overviews include Desai (1995); World Bank (1996a) and de Melo *et al* (1996).

[5] This can be illustrated by the number of country references in the ECONLIT database: in October 1998, Uzbekistan had 49 references, compared to 104 for Estonia (with one-seventh the population), 181 for Ukraine and 1686 for the Russian Federation. There are of course several noteable contributions, including Pomfret (1995); Falkingham et al (1997) and Kaiser (1997).

of the bias that characterised the pre-transition period. Information about, and analysis of, the structure of earnings in the pre-transition period is scarce generally, but especially so for the Central Asian region. Within Central Asia, Uzbekistan is by far the most populous nation, accounting for over 40 percent of the population of the region.[6] Indeed the country is the third largest among the fifteen former Soviet republics, after the Russian Federation and the Ukraine.

Measurement problems cast doubt on the accuracy of official data on prices, output and wages for Uzbekistan. The data which are available are often published in forms that are not amenable to Western-style economic analysis. This affects our understanding of key aspects of the labour market, including the structure of wages, labour force participation and unemployment. In such a context, the value of micro-analysis of representative data used in this thesis is obvious.

Third, within the genre of transition economies, Uzbekistan is an interesting case because of the premium accorded by the government to institutional continuity and the minimisation of economic disruption. The experience of Uzbekistan can therefore be used to cast light on the "speed of transition" debate.[7] Some have drawn attention to the potentially positive welfare effects of slow transition (see, for example, Pomfret and Anderson 1997; Griffin (ed.) 1995; Klugman 1998). More commonly, however, the country has been viewed as a laggard in reform among the transition economies (see, for example, World Bank (1996a); and De Melo *et al.*... (1996)). Indeed relations with the International Monetary Fund (IMF) and the World Bank have been far from smooth – adjustment lending was extended to Uzbekistan much later than Kyrgyzstan and Kazakhstan, for example, and the 1995 IMF program

[6] Central Asia is taken to comprise the former Soviet republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

[7] This debate has taken place between those who endorse rapid liberalisation of the economy and structural reforms (*á la*, for example, the "big bang" in Poland), and those who favour a more gradual approach to change. The former position tends to have been associated with the International Monetary Fund and the World Bank, for example.

subsequently broke down over major policy disagreements.

The relevance of the case of Uzbekistan would be heightened by the finding that changes in the wage structure are nonetheless typical of those in other countries of Central and Eastern Europe (CEE) and the former Soviet Union (FSU). The thesis thus examines whether the structure of earnings in Uzbekistan is similar to that in those countries that have adopted a faster pace of market reform with arguably larger social costs in terms of declines in output and rises in inequality. If this is the case, there are grounds to argue that efficiency in the labour market has not been inhibited by a deliberately gradual approach to reform. This debate has potentially important policy implications for the domestic government as well as the international agencies which advise on reform.

Fourth, what happens to the structure of earnings during transition is important not least because the labour market is the main source of income for individuals and households. In Russia, for example, changes in the level and distribution of earnings as opposed to, for example, the reduced value of state transfers, account for most of the decline in household welfare that has occurred during recent years (Klugman and Kolev, forthcoming). Hence there is interest in the distributive and social consequences of transition. This has several dimensions: not only is the overall distribution of earnings important, but the relative positions of women and men, and also of youth and older workers, matter. Each is investigated in detail in what follows.

1.4 Structure and Methodology

The thesis comprises two parts, each of which is prefaced by a summary, which are structured as follows.

PART I is devoted to providing a better understanding of the economic and institutional framework than has previously been available, in order to facilitate interpretation of earnings in the mid-1990s. It draws together a

range of published and unpublished data to provide the first comprehensive evaluation of the pre- and post-transition labour market in Uzbekistan.

PART I comprises three chapters. Chapter 2 considers the institutional and economic determinants of wages during the Soviet period, and available evidence on wage outcomes. Chapter 3 undertakes a similar task for the transition period, in the regional context of the former Soviet Union. Chapter 4 sets out a theoretical framework that can be used to explain individual earnings outcomes and reviews a selection of the findings of studies of earnings, focusing on the results for the transition economies.

The detailed econometric investigation undertaken in PART II of the thesis relies mainly on techniques that are fairly well-established in labour economics. The estimation method employed is generally an Ordinary Least Squares regression model, with earnings as the dependent variable. The main novelty in this respect lies in construction and interpretation of the models of earnings for Uzbekistan in the broader economic, structural and institutional context of transition. In addition, recent developments in the measurement and specification of key variables, in particular, labour market experience, are utilised. In a number of areas, the results are used to cast doubt on the usefulness of conventional techniques, at least in the circumstances of Uzbekistan.

PART II comprises four chapters that present the results of micro-analysis of a representative data set that was collected in 1995. Chapter 5 describes the data set and variables, and presents results of estimation of a basic human capital earnings model. This highlights problems with the standard approach and, together with the literature review in the preceding chapter, indicates next steps.

Chapter 6 considers the problem of measurement of female experience associated with typical human capital estimations, and implements a correction mechanism based on information on female participation in the sample. Chapter 7 addresses the issue of the appropriate functional form of the hu-

man capital earnings model, and in particular, the specification of experience. Chapter 8 develops several extensions to, and applications of, the basic human capital earnings model. First, an extended model of earnings which includes a range of regional, sectoral and other variables is estimated. Second, some apparent peculiarities in the returns to education are investigated, in particular – with respect to earnings premiums (or "sheepskin effects") for graduates. Third, the appropriate choice of sample – given widespread delays in the payment of wages – is formally tested. The fourth task is an application of an imputed experience variable, demonstrating its importance for the estimated extent of gender wage discrimination.

Chapter 9 undertakes micro-analysis of the data on delays in payment of wages (known as "arrears"). Systematic patterns in the distribution of arrears are investigated using descriptive statistics and multivariate techniques that cast light on the incidence and size of arrears. The consequences of arrears for wage inflation and real wage levels are also examined.

1.5 Summary of Main Findings

The thesis makes a number of contributions to understanding the labour market in Uzbekistan and, more generally, to the literature on labour markets in transition. These are as follows:[8]

The Institutional Framework

- Transition in Uzbekistan has been gradual, but nonetheless marked by a series of measures that have relaxed institutional constraints on individuals and firms and sharpened the importance of market signals. This includes the recognition of unemployment (which had been illegal during the Soviet period) and the withdrawal of budget subsidies to producers. Government intervention remains extensive however, and is

[8] See also the summaries for PARTS I and II.

implemented through, for example, the system of state orders for major agricultural products and control of the financial system.

- In international terms, levels of achievement in education in Soviet Uzbekistan were high relative to the level of per capita income. However the system of education was apparently characterised by narrow specialisation and the limited development of problem-solving abilities.

- Although evidence concerning returns to education during the Soviet period is limited, at best, and no data existed for Uzbekistan that would allow micro-analysis, the general consensus for the USSR is that the effect of higher education on earnings was less than in established market economies. There is evidence, for example, of wages drift which increased the relative pay of manual workers, particularly the unskilled. It is however unclear whether this situation arose from the institutional framework or from technological factors related to low rates of capital investment during the late Soviet period.

Education and Earnings

- The thesis establishes the stylised fact that, by comparison with other economies further advanced in economic liberalisation and transition, returns to education in Uzbekistan in 1995 were not unduly low. Rates of returns to education, as estimated by a basic human capital earnings model, are of the same order of magnitude in the transition economies of Russia and Poland, for example. The (gross) return to an additional year of schooling is around 7.7 percent for the pooled sample, which is also close to the regional average reported in the literature for the OECD and for Latin America.

- Returns to different levels of education are estimated using alternative specifications of the human capital earnings model. In the basic model, the wage increase associated with a university degree is 16.4 percent,

which is among the highest reported for transition countries and well above the OECD regional average of 12.3 percent. The inclusion of controls for sectoral, regional and other factors in an extended model reduces the gross return somewhat, to 8.1 and 11.0 percent for men and women respectively. These returns still exceed those which have been reported for most Eastern European countries.

Experience and Earnings

- The returns to potential experience are low by international standards, particularly for women. The orders of magnitude are nonetheless similar to those reported for other transition countries, where age-earnings profiles have tended to flatten, which might suggest that pre-transition experience is now of lesser value in the workplace, but there are other possible interpretations. However the results raise the question as to whether experience is being appropriately measured by conventional proxies of potential years of work, which will tend to bias the coefficients on experience downward. In fact it is shown that the return to potential experience for women is significantly below that for men, and that the returns to an imputed (lower) measure of female experience are about three times higher.

Women's Experience and The Gender Wage Gap

- The intermittent pattern of female labour force attachment in Uzbekistan means that the amount of actual labour market experience is typically much less than the number of years since leaving school. Rates of labour force participation among working-age women are well below 100 percent, and there is a high incidence of adult women on maternity leave (around 30 percent of the sample).

- The measurement of experience is important for analyses of gender discrimination in the labour market. The use of potential experience (or

age) in human capital earnings functions for women in Uzbekistan, and by implication, in the Russian Federation and elsewhere, will tend to overestimate the extent of unexplained gender wage differences. At the same time, however, the extreme sensitivity of the results to the assumptions underlying the gender wage decomposition demonstrate the need for caution in drawing any firm conclusions about the magnitude of discrimination using these methods.

Specification of Experience and Implications

- A number of international studies have cast doubt on the appropriateness of the quadratic model of experience, which has been the standard specification in human capital earnings functions. Conventional diagnostic tests suggest that this model performs badly in the case of Uzbekistan, though without indicating a clear preference among the alternative higher order polynomial specifications. Local or non-parametric regression techniques are valuable in indicating the preferred model when the results of the conventional tests are ambiguous.

- A limitation that is inherent in cross-sectional analysis of earnings profiles is that the effects of individual experience and differences between age cohorts may be confounded. In the context of large-scale economic change, earnings profiles are particularly likely to be affected by both types of factors. The results suggest that cohort effects are indeed substantial in Uzbekistan. Even in depressed macroeconomic conditions, some individuals have done relatively well – younger, better educated people seem to have higher wage opportunities that emerge as a result of liberalisation of the economy.

- Similar cohort effects might be expected to characterise other transition economies which have experienced similar types of structural change. Hence, the studies of earnings in transition based on a single cross-

section of data and conventional quadratic specifications of experience could produce misleading results.

Additional Determinants of Earnings

- For both men and women, region and ethnicity are found to be significant determinants of earnings. There is a premium associated with living in the capital; somewhat less expected is the finding that Fergana has a larger negative wage effect than Karalkalpakstan, even though the latter is generally considered to be relatively poorer. The data suggest that the traditional advantages associated with Slavic ethnicity have persisted since independence from Moscow which, again, is somewhat surprising given the large-scale migration of Russians since the early 1990s.

- Higher earnings are associated with all sectors of employment relative to the agricultural kolkhoz. There is also a premium associated with private sector employment.

Earnings Inequality

- Earlier studies have suggested that the distribution of earnings has widened significantly in all transition economies. This has been the case in Uzbekistan, where the extent of inequality reflected in the .606 Gini coefficient for net earnings in 1995 is much larger than the Gini of .280 reported for the Soviet period. At the same time, however, available data suggest that the trend toward higher earnings inequality has been less dramatic than in the Russian Federation during the transition.

- Given the institutional and political factors that would be expected to inhibit the adjustment of *ex ante* relativities, delays in payment of wages (arrears) appear to be an important avenue by which the expected widening in the wage distribution has occurred. Decomposition

analysis suggests that arrears account for between 50 and 66 percent of the rise in wage inequality since 1989.

Arrears

- Uzbekistan exhibits a number of characteristics that are peculiar to economies in transition – in particular, the delayed payment of wages affects almost two in five workers. In an extended human capital model of earnings, an arrears dummy variable has large and significant negative effects, and interaction terms indicate that this effect is compounded for residents of Fergana and for non-Uzbeks.

- The possibility of statistically significant differences in the returns to human capital between those individuals who are affected by arrears, and those who are not, are investigated. Estimation of separate earnings functions for the two groups (and by sex) with the net wage received as the dependent variable imply large differences in the returns to human capital, but formal F tests reveal that these differences are not statistically significant. These results confirm the appropriateness of the modelling approach adopted in this thesis, which pools individuals regardless of whether or not they have been affected by arrears.

- The amount of arrears is calculated as the amount reported as owing to the individual from the past month from the main place of work. The amount of money that the individual had contracted to receive in the preceding month (May) can be derived by adding the net wage plus the amount of arrears owed. This is referred to as the "contract wage", and is used in the analysis of the incidence and size of arrears.

- A conceptual framework is established, within which a series of hypotheses about the nature and extent of arrears are set up. In particular, it is possible that arrears are a route to greater efficiency in the labour market by reducing the real value of payments to workers whose

contract wages are, for institutional or other reasons, too high; however it is also possible that arrears are simply a reflection of government intervention in the economy.

- Analysis of microdata on the pattern of wage arrears reveals distinct patterns. Adopting a two-step approach, the analysis shows who is affected by arrears, and second, among those affected, by how much. In general the individual characteristics most frequently associated with the presence of arrears are also associated with larger amounts of arrears. In particular those working on collective farms and people living outside the capital are found to be most affected. These regional and rural/urban disparities are compounded by the fact that the individuals with low contract wages are more frequently and more adversely affected by arrears. Hence arrears have distributional implications.

- The extent and incidence of arrears provide some support for the "efficiency" hypothesis: that arrears are one way for employers to shift net wages toward market-clearing levels in the face of institutional and other constraints. However there is only mixed support for the hypothesis that indicators of individual productivity reflected in human capital variables would be a significant factor in explaining the pattern of arrears. The analysis suggests that a political economic perspective is perhaps a more fruitful approach to thinking about wage arrears.

- In the presence of the high rates of inflation that have characterised much of the transition, delayed payment reduces the real value of earnings and the measured rate of wage inflation. However this fact has not been taken into account in the construction of official statistics on wages by domestic and international agencies. Wage simulations are used to establish upper and lower bounds for the effect of arrears on real wage trends and levels. The implications are substantial, even if the delay in wage payments was limited to only one month.

Possible Implications for Policy

- The analysis raises a number of points that are relevant to the formulation of policy in Uzbekistan, and indeed to a number of countries in transition that share similar problems. The major points can be summarised as follows.

- The finding that returns to education in Uzbekistan are not unduly low should not be cause for complacency in educational policy. Transition has not been associated with significant structural or curricular reforms in education, and therefore the potential contribution of the sector to future growth has not been enhanced. There are several findings which might be of interest to policy makers.

  First, enrolment rates have fallen at all levels of education, but most markedly at the universities. This has been a common trend in transition countries. There is evidence that educational access of children from worse-off households and poorer regions has been more adversely affected, thereby exacerbating the trend toward widening earnings and income inequality, and might require targeted responses if considered an issue by government.

  Second, evidence of lower rates of university participation for women together with evidence that higher wage opportunities are available to tertiary graduates could be cause for concern if the government is concerned about equal opportunity.

  Third, the sharp declines in adult participation in formal part-time training raise questions about the sustainability of the inherited system and the relevance of its approach in the post-transition era, and about the best way to reskill future and current workers. This trend, together with evidence indicating the existence of cohort effects, suggest that the earnings of older workers have been relatively adversely affected by the transition.

- There are substantial gender differences in earnings in Uzbekistan. This appears to have persisted despite the anti-discrimination type legislation. Reconsideration of the extensive leaves and benefits granted to pregnant women and mothers may be warranted insofar as there are reasons to believe that such concessions may increase the risk of gender discrimination as employers become more profit-motivated in their orientation.

- A general theme throughout the thesis relates to the unreliability of official statistics, particularly with respect to labour market developments. The consideration of arrears, for example, suggests that official real wage series may be significantly misleading. To this extent, there is a clear need to improve data for decision-making. This applies to both domestic agencies, as well as the international financial agencies charged with the provision of advice to government. The recent initiatives to address issues of microdata data collection (household and labour force surveys), such as training in sampling techniques consistent with OECD standards, are therefore timely.

Part I

Empirical and Theoretical Background

Summary of Part I

The objective of PART I of the thesis is to understand the institutional and economic factors that are likely to affect wage outcomes during the transition in Uzbekistan. The relative lack of published information and analysis on this topic require that greater attention be given to this issue than would be needed for a country that had been more extensively studied.

PART I comprises three chapters, which are structured as follows.

Chapter 2 considers the economic determinants of wages during the Soviet period, within the institutional framework which then prevailed. Available evidence on wage outcomes is reviewed, drawing attention to the structure of relativities among sectors, and among the former Soviet republics, as well as what can be learnt about the effect of education on earnings.

Chapter 3 undertakes a similar task for the transition period, identifying the major economic and institutional changes that have been associated with the transition. Economic developments and outcomes in the labour market are reviewed in the regional context of the former Soviet Union.

Chapter 4 elaborates a framework that can be used to explain individual earnings outcomes based on the theory of equalising differences (Rosen, 1986). The human capital theory of earnings is set out, followed by a review of the problems that arise in its empirical implementation that are relevant to the subsequent analysis. A survey of the literature on the determinants of earnings in transition is presented in the second part of the chapter, drawing attention to issues of methodology as well as the findings that have emerged to date.

The main themes and findings of PART I can be summarised as follows:

Economic Conditions

- For seventy years, Uzbekistan was part of a larger planned economy, but was underdeveloped relative to the rest of the USSR in terms of the level of industrialisation. The republic was also characterised by problems associated with surplus labour. The Soviet state, through its ownership of the means of production and detailed central plans, strictly limited the role of product prices and the extent of enterprise autonomy. The planned economy was believed to be associated with pervasive inefficiencies, manifested in low factor productivity and stagnation of output growth.

- Economic transition was embarked upon after attaining formal independence in December 1991. The subsequent period has been characterised by periods of hyperinflation and large declines in output.

- There have also been some important structural changes, including a decline in the share of industrial output and an expansion of private sector activity. Government intervention remains extensive nonetheless and is mediated through, for example, the system of state orders for major agricultural products and control of the financial system.

Education

- In international terms, levels of achievement in education in Soviet Uzbekistan were high relative to the level of per capita income. However the system of education was seen to be characterised by substantial problems including early and narrow specialisation and limited development of problem-solving abilities.

- The transition has not been associated with significant structural or curriculum reforms in education. Enrolment rates have fallen at all

levels of education, but most markedly at the university level. The reasons for this decline are discussed. Sharp declines are also documented for adult participation in formal, part-time training.

Labour Market Regulation

- In general, during the Soviet period, individuals were free to choose their occupation, place of work, and educational paths.
- The formal determination of Soviet-period wages was the perogative of central planners. The available evidence nonetheless suggests that the theory of equalising differences, which refers to observed wage differentials required to equalise the total monetary and non-monetary advantages or disadvantages among work activities and among workers themselves, influenced wage outcomes under central planning. However this does not mean that the system functioned efficiently.

Firm Regulation and Incentives

- There was a range of problems, related mainly to the incentives facing firms, that were arguably inherent in the Soviet economy. The result was high levels of labour hoarding and a tendency for wage levels to drift above the plan.
- Transition has been marked by a series of measures that have relaxed the institutional constraints on individuals and firms and sharpened the importance of market signals. This includes the legal recognition of unemployment (which was formally illegal during the Soviet period) and the withdrawal of budget subsidies to producers (which were formerly extensive).

Wage Outcomes

- Evidence about returns to education during the Soviet period is limited. No data exists for Uzbekistan that would allow microanalysis. However the relatively abundant supply of skilled labour in Uzbekistan relative to the level of economic development might be expected to depress returns to education.

- The general consensus is that the effect of higher education on earnings in the USSR was less than in established market economies. There is evidence, for example, of wages drift which increased the relative pay of manual workers, particularly the unskilled. It is unclear whether this situation arose from the institutional framework or from technological factors related to low rates of capital investment.

- Conventional indicators of inequality do not show an unusually compressed distribution of earnings within the republics of the former Soviet Union relative to a number of Western European countries. Available evidence nonetheless suggests increases in measures of inequality have accompanied economic liberalisation in all the transition economies, with the sharpest rises being reported for the Russian Federation.

Earnings in Transition: Theory and Evidence

- There is a vast empirical literature that is based on the estimation of human capital wage functions which confirms the positive correlation between higher levels of education and experience on the one hand, and earnings on the other.

- However difficulties arise in interpreting the positive association between education and earnings which may be due to, for example, signalling effects or to the connections acquired through education, rather

than due to increases in individual productivity.

- The recent availability of microdata has enabled a number of studies of formerly planned economies, which have generally found support for the hypothesis that rates of return to educational qualifications tend to rise during the transition.

- Empirical applications of earnings functions typically encounter problems related to omitted variables (like ability) and inaccurate measurement of independent variables (like experience). Some of the existing studies of wages in transition are susceptible to criticism on a number of these methodological grounds, which are also encountered in Western studies. Ways to deal with these issues are flagged, and tackled in PART II of the thesis.

Chapter 2

Soviet Uzbekistan

2.1 Introduction

This chapter provides background on Uzbekistan during the Soviet period. The main objective is to facilitate interpretation of developments in the labour market during the transition. For seventy years, until 1992, the Republic of Uzbekistan was part of a regime that was highly centralised in both economic and political terms. This legacy would be expected to play a key part in shaping the immediate post-independence period. Yet our understanding of wages and the labour market during the Soviet era is unfortunately limited by a paucity of independent analysis and reliable data.

Soviet scholars worked within a totalitarian regime that imposed severe limits on the extent and nature of their inquiry. There were great quantities of data, as one might expect in a centrally planned system, yet there was a dearth of representative survey data. The regular household survey was subject to serious sampling bias (Falkingham and Micklewright 1997), and/or the results were systematically suppressed and made available only in forms that limited its usefulness.[1] The data on the labour market that

[1]Even released information was often in forms that limited its usefulness. For example, all the available results from the Family Budget Survey on earnings were classified under two headings – wage earners and collective farmers – where the former category also included workers on state farms. Hence one cannot examine a rural-urban breakdown.

was released by the statistical agency (Goskomstat, or Goskomprognostat, as it is now known in Uzbekistan) suffers from a range of drawbacks that are detailed below. Even local researchers had problems accessing what data were available. Because of this combination of factors, there was no tradition of micro-analysis of wage and employment data of the type that had become well-established in Western (neo-classical) economics by the 1970s including, for example, the empirical analysis of earnings functions.

There are nonetheless a number of useful studies that can be drawn upon for an analysis of the Soviet period. This is particularly true since the era of *glasnost*, or opening up of discussion, in the 1980s . Western books relevant to the study of Soviet wages include Kirsch (1972), and run through to the end of the Soviet era with the publication of Atkinson and Micklewright (1992), Ofer and Vinokur (1992) and Marnie (1992). However the Western analyses are equally hampered by the lack of representative micro-data.[2] Moreover neither the Soviet nor Western studies tend to pay much explicit attention to the Central Asian region.[3] In some senses this does not matter, since Uzbekistan was part of a centralised and planned system characterised by uniform rules. On the other hand, there were certain demographic and economic features that distinguished the republic from the rest of the Soviet Union, or at least from Russia, the republic which tended to receive the greatest attention.

This chapter is motivated by the need to understand the institutional,

See also Marnie and Micklewright (1994).

[2]Ofer and Vinokur (1992) avoids the problems associated with the Soviet surveys by drawing upon sample surveys of emigre Jews, but this in turn raises further problems with respect to representativeness. In particular, it is noted that the individuals had come from urban and European (western) parts of the USSR, which limits the usefulness from the perspective of Uzbekistan. The same is true of Katz's (1994) interesting study of gender differentials in Soviet wages, based on a sample from Taganrog, a single industrial town in European Russia.

[3]There are some noteable exceptions: Marnie (1992) whose final chapter is entitled *Regional Aspects of Employment and Unemployment in the USSR (With Particular Reference to Central Asia)*; Lubin (1984) *Labour and Nationality in Soviet Central Asia*; and Rumer (1989) *Soviet Central Asia: The Tragic Experiment.*

economic and demographic factors which influenced the determination of wages in Uzbekistan during and shortly after the Soviet period. The micro-analysis in PART II is based on a data set that was collected less than three years after the collapse of the USSR. The legacy of the system of central planning that had prevailed for seventy years would be expected to persist for several years, at least.

In this chapter, within the constraints imposed by the data, the following broad questions are addressed with respect to the Soviet period. First, what was the demographic and economic context within which wages were determined? Second, what was the nature of the stock of human capital? Section 2.2 reviews the determinants of wages along several dimensions, viz. the structure of the economy and employment and the stock of human capital, as reflected in the levels of educational qualifications of the population and the system of education. Third, what were the institutional and behavioral traits that affected the determination of individual wages in the Soviet era? Different aspects of the institutional framework that governed wage setting are reviewed in Section 2.3. And fourth, what were the outcomes in terms of the distribution of earnings and returns to skill? The final section presents evidence about earnings by branch (sector),[4] measures of inequality and returns to skill. A key underlying question throughout the chapter is the extent of enterprise and individual autonomy within the overall constraints imposed by centralised wage fixation and the system of economic planning that determined output.

[4]The Soviet literature tends to refer to "branches of the economy", which are equivalent to what western economists would call sectors of the economy. In this thesis, these two terms are used interchangeably.

2.2 Determinants of Wages

2.2.1 Introduction

Uzbekistan's population of 23 million is the largest of the Central Asian countries of the former Soviet Union. About half reside in rural areas and 43 percent of the population is under 16 years of age. Ethnically, according to the 1989 census, the population was mainly Uzbek (71 percent), alongside significant numbers of Russians (9 percent) and Tajiks and Kazaks (4 percent each). The regional ethnic picture is somewhat different in that the Russians mainly reside in urban areas, and the rural population is overwhelmingly Uzbek.

In several respects Uzbekistan has a socio-economic profile close to that of a developing country, although significantly distinguished from countries at similar levels of per capita income by virtually universal literacy and access to health services (Falkingham, Klugman, Marnie and Micklewright 1997). The level of economic development at independence in 1991 was low in terms of several commonly used indicators: low per capita income (US$ 860, second lowest in the USSR), rural predominance and high population growth. The mean income in Uzbekistan was only 55 percent of the mean income in the Russian Federation in 1989 (Atkinson and Micklewright 1992), and only 13 percent of the United States.[5]

This section examines several broad dimensions of Soviet Uzbekistan that would be expected to affect wage outcomes. First the structure of economic activity in the republic is examined, drawing attention to the types of controls imposed on enterprises. Second, and relatedly, the structure of employment is reviewed. The third area of interest is the level and nature of human capital in the economy.

[5]Russia was about 30 percent of the US. These figures are based on Purchasing Power Parity Estimates of GDP per capita for 1987 (World Bank, 1996a, Annex Table 1).

2.2.2 Structure of the Economy

Soviet Uzbekistan had a low level of economic development, that was compounded by problems that characterized the rest of the USSR. Inefficient production and highly monopolistic market structures, stagnating output and repressed inflation were all evident in Soviet Uzbekistan (Pomfret 1995; see also Rumer (1989) on the problems of Soviet regional economic policy). Labour in both industry and agriculture was largely engaged in state-owned entities that were characterised by the significant overstaffing, obsolete production methods and technology that typified the centrally planned regime.

As part of the Soviet Union, the economy of Uzbekistan was the subject of extensive centralised planning. Productive entities were largely state-owned and the coordinating roles of markets and prices were almost completely suppressed. Detailed, centrally determined plans for the inputs and outputs of all branches (sectors) of the economy were developed on a strategic basis every five years, which in turn generated sets of targets, typically specified in terms of physical output. The targets were the task of branch ministries. Enterprises, collective farms and departments (e.g. railways) were owned by individual ministries at the all-Union or Republican level. Budget constraints on firms were soft in the sense that any losses were absorbed by either the state budget, the extension of credit or cross-subsidisation across the branch. Prices were administratively determined. Enterprise autonomy was, at least until 1987, strictly limited: for example enterprise deposits were earmarked for planned expenditures and could not be converted into cash except to make authorised payments, mainly wages (IMF *et al.* 1991).

The cornerstone of economic reforms in the late Soviet period was the 1987 law *On Enterprises* which abolished traditional output targets, allowed enterprises to trade directly with their suppliers and customers, and enabled greater independence in decisions about investment and deployment of profits. Enterprises were supposed to become self-financing. However state orders still accounted for the vast bulk of production and the degree of enterprise

autonomy was less than might have been envisaged, in part because enterprises themselves wanted a guaranteed source of inputs to meet orders. Tax rates were unpredictable and profits were subject to arbitrary confiscation by the branch ministry to cross-subsidise loss making enterprises. While state orders declined from 1989, the lack of well-functioning markets proved to be highly disruptive to output levels (as will be shown in the next chapter).

At independence, agriculture accounted for about 36 percent of national income, followed by industry (33 percent of output and 14 percent of employment), and construction (14 percent of output). This reflected Soviet planning priorities, in particular the emphasis on cotton, and arguably resulted in a lower level of diversification in production than might have been expected in a country with such varied natural resources.[6] In 1990, cotton represented 38.2 percent of agricultural output, compared to 3.3 percent for grain and 9.6 percent for potatoes. Animal husbandry was almost as significant as cotton, accounting for 36.6 percent of agricultural output in 1990. The republic was heavily dependent on food, particularly grain, imports from Russia and Ukraine.

Agricultural production was organized into *kolkhozy* (collective farms) and *sovkhozy* (state farms) and a limited area devoted to private plots. The forms of ownership were mainly distinguished by the method of payment of workers: the *sovkhozy* paid fixed salaries to workers whereas the *kolkhoz* paid workers out of its own residual revenue. Official figures suggest that in 1990, a significant share of workers in agriculture (37 percent) fell into the category of "temporary workers and labour in private plots". Since the scope of private plots was limited, it seems that a significant proportion of workers were regarded as "temporary" (see Marnie 1992). This suggests the existence of a large source of surplus labour, even during the Soviet era of "full employment", that was formally employed only on a seasonal basis.

[6]For example, the republic has a rich endowment of natural resources – gold, natural gas and oil, and other minerals (OECD/ CCET, 1996).

The industrial sector consisted largely of processing of agricultural raw materials and the production of machinery and chemicals linked to agriculture. A possible advantage of "backwardness" was that industrial enterprises were, on average, smaller than, for example, in Russia, Ukraine and Belarus (employing on average 500-700 workers, versus 1,000 in the other three republics). Uzbekistan still generally faced the problems of technical obsolescence and low standards of quality of industrial output (Pomfret 1995, p. 68).

As in other planned economies, Uzbekistan's retail and trade services were relatively under-developed. The so-called non-material sphere accounted for about one-fourth of employment, the bulk of which comprised social services, in particular, education. Banking and finance represented only 0.3 percent of total employment. Trade and catering, which was actually classified under the material sector, accounted for 5.6 percent of employment in 1991.

2.2.3 Demand for Labour

In the Soviet Union, managers tended to "bid for as many inputs as they can cajole out of the central planners, and ... the incentives to shed excess labour (were) weak to non-existent" (Rutland 1986, p. 199)[7]. Involuntary redundancies were virtually unknown through most of the Soviet period, in part due to legal constraints on firms, but more generally because of the output targets which encouraged firms to hoard labour. The phenomenon of labour hoarding can arise in market economies, because the fixed costs associated with recruitment and training may deter firms from immediately retrenching workers in response to downturns in demand, especially if the expected duration of the downturn is short.

It is difficult, however, to estimate the extent of labour hoarding since

[7]Various administrative attempts to improve labour productivity – such as the *Shchekino* method whereby workers and managers were allowed to share directly in any savings resulting from operating the plant with less than the initially targeted labour force - did not prove successful on a large scale. See Rutland (1986) for a review.

this depends on identifying "potential" output per worker.[8] Estimates of labour hoarding or "over-manning" in Soviet enterprises in the early 1980s were in the range of 10-15 percent (Marnie 1992, p.12), and up to 25 percent by the IMF *et al.*, (1991).

Despite labour hoarding, the combination of high population growth and a relatively lower level of industrialisation meant that Central Asia was known as a "labour surplus" area: the number of working age population exceeded the number of jobs in the official economy (Marnie 1992). This was in contrast to the western parts of the former Soviet Union which had been affected by "labour shortages". Not all of Uzbekistan was characterised by labour surplus, however. The sparsely populated rural oblasts such as Dzijak were seen to suffer "shortages", whereas densely populated rural areas of Andijan and Fergana had surplus labour.

There were intermittent reports of unemployment in Uzbekistan since the 1970s, although there are no reliable data upon which to judge these reports (Marnie 1992). In fact discussions of unemployment in the Soviet context appear to refer to those "not employed in the official economy" (*nezanyantye*), without any distinction between those actively seeking such employment, and those who preferred to work in the household sector. The share of the non-employed in the working-age population was almost 14 percent in 1989, when the comparable figure for Russia was 5.5 percent (Marnie 1992). The vast majority (nine out of ten) of the non-employed in Central Asia were women, and most lived in rural areas (Marnie and Motivans 1993).

Hence caution is needed in interpreting such Soviet concepts as "non-employed", which might partly reflect the central planners' imperative to provide jobs for all people of working age,[9] and a refusal to recognize home

[8] Bosworth and Westaway (1987) calculated estimates of labour hoarding for Australia, for example.

[9] Hence, for example, there was no Soviet concept equivalent to the Western/ International Labor Organisation (ILO) measure of labour force participation: see Klugman and Scott (1997) for analysis of this point with respect to Kazakhstan.

production as legitimate labor market activity.[10] Non-employment may also have been over-stated by local officials bidding for additional resources from Moscow (O. Osipov, cited in Marnie 1992). According to calculations based on the 1989 census, the employment rate was about 90 percent for men aged between 25 and 54, and 80-86 percent for women aged between 25 and 49 years[11] (Isamiddinova 1997).

Table 2.1: Distribution of employment by branch,1980-1990

Sector	1980	1985	1990
industry	19.4	19.7	19.5
agriculture	20.2	19.9	18.3
transport and communications	16.9	18.1	14.3
construction	10.4	10.1	10.8
trade and catering	9.0	8.7	8.3
housing and communal services	3.1	2.9	3.1
health and social security	7.1	7.6	8.8
education and culture	14.4	15.3	18.0
science	2.3	2.2	1.6
credit and insurance	0.5	0.4	0.5
state administration	2.5	2.4	1.6
Total	100	100	100

SOURCE: Goskomprognostat

The structure of employment reveals the importance of agriculture, industry and education, which accounted for roughly equal shares of total employment in 1990 (Table 2.1). Employment in the so-called "non-productive" sphere was dominated by public social services, while other service sector activities, such as trade, absorbed a relatively small share of the workforce

[10]The official labour statistics nonetheless include categories under the material sector, labelled "members of families of workers and employees working in private subsidiary agriculture" and "other", which both rose over time and together accounted for 15 percent of the employed population in 1991.

[11]The employment rate is defined as the ratio of the number of employed to the total number of population for the respective age-gender group.

in Uzbekistan, as in other planned economies.[12] Health, education and science together accounted for about three-quarters of employment in the non-productive sector.

There were significant changes over time in the relative share of employment accounted for by different enterprise types (Table 2.2). Official data for the period 1985-1991 show the increasing importance of the private sector, which virtually doubled its share to about 17 percent of employment by independence. The state sector nonetheless remained dominant: state enterprises and farms accounted for about two-thirds of employment, and collective farms for a further 15 percent.

Table 2.2: Distribution of employment by employer, 1985-1991

Sector	1985	1989	1991
state sector	71.8	67.0	64.6
collective farms	15.4	13.8	14.2
private sector	9.9	13.8	16.9
cooperative and other	2.9	5.4	4.2

SOURCE: Goskomprognostat

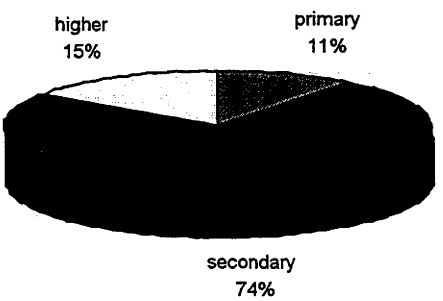
In sum, the socialist state guarantee of full employment was not fully implemented in Uzbekistan, which stands in sharp contrast to the western parts of the USSR. The republic was also distinguished by the relatively large role of agriculture, especially private agriculture, prior to the transition. This does not mean that labour hoarding was not an issue in Uzbekistan: indeed there is no reason to expect that it was less common than in the rest of the Soviet Union for which estimates range up to 25 percent.

[12] Marxist economics separates "productive" from the "unproductive" sectors; the latter are concerned with the distribution, not the production of the social product, and received lower priority from planners (Rutland 1986, pp. 194-5).

2.2.4 Human Capital

Education indicators showed steady increases during the Soviet period. Levels of literacy and higher education in Uzbekistan, in common with CEE, approached OECD levels, and were far above regional averages in the developing world. Figure 2.1 shows the distribution of the adult population in 1989 by level of education attainment. In 1990, the rate of illiteracy was about 2.3 percent, and the average number of years of schooling was 10.9 years (Tibi 1995). This was an important achievement in Central Asia where, in contrast to much of Central Europe, there was no historic tradition of widespread access to education prior to central planning (UNICEF 1998, Chapter 2).

Figure 2.1: Distribution of adult population, by education level, 1989



Broadly speaking, the system of Soviet education may be described as follows. Formal schooling began at seven years of age and extended for a compulsory minimum of ten/eleven years.[13] Primary (of three/four years

[13]In 1986 the duration of primary education was increased from three to four years,

duration), middle (five years) and secondary schools (two years) formed the basic education. Even within the centralised Soviet system, there was a diversity of schools of varying quality; some, for example, had advanced teaching in particular subjects (Tibi 1995).

After the completion of middle school, there were two broad education paths open to the individual: the academic stream or vocational training. Those who completed two further years of secondary education, could proceed to higher education, provided by universities and institutes. Undergraduate courses lasted five years. In 1989, about 30.2 percent of individuals aged between 15 and 19 years were enrolled in the former (grades 10-12), while 7.9 percent were enrolled in specialised secondary training and about 11 percent in vocational training. About 260 different vocational specialties were taught in the so-called PTUs (vocational training schools) and SSUZs (special training schools).

Table 2.3 shows the relative significance of alternative education paths for different age cohorts in 1989. Overall, about 15 percent of the adult population had completed vocational training, compared to about 11 percent who attended higher education. Vocational training had been popular for about two decades, with 22 percent of individuals under 40 years of age having such training, compared to just 15 percent of 45-49 year age group. For higher education, there is evidence of reduced popularity over time; the share of 25-29 year olds with higher education was 14 percent, compared to 22 percent for the 40-44 year age group. Of course these figures on levels of educational attainment could reflect supply-side constraints as well as changes in demand.

This introduction to the Soviet education system would not be complete

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and hence the overall minimum from ten to eleven years. However recent enrolment data suggests that this reform was not fully implemented, and that primary education lasts three years for some pupils and four years for others (Tibi 1995, p. 98). Tibi (1995) also notes that primary education may still have been too late in starting and too short in duration, especially for those children who did not attend formal pre-schools. (Only about 35 percent of the age cohort attended pre-schools in 1990: Klugman *et al* 1997.)

Table 2.3: Educational attainment by age cohort, 1989

		Age Cohort				
	Adult population	25-29	30-34	35-39	40-44	45-49
Higher education	11.1	14.4	16.5	19.3	21.5	15.4
Vocational training	15.0	22.1	22.2	22.3	19.3	15.1

SOURCE: Goskomprognostat

without a review of the system of adult education that was undertaken by workers on a part-time or evening basis. This is a potentially important part of 'on-the-job' training. Adult education had a long history in the USSR, ever since Lenin's 1919 decree *On the Eradication of Illiteracy Among the Population* which directed individuals under 50 years of age to become literate, a staggering task at that time when tens of millions of Soviet people were not. In the early twentieth century, only about 2 percent of the population of Turkestan (as the region was then known) was literate (Ministry of Higher and Specialised Secondary Education of the Republic of Uzbekistan (MHSSE) 1996). In 1918, the Turkestan People's University, the first state university in Central Asia, was opened in Tashkent to all those wishing to attend lectures, regardless of the educational level.[14] Up until 1991, lifelong learning for working adults, improvement of qualifications and the provision of opportunities for re-learning were important elements of the Soviet regime (Zajda 1998, p. 1). This included so-called compensatory education for those who had been unable to complete their secondary education, and was offered in evening schools (*vechernye shkoly*) and correspondence schools (*zaochnye shkoly*).[15] In the Uzbek republic, as elsewhere in the Union, there were colleges devoted to evening courses for workers. There were 190 such

[14]Specialised secondary education pre-dated communism, however: in 1895, an agricultural school was opened in Samarkand, and by 1914 there were two agricultural schools and six technical and vocational schools.

[15]During the 1960s and 1970s, adult education also took place in the voluntary sector (*neformalnye struktury*), which included people's universities (*Narodnye Universitety*), public lectures and the Knowledge Society (*Znanie*): Zajda 1998, p. 2.

schools providing general academic education in the late Soviet period, with enrolments numbering 64,800 (Tibi 1995, Annex 5A).

Structure

The Soviet educational system had some specific features which may well have affected the labour market. It is beyond the scope of this chapter to investigate such complex topics as curricula, pedagogical methods and teacher training. Here I simply set out the nature of the inheritance and highlight the strengths and weaknesses of the traditional approach to learning.[16] The next chapter reviews the main reform tendencies in the education system that have emerged to date.

On the positive side, not only was access broad, as measured by enrolment figures, but the quality of basic education was good. One component of quality is the learning achievement of students – this can be measured by standardised tests in well-defined subjects. Although results specifically for Uzbekistan are not available, pupils studying elsewhere in the region under a Soviet model of education have scored well in international assessments in science and mathematics.[17] This was in part ensured through the use of national 'norms' which, while leading to a number of problems associated with over-centralisation (see Klugman, forthcoming), helped to establish and enforce minimum standards across the country.

As one might expect, Soviet education was highly centralised in terms of "the extent of control ... and the degree of uniformity enforced in principle and practice throughout the length and breadth of (the USSR)" (Grant 1964, p. 31). Education was to serve national political and economic needs as interpreted by the Supreme Soviet. The Council of Ministers in Moscow

[16]This evaluation draws on work by the author that was published as Chapter 2 of UNICEF (1998) Regional Monitoring Report, 'Education for All?'

[17]Cross-country comparisons of learning achievement are of course fraught with difficulty, although the Third International Mathematics and Science Study (TIMSS) does adjust for repetition rates and other factors that might be expected to affect the reliability of the results (see Vari 1997).

acting on behalf of the Supreme Soviet passed directives down the line for implementation. In Moscow, the central planning agency Gosplan analysed the proposals submitted by each republic including Uzbekistan, then drafted a plan covering the number of students and schools at each level, number of staff, volume of investment and the necessary finances (Tomiak 1992, p. 44). Republic-level submissions were based on industrial requirements for new specialists estimated on the basis of fixed coefficients per unit of output (normatives). In practice, the number of student places in institutes and their budget allocations "like everything else, were subject to bureaucratic bargaining" (Salehi-Esfahani and Thornton 1997, p. 6).

There were nonetheless local responsibilities in the Soviet system. There were twelve oblasts (corresponding to state or provincial level administrative units) in Uzbekistan (plus Tashkent city and the 'autonomous republic' of Karakalpakstan), and about 190 raions (corresponding to local councils or counties).[18] Direct control over schools was exercised by the oblast and raion departments of education through the supervision of programmes and school directors. The vast bulk of spending on general (pre-school and basic) education came from local budgets: indeed it is doubtful whether the Union and Republican budgets together accounted for more than 10 percent of the total costs of general education of schools (Noah 1966, p. 58). Yet decisions over local expenditure decisions were very tightly controlled.

Norms played a pivotal role in central control over the education system, relegatingating local authorities to the task of transmitting funds to schools. There were different types of norms: for unit expenditure (per teacher, per class, per pupil), based on input ratios (e.g. pupils per class), and quantitative targets (e.g. enrolments). The allocation of funds among different types of school and articles of expenditure was centrally determined, and not responsive to local priorities.

One outcome of centralised control of education was relatively uniform

[18]This remains the basic administrative structure of the republic up through 1998.

provision of services, at least in terms of pupil-teacher ratios and enrolment rates. In 1989, according to census figures, the share of the adult population who had higher education was 11.1 percent (see Table 2.3), not far behind much higher income republics including Ukraine (11.9 percent) and Russia (13 percent).[19] Furthermore, efforts were made by the central planning authorities in Moscow to extend access in rural areas, which would tend to have benefited the population of Uzbekistan.

It would nonetheless be wrong to conclude that the systems of education developed under central planning attained uniform standards across the Soviet Union. Particularly in rural and remote areas, material standards were often poor (see UNICEF 1998, Chapter 2). The vast majority of rural schools lacked the basic amenities of water, heating and plumbing. Whereas four out of five urban schools did not have piped water, over three out of four rural schools did not. In Karakalpakstan, for example, only one in three secondary schools had piped water. The overall share of Karakalpak schools with sewerage was even lower (only 20 percent of secondary schools). Rural schools were prone to problems associated with their small size, including teacher shortages and subjects either not being offered or being taught by non-specialists. At the university level, there was an enormous gulf between the quality of education provided in universities and institutes in Moscow and St Petersburg (then Leningrad) and in the rest of the country (Salehi-Esfahani and Thornton 1997).

[19] Earlier studies have concluded that, relative to the significant variations in population density across the USSR, average school size and the share of the population enrolled in post-secondary education, the range of inter-republic expenditures per pupil were modest and far less than among the states of the USA (Noah 1966). At the extremes, average expenditure per pupil in Estonia was 28 percent above the Soviet mean in the early 1960s, while in Moldova and Kazakhstan, the figure was 12 percent below. Uzbekistan was close to the Soviet-wide average.

Shortcomings

The Soviet model of education had further less positive traits. First, it is generally recognised that the pedagogical emphasis was upon fixed, as opposed to dynamic, skills, a tendency still found in more recent studies (Zablulionis 1997). In other words, the acquisition of factual material was stressed rather than its interpretation and the application of material to new contexts. As described by one former student

> "At mid-level institutions in the republics, students merely received some practical knowledge of institutions and tasks that might improve productivity in specific tasks but it afforded little intellectual breadth. As a screening mechanism, a diploma from these institutions signalled that a student was willing to sit quietly for hours and memorise vast amounts of mind-numbing detail, abilities that would be tested in a future, mind-numbing job."(Salehi-Esfahani and Thornton 1997, p. 10)

Second, the scope for individualism was limited in various ways. The curriculum was rigid. Subject choice was very limited, even at the university level (see below). The nature of the planned economy together with political totalitarianism meant that methods of teaching focussed on instructing students on what they needed to know to fill their positions within the various sectors of the economy. The number of courses offered in a programme was typically equal to the number of courses required for graduation – that is, there was virtually no choice within the area of study.

The number of hours of instruction was very high. These features are consistent with the planners' preoccupation with target output levels due to problems involved in monitoring quality, a tendency which has been noted by Stiglitz (1994) and others. In Uzbekistan, university students attend classes for 39 hours a week for an average 28 weeks annually, excluding examination

and 'practice' time (Salehi-Esfahani 1997).[20] By law, all university students were required to live in farming communities and participate in the cotton harvest for four to six weeks each autumn.

Third, the structure of the post-basic educational system encouraged, indeed generally required, narrow specialisations that limited individual options for occupational change. The system was highly fragmented resulting in a much larger number of specialties than one might expect of an economy with the level of sophistication of Soviet Uzbekistan. There were a number of highly specialised institutions, including, for example, the Tashkent Automobile and Road Construction Institute. This might be predicted to have limited worker mobility among occupations. Students who were not continuing with general secondary education (about one-fifth of the cohort: Table 2.3) were streamlined into narrow vocational training from the age of 14 years. Vocational training itself was organised separately on a sectoral ministry basis, for agriculture, heavy industry, railroads and so on.

Vocational and technical education were important elements in the post -compulsory education system of the Soviet Union. Managers, however, were apt to criticise the quality of such training and the extent to which it met the skill demands of their enterprises (Heynemann 1997a). Doubts surrounding the efficacy of vocational type training are not of course confined to the USSR; vocational training has been seen to have poorer returns than more general academic education in many market economies (see Psacharapoulos 1985; McMahon 1988).[21] Given the apparent poor general quality, reputation and obsolescence of much vocational training in the formerly socialist economies, one would not anticipate such qualifications to be highly valued in the transition to a market economy. This is an empirical question: trends in the popularity of vocational courses are investigated in the next chapter,

[20]The excessive number of hours of instruction has also been attributed to the lack of textbooks, which led teachers to dictate their lectures.

[21]In addition, the higher unit cost of provision of vocational training generally lowers the social rate of return (see Psacharapoulos 1994).

and the private returns to such training are estimated in PART II.

Fourth, teachers were often poorly qualified, especially at the elementary level. Though evidence for Uzbekistan is scarce, even in Russia, for example, more than half of primary school teachers have no higher education (OECD 1997) and some pedagogical institutes admitted students with only grade nine school education. In the 1980s, sociological surveys suggested that well over 80 percent of Soviet teachers were dissatisfied with the quality of their training (Tomiak 1992, p. 42). This situation was associated with the earlier expansion of the Soviet education system which stretched the qualified labour supply to its limits, but also with wage rewards that were generally below average that made teaching relatively unattractive (see Table 2.6 below). One would expect that the situation in Uzbekistan was worse, not least because the school system had had to expand rapidly to cater for high population growth.

Finally, it is noted that the higher education sector suffered the foregoing problems to at least the same extent as primary and secondary levels of schooling.[22] Higher education was characterised by a large number of small specialised institutions, some of which belonged to specialised ministries, a situation that is seen to be inefficient both pedagogically and economically (Thompson 1996).

In general, it was up to the individual to decide how much education to undertake and where to seek employment (subject to residence restrictions). The main exception was that graduates from PTUs and universities could be directed by the authorities to their first jobs, where they were officially obliged to stay for three years. In practice, however, "many youths disobey(ed) the directives or leave before their tour of duty is over" (Chapman 1977, p. 250).

[22]The number of institutes of higher learning, as they are known, increased rapidly in Uzbekistan, from one in 1920, to 30 in 1940, and to 43 by 1990.

It is notable that entrance to university was a highly competitive affair among secondary graduates. Salehi-Esfahani (1997) explains the apparent paradox of high demand for such a low quality service in terms of the licence and/or personal connections that university provided for individual advancement in a planned economy (see Chapter 4). As a licence, a university degree was "a credential providing access to executive positions. That plus Party membership put a young professional on the bottom rung of an escalator into the *nomenklatura* with the prospect of...access to increasing authority and perquisites " (Salehi-Esfahani and Thornton 1997, p. 6).

Personal connections were also extremely important in the bureaucratic command economy – it has been argued that planning became a largely personalised bargaining process, with connection (*"blat"*) an important element (World Bank 1996a, p. 1). The structure of learning at the university level was based on study collectives, which were close-knit groups, and often study groups became relationship networks later in the administrative system. Hence completion of university signalled "an individual's ability to function as a cooperative member of a strong team, since this provided evidence of an individual's ability to acquire relationship capital..." (Salehi-Esfahani and Thornton 1997, p. 10). The same factors may operate in a market economy as well, of course, as noted in Chapter 4.

After independence, Uzbekistan, like many other countries in the region, adopted national legislation that set out wide-ranging, often ambitious, goals and principles for education. For example, "planned enrollments" were abolished at independence. Trends in enrolment, the extent of educational reform and its impact on the quality of education are reviewed in next chapter.

2.3 The Institutional Framework

This section reviews the institutional framework within which individual wages were determined. According to Marnie (1992)

> Workers on the whole chose their place of work free of any central administrative body, and were free to change jobs at will, while administrative regulations aimed at limiting worker mobility are reported to have functioned imperfectly. Wage differentials were used to attract workers to priority branches and regions. Despite the amount of detail devoted to employment planning in theory, in practice it played a very minor role, and enterprises had a large degree of flexibility in hiring their workers within the limits of a centrally allocated wage fund (p. 56).

In contrast the World Bank (1996a) reports that:

> Although people were both hired and paid wages under central planning, labour markets did not work anything like in market economies... Wages bore little relation to individual performance: "Work was somewhere we went, not something we did" (p. 72).

There are contrasting views about the determination of individual earnings in the planned Soviet economy. On the one hand, some have concluded that the labour market was the least regulated aspect of the planned economy (for example, Marnie 1992; Atkinson and Micklewright 1992). On the other hand, a common view held by the World Bank among others, is that individual incentives were generally repressed, and "required in their place an intrusive set of controls" (World Bank 1996a, p. 73).

Given the freedom of individuals in their choices of jobs, the setting of differentials was used at least partly to provide incentives as in a market economy (Phelps-Brown 1977).[23] This section examines the system governing labour compensation as it existed from the mid 1950s through the mid 1980s, the problems that were perceived by Soviet analysts and the objectives

[23] The situation was thus quite different to which prevailed in pre-transition China, where Knight and Song (1990) observed "the initial assignment to a job is very important: the first job is often the last" (p. 9).

and nature of the later reforms, in particular the 1987 law *On Enterprises.* The objective is to ascertain how individual earnings were supposed to be determined under the planned system, since this institutional context would be expected to influence the determinants of wages subject to micro-analysis in PART II of the thesis.

2.3.1 The Wage Tariff

After the mid-1950s a Union-wide system of tariffs (*tarifnaya sistema*) was the basic administrative instrument of wage determination. The system was not static, in that changes were made at various times to respond to perceived problems. The system of tariff wages comprised, by the mid 1980s: (a) basic wage rates (*stavki*), which specified the base (minimum) wage in each branch of the economy; (b) a set of coefficients (*tarifnayasetka*), typically six, for each branch, which set the wage rates relative to the least skilled (minimum). Individual jobs were assigned to a particular point on this scale; and (c) additional coefficients for arduous work and for employment in remote parts of the country. Thus job categories were classified hierarchically according to skill levels and degree of responsibility; these wage grades determined the relevant tariff wage rates. Table 2.4 provides an example, for the mining industry.

Table 2.4: Tariff skill scale for mining industry, 1987

	I	II	III	IV	V	VI
Tariff Coefficient	1.0	1.11	1.22	1.38	1.58	1.86
Relative Step	-	11	11	13	15	18

SOURCE: Oxenstriena 1990, Table 5.1

There was a similar, though separate, tariff structure for the productive and non-productive spheres. Uniform criteria were supposed to apply across branches – that is a grade III job was supposed to involve the same intrinsic levels of skill, irrespective of branch.

Collective farm workers were outside the tariff wage system; while they were guaranteed minimum wages, their wages were formally a dividend from the net revenue of the kolhoz. According to Oxenstriena (1990, p. 126), the *kolkhoz* was able to receive "loans" from the budget when it had insufficient revenue to pay its members at rates comparable to the tariff wages in agriculture. However studies of living standards based on official data have suggested much lower levels of income among collective farm households (Marnie and Micklewright 1994). These households depended to a significant extent on their private plot activities to provide adequate food and cash (Nove 1988).

There is an important caveat in interpreting the institutional framework that governed wage setting and the official data on wages. The wage share declined over the decade to 1985, and represented, on average, about two-thirds of labour remuneration in 1990 (Scherbakov 1987, p. 76). This compared to about 75 percent in the early 1960s[24] (Kirsch 1972, p. 12). In fact the other cash elements of earnings – bonuses, additional wage payments and supplements – became regarded by a number of analysts in the late 1980s as *automatic* additions to the wage rate that served to *equalise* the earnings distribution (see e.g. Scherbakov 1987).

This is somewhat surprising if one expected that firms would use these discretionary payments to widen the structure of wages imposed by the central tariff. The automatic nature of the payments also contrasted with earlier periods when bonuses had been viewed as a way for enterprises to overcome the lack of branch-wide wage differentials, even if most discretionary payments were not used to establish on-the-job incentives (Kirsch 1972). It is in any case clear that the larger the relative significance of enterprise-allocated non-wage payments, the weaker the extent of central control over the determination of earnings.

[24]These figures relate to the Soviet Union as a whole; the situation in Uzbekistan was similar, although given the lesser relative importance of industry in the republic, extra-wage compensation may have been less significant in size.

How were labour payments actually determined at the enterprise and individual level? As already noted, the tariff wage scales, the quantity and prices of material inputs and outputs were all set centrally. The wage fund was one of these inputs. The funds were assigned to ministries, enterprises and organisations in absolute amounts based on norms, once the volume of net output was determined (Lane 1987, p. 119). Norms represented the estimated amount of time necessary for the fulfillment of a particular work activity given the qualifications of the workers and the level of technology. Wage tariffs and associated rules and regulations were derived and set for jobs, not for people. As in a Western economy, the position of the individual worker within the overall scale depended on the decision of the employer.[25]

That said, a series of "pure wage differentials" were used by Soviet planners. In theory, the (multiplicative) components of the average wage at a given enterprise could be disaggregated as follows (Kirsch 1972, p. 161)

$$W = B * S * C * I * P * R * D$$

where W is the monthly wage, B is the basic wage rate under normal working conditions, S is the skills coefficient, C is a coefficient to adjust for abnormal working conditions, I is an incentive coefficient corresponding to earnings above base rates due to over-fulfillment of norms, P is an inter-branch differential based on the (planners') priority of the branch, R is a regional coefficient depending on location of the enterprise,[26] and D is the number of workdays in a given month. It is unclear, however, as to whether an individual's earnings could be decomposed along these lines. The formula sat alongside the frequently heard Soviet claim that payments to labour were based on the quality and quantity of work, where the former refers to the

[25] A number of Western economists have pointed this out, including Malle (1986), Marnie (1992) and Commander and Staer (1991).

[26] For example, workers in distant regions of Central Asia received a coefficient of between 1.15 and 1.3. The same coefficient was applied to pensions. The rationale was that compensation was needed to account for higher prices and harsher conditions (though for workers this obviously overlaps with the coefficient for abnormal working conditions, C.

skills required and the latter to working conditions that determined work "intensity".

In the Soviet Union, each of these coefficients was set centrally. Yet it is arguable that these rules simply reflected market pressures. The formula bears obvious resemblance to the factors determining wage outcomes in a market economy. The skills coefficient can be interpreted as returns to human capital, C could be taken to represent "compensating differentials" for working conditions,[27] I suggests the notion of efficiency wages[28], P and R are adjustments for regional conditions (again, compensating differentials), and D is the amount of time spent working.

The familiarity of this formula to Western economists thus provides some insight into Soviet wage determination. It implies that a potential consideration behind the differentiation of the wage structure was to provide incentives to workers to improve their qualifications (Kirsch 1972, p. 101). This objective was apparently fulfilled insofar as the average educational level of the Soviet workforce increased over time: between 1962 and 1979, the share of industrial workers classified in the lowest skill group fell 2.3 times, whereas the share classified in the highest skill group rose 1.9 times (Kunel'skii 1981, p. 151).[29] However it is also possible that, because skill scales and basic rates were altered infrequently, enterprises inflated skill group classifications as a way to pay higher wages and thereby attract and retain workers (see below).

Economic reforms initiated in 1956 meant that central control over the wage structure was increased. The changes included a reduction in the num-

[27] This theory is reviewed in Chapter 4.

[28] The efficiency wage hypothesis suggests that worker productivity is affected by the wage paid: higher wages may lead to improved productivity through, for example, improvements in worker nutrition and health (an effect likely to be important in poor countries) and/or through the positive psychological effects associated with a higher wage (see Sapsford and Tzannatos, 1993, pp. 151-2).

[29] Of course increasing average educational qualifications of the workforce also characterised market economies over this period: see Shavit and Blossfeld (1993).

ber of skill groups, increased minimum wages, and the introduction of single wage-skill rates for similar occupations across branches. Differentials for conditions of work and for geographic location were made more explicit and more uniform (Chapman 1977, p. 252). Trends in the extent of inequality over time are reviewed below. It is sufficient to note here that Western analysts observed a trend toward greater uniformity in wage determination and outcomes up through the 1970s.[30]

Even during the period of centralised control, however, Soviet enterprises tended to increase wages, especially for lower paid workers. This can be explained, at least in Western parts of the USSR, by the problems related to labour shortages in industry and high labour turnover (Rutland 1986). Enterprises did not, at least until the late 1980s, face hard budget constraints, and firm incentives, based on output targets, continued to favour overstaffing. For managers, a larger workforce meant that the enterprise had a larger wage fund as well as larger incentive funds (Bukhval'd and Pogrebinskaia 1987, p. 41).

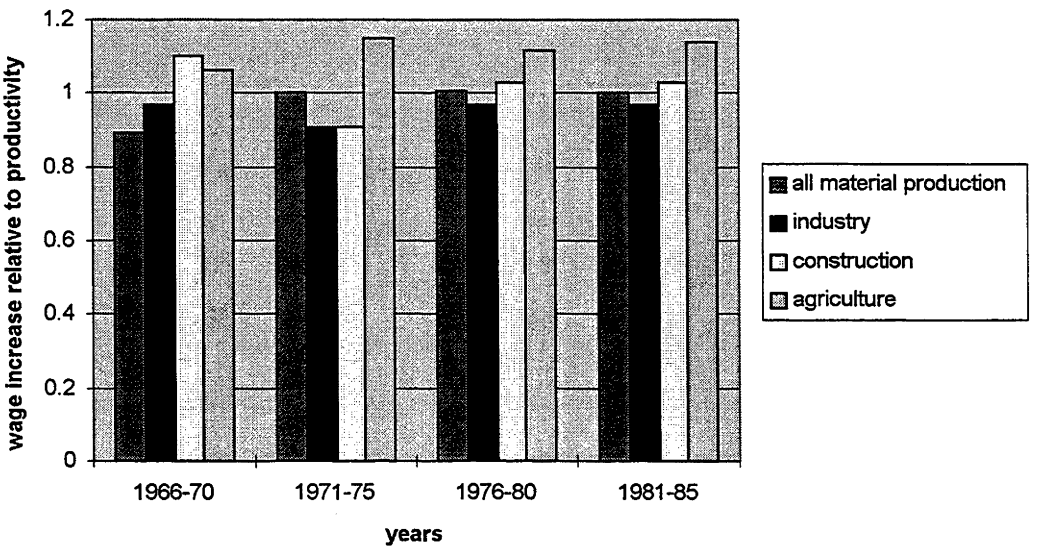
In the 1980s, planners sought to limit wage rises to only 0.35 percent for every one percent rise in productivity. This compared to outcomes in industry which had risen from 0.23 percent per one percent rise in productivity in the early 1950s, up to 0.9 percent in the period 1976-1983. However the limitation proved unsuccessful: apparently because production plans were often revised downward without reducing the size of the wage fund (Lane 1987, p. 119). Figure 2.2 shows the relation between changes in labour productivity and wages for selected branches of the Soviet economy between 1966 and 1985, suggesting that the largest gaps arose in agriculture.

2.3.2 Perceived Problems

The Soviet system of wage determination developed a number of features that came under increasing domestic criticism in the 1980s. However data

[30] See, for example, Chapman (1977); Malle (1986).

Figure 2.2: Relation between increases in wages and labour productivity, USSR, 1966-1985



constraints make it difficult to establish the extent to which the perceptions reflected the underlying reality. The issues which attracted the most attention (and which also overlapped to a significant extent), included inflexibility and the related problem of inappropriate norms; the failure of bonuses to stimulate work effort; overpayments; inappropriate incentives at the enterprise level that tended to lead to, *inter alia*, overstaffing; and a perception that the earnings distribution was overly compressed, resulting in inadequate returns to skill and work effort. One important outcome was wages drift, whereby earnings outcomes differed significantly from the central plan. Each of the perceived problems is elaborated briefly below.

Inflexibility

The centralised differentials established in the wage tariff structure have been described as "ponderously inflexible and insensitive to labour market condi-

tions" (Kirsch 1972, p. 169). Tariff revisions were infrequent partly because the handbooks which specified in detail the features that a job must have in order to be classified in a certain skill group would then have to be revised also (Oxenstriena 1990, p. 133). If centrally set wages were inappropriate (from the enterprise's point of view), there were ways to circumvent the tariff.

Norms were widely used as instruments of planning in the command economy.[31] Norms were also utilised (or manipulated) by enterprises to overcome perceived inadequacies in the established tariff structure. The determination of norm levels was largely decentralised since labour input requirements depended on the technological conditions at the plant level. Enterprise managers tended to set their plant norms at "unduly low levels" (Bunich 1981), in order to facilitate fulfillment. Moreover since output norms were often not revised for many years, they became increasingly easy to surpass, resulting in substantially higher wages relative to productivity (Bukhal'd and Pogrebinskaia 1987).

Hence official statistics suggested that output norms were overfulfilled by as much as 135 percent and occasionally 2-3 times, leading analysts to conclude that "a significant number of norms are without technical, organisational or economic foundation" (Scherbakov 1987, p. 76). It was apparently even possible for enterprises to simultaneously fail to meet their established output plans and overfulfil their labour norms. A frequently voiced criticism in Soviet academic journals by the late 1980s was that unduly low norms did not reflect existing levels of productivity, and enabled the payment of "excessive" wages.[32] From the employers' perspective, the behaviour was entirely rational – they wanted to maximise output (Oxenstriena 1990; Hanson 1987), and low norms and high earnings facilitated recruitment and retention of workers to help meet this goal.

[31]Including, for example, the organisation and financing of the education sector, discussed above.

[32]See, for example, Bukhal'd and Pogrebinskaia (1987).

Bonuses

The role of bonuses in total labour remuneration increased steadily in complexity and relative size over time. Table 2.5 shows that money wages only represented, on average, about two-thirds of labour remuneration. The balance came under the heading of bonuses and in-kind compensation, which are not accounted for in the official wage statistics.

Table 2.5: Composition of labour remuneration, 1980-1991

	1980	1985	1991
money wage	70	67	66
bonuses etc	30	33	34
Total	100	100	100

SOURCE: Goskomprognostat

In industry alone, by the mid 1980s there were 56 bonus systems in operation. There were various financing sources for bonus-type payments at the enterprise level, including the wage fund, the Material Incentives Fund (MIF) and the Social Consumption Fund (SCF). The MIF, which was originally based on a portion of retained profits, became less directly related to enterprise performance and by the early 1980s at least, shortfalls in the MIF at the enterprise level were typically met by cross-subsidies across the branch. In the 1960s there were widespread concerns that managers were receiving a disproportionately high share of such payments, leading to the introduction of more centralised controls.

The SCF was used to finance various non-wage benefits including preschools, health and recreational facilities. For every rouble of wages there were 46 kopeks in the SCF in 1965, and this rose to 58 kopeks in 1980 and further to 69 kopeks in 1984. According to Scherbakov (1987), bonuses and similar elements in the system of labour remuneration became an "automatic addition to the wage rate that is intended to preserve the economically necessary level of wages", used as a way to reduce unplanned labour turnover.

"Overpayments"

By the late Soviet period, there was widespread discussion in the economics literature about a phenomenon known as "overpayment" of workers. There were various routes by which this could occur. *"Vyvodilovka"* was a frequently used term that included the practice of increasing wages through higher job classifications. This may have been a rational response by employers to centrally set wage rates in order to attract and retain workers in demand. It also extended to falsification of records by the enterprise. Examples include falsification of the volume of work done, and bonuses for fictitious fulfillment of the plan (Bukhval'd and Pogrebinskaia 1987). Such practices were apparently prevalent in the transport and construction branches, where output was often overstated by as much as 15-20 percent (ibid.).[33] This was also referred to as "unearned income", which extended somewhat further to include any illegal activity including the production of defective products and pilfering of material inputs such as fuel. In fact these practices occurred on a national scale in Uzbekistan during the stewardship of Party Secretary Sharif Rashidov in the 1960s, with the falsification of reports of cotton output (see Rumer 1989, Chapter 4).[34]

2.3.3 Wage Reforms

The various problems associated with the system of wage determination led to a number of reform attempts being undertaken by Soviet authorities. There were two major wage reforms in the post-war period under the presidencies of Kruschev (1956-1962) and Gorbachev (1987-1990). The main provisions of these reforms were "strikingly similar" (Filtzer 1994, p. 59), and included:

(i) Increased output quotas and basic wage rates, to reduce the frequency

[33] Osipenko (1987) reported that falsifications were found at half the enterprises checked that belonged to the Ministry of Construction Materials.

[34] Interestingly, Rashidov is now regarded as something of a national hero for what has been interpreted as his anti-Soviet stance.

of payments for 'overfulfillment' of norms;

(ii) More extensive use of quality and performance bonuses;

(iii) A substantial regrading of jobs, both downwards and upwards in the tariff wage scale; and

(iv) Wider wage differentials between highly and less skilled workers.

Thus in 1987 the Party Congress resolved in favour of the "elimination of (wage) levelling" and decrees were issued *On Improving the Organisation of Wages* and *On Introducing New Wage Rates and Salaries for Personnel in the Productive Branches of the National Economy.* The Gorbachev reform differed from earlier attempts because it was part of a package that aimed to introduce a hybrid market socialism with increased economic autonomy for enterprises and individuals, albeit still within the framework of predominantly state ownership (IMF *et al.* 1991, p. 25). The 1987 law *On State Enterprises*, that introduced the principle of self-financing, has already been noted. Various rules governing bonuses and premia were relaxed. By January 1990, 86 percent of the non-agricultural productive workforce in the USSR was under the new system (Filtzer 1994, p. 61).

In the agricultural sector, various experiments had taken place in the post-war period in an effort to increase productivity. For example, collective contracts whereby groups of workers were recognised as a legal entity within the jurisdiction of the farm and pledged certain levels of output to the state at set prices, designed to increase worker incentives (Laird and Laird 1988). However the contracts did not allow the farmers to decide which crop to grow, and they remained vulnerable to shortages of key inputs.

Gorbachev's reforms were associated with an upsurge in the general level of wages in the late 1980s. Various measures to restrain wages growth, such as limiting wage rises to increases in productivity in 1989, failed. Subsequently a tax on excess wages was introduced, though with a series of exemptions that were progressively widened. The Gorbachev wage reform was eventually abandoned at the end of 1990.

The conclusions of this review can be summarised as follows. In some senses the operation of the Soviet labour market was not very different to what is observed in established market economies. In fact a number of the rules, relating to the recognition of educational qualifications and the conditions of work, for example, were in fact designed to reflect market forces. This was of course necessary, since individuals were largely free to choose their education and career paths. Moreover, even within the constraints of the central plan, the employer had substantial discretion in terms of setting output norms and assigning individual employees to their skill and job grades.

This similarity does not however mean that the wage outcomes mirrored those found in market economies. There remained fundamental differences in the nature of the respective economic systems. Most importantly, the objective of Soviet firms was not profit maximisation, but rather the maximisation of output and employment. This had significant implications for wage outcomes, as shown in the next section.

2.4 Wage Outcomes

The picture portrayed of the Soviet wage structure typically is one of rigidity and pervasive and intrinsic inefficiencies. To quote the World Bank's 1996 World Development Report, "wage structures were rigid and varied little from top to bottom" (p. 72). In fact, however, official data on the structure of relative wages suggest some significant changes over the decade prior to transition. Moreover, levels of earnings inequality were of similar orders of magnitude to countries of Western Europe. This is not surprising in that the wage setting formulae explicitly sought to reward skill and effort, and compensate for differences in working conditions, and were thus not dissimilar to the factors that are thought to affect wage outcomes in market economies.[35]

[35] As reviewed in Chapter 4.

This section examines evidence about wage outcomes in the demographic and economic context of the republic, and the institutional framework that governed wage setting. Evidence is available along three dimensions: the structure of wages by sector, the inter-republic structure of wages, and the extent of wage inequality.

2.4.1 Inter-sectoral Relativities

Trends in the structure of wages by sector (branch) in the late Soviet period show a relative improvement in the wage position of agricultural workers over the decade prior to transition (Table 2.6). By 1991, agricultural wages averaged 10 percent above the economy-wide mean. Over the same period, workers in industry appeared to lose their relatively privileged position. Further down the distribution, however, among workers in the social sectors (health, social security, education and culture), there was greater stability in the ranking. Likewise, at the top end of the distribution, wages in construction, transport and communications remained well above average.

Table 2.6: Relative wages by branch, 1980-1991

	1980	1985	1991
industry	107	109	100
agriculture	97	94	109
transport and communications	108	110	125
construction	132	134	122
trade and catering	83	83	82
housing and communal services	75	75	73
health and social security	77	75	73
education and culture	84	89	77
science	104	110	112
credit and insurance	93	94	178
state administration	93	90	108
Total	100	100	100

SOURCE: Goskomprognostat

An important caveat needs to be recalled with respect to the foregoing pattern of wage differentials, which is limited to money wages as determined by the centralised wage tariff. This was shown in Table 2.5. The distribution of bonuses and other compensation was used by enterprise managers to attract and retain labour and skills in demand.

2.4.2 Inter-republic Relativities

The Soviet wage tariff was set centrally, so that sectoral wage relativities under the tariff system in Uzbekistan were similar to those, for example, in Russia. Table 2.7 shows republic level branch averages for Uzbekistan and Russia relative to a Soviet average (100). At least until the late 1980s, construction and industrial workers were relatively better paid, whereas those working in agriculture received below-average wages. Average wages in the service sector (education, health, housing, culture) and administration, were even less than in agriculture. At the same time the overall level of nominal wages in Uzbekistan was below the Union wide level: in 1987 the average monthly rouble wage in Uzbekistan was 169.7, compared to 216.1 in Russia. Available evidence on official prices of consumer goods suggest that the differentials were even greater in real terms (Klugman 1996).

The significant differences in average branch wages among the Soviet republics are surprising to the extent that wages were determined by Union-wide tariffs that should in principle have applied equally in Russia and Uzbekistan. At the branch level, individuals might have been expected to have the same average wages, wherever they happened to live in the USSR. On the other hand, of course, average wages in the two republics would be affected by compositional factors, and in particular the relative importance of different sectors and the skills of employees therein. Moreover, as Lane (1987), Malle (1985) and others have pointed out, the Soviet labour market was differentiated on the demand side. This reflected the priority accorded to certain sectors and the status of specific working groups (in particular, women).

Table 2.7: Monthly wages by branch, Uzbekistan and Russia, 1987

Sector	Russia	Uzbekistan
industry	114	90
agriculture	108	78
transport and communications	110	85
construction	134	110
trade and catering	82	66
housing and communal services	80	62
health and social security	75	67
education	84	82
science	111	97
credit and insurance	105	83
state administration	99	81
Republican Average	107	84

SOURCE: IMF *et al.* 1991

The outcomes would also be expected to reflect differences on the supply side of the labour market. Regional wage differentials may have reflected local market conditions, in particular, the relative abundance of labour resources in Uzbekistan described in Section 2. The situation in Uzbekistan differed from that in the European parts of the USSR where labour shortages induced management to increase wages to maintain a stable and well-motivated workforce. Moreover since the size of wage funds was the product of negotiations between enterprises and higher administrative bodies, it is also quite plausible that enterprises located in Uzbekistan had lower prestige and political muscle and hence relatively weak bargaining power compared to firms located closer to Moscow.

Overall, despite the complex and extensive institutional framework that was established to govern payments to labour, the processes and outcomes may not have been dissimilar to those observed in market economies.[36] As

[36] An analogy can be drawn here to comparisons of wage outcomes in Australia and the United Kingdom. The two countries reflect a similar structure and extent of unionisation, though one might expect that the different institutional settings, in particular the system

Lane (1987, p. 177) noted, "The differentiation in the (Soviet) labour market is the consequence of complex interchanges between administrative decision, traditional values and market shortage". Although directed at sectoral differentials, this observation has relevance for the inter-republic differences. It would also hold equally well as a description of wage outcomes in a developed market economy like Australia.

This does not mean that wage outcomes would necessarily mirror those found in market economies. A key difference lies in the objectives of firms: Soviet firms aimed to fulfill centrally set targets, and there was no general motivation to minimise costs or maximise profits.

2.4.3 Extent of Inequality

As noted above, the Soviet distribution of earnings is typically believed to have been more compressed than in market economies, consistent with the egalitarian objectives of the planners of a socialist society. By the late Soviet period at least, a number of Soviet economists expressed the views that (i) the distribution of wages was "too narrow"; and (ii) this had adverse repercussions for efficiency in the labour market and the economy generally. There is some evidence for the proposition that skill differentials were narrow relative to differentials in market economies, as shown in the next section. In this section the focus is on the overall distribution of wages.

The evidence for the Soviet Union and Uzbekistan does not suggest an unusually compressed interpersonal distribution of earnings however. This conclusion is supported by an evaluation of the available evidence, based on micro-data, about the extent of wage inequality, in the context of findings for Eastern and Western Europe. Before proceeding, a brief elaboration of the alternative inequality indicators is given.

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of wage awards and arbitration tribunals in Australia, to have had a significant impact. In fact, the resulting sets of wage relativities have been similar, although the overall earnings distribution has tended to be more equal in Australia (Norris 1996, p. 211).

Measures of Inequality

Several indicators of inequality are presented in this section, drawing upon earlier studies of distribution during the Soviet period. The Gini coefficient is a measure summarising evidence for the whole distribution under consideration. A simple mathematical interpretation is that twice the Gini coefficient is equal to the expected difference in incomes, relative to their mean, between any two people drawn at random from the population (Atkinson and Micklewright 1992, p.25). For example, a Gini of 0.3 means that the expected difference between the wages of two randomly chosen individuals is 60 percent of the average wage. The Gini has a range between zero and one, and the higher the Gini, the less equal is the distribution (see Deaton 1997, p. 138-140).

The Gini is often defined from the Lorenz curve: in geometric terms, the Gini measures the area between the Lorenz curve and the (45 degree) line of equal incomes. The Lorenz curve is constructed by ranking individuals in ascending order of their earnings, and then calculating their cumulative share of total earnings. That is, the Gini coefficient is

$$\gamma = \frac{2}{N^2\,\bar{y}} \sum_{i=1}^{N} i(y_i - \bar{y})$$

where the y_i are the individual incomes (wages), which are arranged in ascending order, $\bar{y}$ is the mean, and the population is size N.

Other inequality indicators are more sensitive to changes at the extremes of the distribution. One commonly used and simple measure is the 90/10 or decile ratio. The decile ratio equals the earnings of an individual at the ninetieth percentile over that of an individual at the tenth percentile. Another indicator is the so-called "P10" denotes the average earnings of individuals in the bottom decile relative to the earnings of the median individual, expressed as a percentage.

A recent review by Wolfson (1997) draws attention to drawbacks associated with commonly used measures. A number of measures are evaluated in

terms of a basic axiom of inequality measurement – the Pigou-Dalton condition of transfers, that a transfer from a better off individual to a worse off individual should reduce the extent of inequality, which is formally equivalent to a Lorenz criterion. A simple numerical example shows the problem with the P10 measure, for example.

Say there are three individuals with incomes (1, 5, 9). If the middle individual gives one unit of income to the individual at the bottom, the resulting distribution (2, 4, 9) is clearly more equal according to the Lorenz curve criterion. However the P10 measure increases, indicating an opposite direction of change. Wolfson (1997) concludes, quite strongly, that the decile ratio and the P10 have "no redeeming features" for the measurement of formal concepts of inequality, but concedes that their continued popularity is understandable, given their understandability and wide availability. The solution suggested by Wolfson (1997) is to use a carefully chosen set of measures, rather than rely on one or two in isolation.

The picture of inequality presented in this thesis is based on the Gini coefficient, the decile ratio and P10 measures. The justification is two-fold. First, the review is based on the measures used in already published sources. Common measures are attractive in part because their popularity facilitates cross-country comparisons, which are an important aspect of the present analysis.

Second, the decile ratio and P10 do not require information on the full distribution of earnings. Notably, they ignore information on the shape of the distribution within the first and last deciles, which may be particularly badly measured for a whole host of reasons that are especially important in the formerly planned economies.[37] Hence the problems arising from mismeasurement at the top and bottom of the distribution are alleviated somewhat.[38]

[37] I am grateful to John Micklewright for communications on this point.

[38] Of course, the problems arise in part because we are interested in what is happening at the top and bottom of the distribution – thus while 75/25 ratio might be expected to be more robust (as shown in Chapter 9, for example), useful information would thereby

Evidence about Earnings Inequality

There have been a number of studies of earnings inequality during the period of central planning. Comparative evidence about levels of inequality reveals contrasts among the various command economies, as well as trends in the extent of inequality over time.

The extent of inequality in the distribution of earnings has varied over time, reflecting changes in institutional rules and in economic conditions. Following the increase in centralised control over the wage structure in 1956 that was described in the previous section, the wage decile ratio fell from 8:1 to 4:1 over the next two decades (Chapman 1977, p. 252). It is however difficult to directly attribute such trends to institutional changes, since falling rates of capital investment and capital productivity may have also played a role, as explained below.

There were significant differences among the planned economies of Eastern Europe and even within the different republics of the USSR. Atkinson and Micklewright's (1992) extensive study suggests that the magnitude of earnings inequality for the whole USSR was greater than for some Eastern European comparators, including then-Czechoslovakia and Poland, and even higher than Great Britain in 1986 (Table 2.8). The Gini coefficient was lowest in Czechoslovakia, where there was almost total socialisation of agriculture and severe restrictions on private business activity (Milanovic 1998, p. 13). In Poland, where private agriculture was permitted, the Gini coefficient was somewhat closer to Soviet levels. The fact that the Soviet distribution of earnings was comparatively unequal is of course not surprising in that the USSR is a much larger and more diverse country than any of the comparators listed, with over 250 million people in a range of economic and demographic circumstances.

A different picture might be expected to emerge if the distribution by republic is examined; specifically, one would expect within-republic distrib-

be "discarded".

Table 2.8: Measures of earnings inequality, selected countries

	Gini Coefficient	P 10	Decile Ratio
USSR	.276	55.7	3.28
Czechoslovakia (1987)	.197	63.2	2.45
Poland	.242	55.7	2.77
Great Britain	.267	55.7	3.23

SOURCE: Atkinson and Micklewright 1992, Table 4.1
NOTE: See text for definition of the measures used.

ution of earnings to have been narrower. Atkinson and Micklewright (1992) concluded that this was indeed the case, as shown in Table 2.9. They found that Uzbekistan ranked fourth out of the 15 republics in the decile ratio for full-time workers.[39]

Table 2.9: Measures of earnings inequality, 1981 and 1986

	Gini-coefficient	Decile Ratio	P10 (percent)
1981		2.90	60.3
1986		2.98	61.5
USSR (1986)	.276	3.28	55.7

SOURCE: Atkinson and Micklewright (1992), Tables 4.1 and 4.3.

2.4.4 Returns to Human Capital

It was widely perceived by Soviet economists that low returns to education and skills and on-the-job training were a critical problem with the system of earnings. To quote one leading Soviet analyst, "Wages now offer less motivation to master complex, highly skilled and highly productive (jobs)" (Scherbakov 1987, p.73).[40] The general view of Western commentators has also been that the returns to human capital investment, and especially to

[39]The most equal of all the republics was Moldova – population 4.3 million – with a decile ratio of 2.8, while the highest decile ratios were observed for Russia, 3.3 and Armenia, 3.4.

[40]Scherbakov was writing as the head of the Department of Labour at the All-Union level in Moscow.

higher education, were low in the centrally planned regimes (see, for example, Rutkowski 1995; Ozarem and Vodopevic 1997; Newell and Reilly 1996).[41] Ideally, for the purposes of providing a benchmark for the micro-analysis in PART II, some measures of distribution by education or skill level would be presented. The direct evidence for Soviet Uzbekistan is however scarce, and there is no possibility of multi-variate analysis to fully control for the effect of human capital variables on earnings outcomes. There are nonetheless some features that can be gleaned from the evidence that is available, as well as cause for caution in interpretation, as shown below.

Table 2.10 compares money wages by broad job position, and by branch, relative to an economy-wide mean. Several categories are presented: first, a Soviet concept which translates as "engineering and technical personnel" (ITRs); second, employees (both white and blue collar); third, managers; and fourth, specialists, who have vocational or secondary specialist education. It shows some remarkably similar patterns across branches of the economy. Managers were generally receiving wages about 20 percent above the branch average. On the other hand, so-called specialists received below branch average wages (typically about one-fourth less than the mean). In the heavy resource extraction industries such as mining and metallurgy, employees' wages averaged about double those of specialists, and generally exceeded those of the managers'.

In the mid 1980s, the range in wage rates between the highest and lowest skill grades in light industry was only 50-60 percent. The growth rate of wages of specialists and managers lagged behind that of workers; in a number of branches, including machine building, construction materials and mining, the wage of workers was higher than that of engineering technical personnel (Kostin 1988, p.63; Scherbakov 1987, p. 74). This situation was seen to contravene the socialist principle of payment according to one's labour.[42]

[41] These studies are among those reviewed in Chapter 4.

[42] At least by the 1980s, the writings of Soviet academicians and leadership (eg Gorbachev) portrayed the principle that individuals ought to be remunerated according to

Table 2.10: Distribution of wages by job position, 1989

	ITR	employees	managers	specialists	Average
	(percentage of average)				(roubles)
industry	102	131	125	73	386
mining	107	126	124	75	556
energy	104	141	120	75	569
machine building	125	120	123	76	398
light industry, including	100	135	118	77	324
textile	102	127	119	76	359
food	101	117	128	74	298

SOURCE: Goskomprognostat

And among the results that flowed, domestic commentators observed that an "unjustifiably large number of persons with higher education have become blue collar workers" (Scherbakov 1987). The share of persons with higher education engaged in primarily physical work rose from 1.5 percent in 1959 to 3.1 percent in 1970 to 7.7 percent in 1979 (Porket 1989, Table 8.3).

The importance of higher education in the socialist system may have extended beyond the *monetary* returns. For several reasons – including the limits on asset and wealth accumulation, the number of essential and elite services (from housing to childcare to holiday resorts) that were tied to the individual's job, and the fact that connections rather than roubles governed access to those goods and services in greatest scarcity (Atkinson and Micklewright 1992) – one might expect that the value of higher education would have been enhanced to the extent that access to networks and positions associated with these perquisites was thereby facilitated.

As noted already, the absence of micro-economic empirical evidence calls for caution; in particular, many of the Soviet studies failed to control for other factors like experience and location that would be expected to affect wage outcomes. There is also need for caution in attributing causes of the observed

their contribution to output as consistent with socialist principles of distribution. Of course this comes to close to saying that people ought to be paid their marginal product.

outcomes. With these caveats in mind, the evidence available suggests the following tentative conclusions about the returns to education during the Soviet period.

First, specialists tended to be worse, or at least not much better, paid than workers, despite their further formal education at PTUs or universities. Oxenstriena (1990) found that when the intra-branch extent of *tariff* wage differentials was *wider* than the actual extent of the differentials, this was often because low skilled workers were receiving high wages. This was attributed to relatively high demand for low skilled labour and the backwardness of Soviet industry (p. 149). The fact that individuals still chose to pursue higher education and careers as specialists can be attributed to the non-pecuniary aspects of work and the gender division of labour. Work in a specialist position may have enabled the individual greater flexibility in terms of working hours as well as more pleasant working conditions. This may have also contributed to gender segregation in the labour market on the supply side (see below). It is nonetheless worth noting evidence (for Russia) that the attractiveness of higher education had declined over time.[43]

Second, as already noted, significant numbers of university graduates and people with specialised education were engaged as workers. In 1987, an estimated 10 percent of university graduates and 36 percent of specialists were engaged as "workers" in the USSR (Filtzer 1994, p. 237). This figure had rapidly increased, by 9 percentage points in 1987 over 1985, and by a further 6 percentage points to 1989, despite initiatives from the late 1970s that provided for earnings increments to individuals of high vocational skills of up to 50 percent of the wage, in recognition of the fact that salaries "do not always reflect higher skill levels" (Bunich 1981, p. 37). The increasing likelihood that an individual with higher education would end up being employed as a

[43] According to surveys of secondary school students in the 1960s, 80-90 percent desired to gain admission to a higher educational institution; by the mid 1970s, this figure had dropped to 50 percent (Porket, 1989, p. 146). The declining cohort enrolment rates have already been noted: Table 2.3.

worker can be attributed to both supply and demand-side factors. On the supply-side, the monetary rewards of workers' jobs often made such positions more attractive, while on the demand side, there was relatively higher demand for workers. In addition, the mismatch implies that the system of "planned enrolments" (whereby the demand for graduates in different fields ought to equal their supply from education institutions) was not functioning well.

Third, there is survey evidence that was compiled in order to investigate the significant crude gender wage gap suggesting that "there was little connection between earnings and education in the USSR", particularly for women (McAuley 1981, p. 146). In one sample, drawn from the Russian industrial city of Taganrog in 1967-70, 40 percent of the women were classed (and paid) as unskilled though they had at least a secondary specialist education. About half of both men and women with at least secondary specialist education were classed as "semi-skilled". Another sample, drawn at the same time, revealed that office staff who had on average 9.5 years of schooling earned only 97 rubles per month on average, compared to the 152.5 rubles earned by workers with an average of 9.1 years of schooling. These figures provide some insights, but are based on cross-tabulations rather than multivariate analysis with a set of controls like level of experience, region and other factors that would be expected to affect wage outcomes. Hence the differences likely reflect gender discrimination against office staff (of whom women comprised the majority), as well as low returns to education.

Fourth, and related to the foregoing, is the importance of segmentation in the Soviet labour market. While employers were largely free to recruit, workers' geographical mobility was significantly constrained by administrative restrictions (the residence permit or *propiska*).[44] This was compounded by pervasive housing shortages, especially in urban areas. In such a context

[44] At least up through the late 1970s, discriminatory legislation made it harder for workers on collective farms (*kolhozniki*) to obtain internal passports and leave the land (Katz, 1994, p. 81).

one would expect that individuals would face difficulties in finding work that best utilised their skills. Hence the impact of education on earnings might thereby be diminished.

A final, more general point about the interpretation of evidence about skill differentials is needed. One has to be cautious in attributing a causal relationship between narrow skill differentials on the one hand, and the existing rules and institutions on the other. There are other reasons that could account for the former. Most obvious, perhaps, is the fact of low capital productivity and low rates of technical progress. It has been shown in the US that the productivity of highly educated workers is greater the higher the rate of technological change (Bartel and Lichtenberg 1987). Empirical estimates of labour demand using cross-section time series over the period 1960-1980 found that "the relative demand for educated workers declines as the capital stock (and presumably the technology embedded therein) ages" (Bartel and Lichtenberg 1987, p. 11). For Australia, Chapman and Tan (1992) found that the returns to on-the-job training are higher for individuals employed in industries experiencing rapid rates of technological change, as proxied by estimated rates of growth of multi-factor productivity.

Rates of total factor productivity growth in Uzbekistan had been at best stagnant in the couple of decades prior to independence. According to the estimates presented by Easterly and Fischer (1995), total factor productivity growth in Uzbekistan was amongst the worst of the Soviet republics, averaging -0.4 percent over the period 1970-1990, and was as low as -3.7 percent in agriculture. A number of observers noted that much of the republic's capital stock was obsolete at independence (e.g. Pomfret 1995).

It is difficult to disentangle the effects of the wage tariff and associated rules, from the effects of low rates of investment and productivity growth on returns to human capital and wage outcomes. This problem is implicit in the comments of some domestic observers. For example, Kostin (1987) stated that the compressed wage structure reduced the motivation of managers and

specialists to "accelerate scientific-technological progress, to improve product quality and increase labour productivity", suggesting that the various dimensions compounded each other.

2.5 Conclusions

This chapter has evaluated the factors that influenced the determination of wages in pre-transition Uzbekistan. The passage of time since the collapse of the Soviet regime is only short – the microeconometric analysis in PART II is based on data collected three years after independence. One would expect that the institutional factors and behavioural norms associated with seventy years of communism would wield a strong influence on outcomes in 1995. Although direct empirical investigation of earnings determination in Soviet Uzbekistan is constrained by the absence of representative microdata, the conclusions are important for the analysis in the chapters that follow.

The demographic and economic structure of the republic tended to be associated, even prior to the transition, with significant labour surplus. Agriculture has traditionally played an important role in providing income earning opportunities. While the workforce is well-educated by international standards, the rigid and narrow nature of the Soviet education system creates a suspicion that the skills transmitted would be less useful in market conditions.

Within the centralised economic system that existed in the USSR, the institutional framework for wages applied to jobs, not to individuals. As in Western economies, employers had autonomy both in assigning individuals to jobs, their associated skill grades and, to a significant extent, in the allocation of non-wage remuneration. Since 1956, Soviet workers had been free to choose their type and place of work, and to change jobs as they wished.

This review suggested that the earnings outcomes in Soviet Uzbekistan, as elsewhere in the USSR, often tended to frustrate the goals of the planners.

Soviet policy makers were engaged in a continuing "struggle" to raise labour productivity, and the tariff system was designed to reward the "scientifically measurable" contribution of each worker in accordance with the principle of "equal pay for equal work" (Rutland 1986, p. 195). Individual wage differentiation within the planned system had several aspects, including a managerially assigned adjustment (*razryad*, or coefficient of personal labour contribution) for each job, as well as significant variance in the amount of bonuses across branches.

In practice the goals of the planners were not met, for several reasons, including increasing resort by employers to non-wage payments and to such expedients as setting low output norms, and this was reflected in the continued wages drift from the plan. Yet the determinants of wages and the associated outcomes still seemed to depart significantly from what would be expected in a market economy. This can be traced, at least in part, to the fact that management itself did not have incentives to increase efficiency in the firm: their dominant motivation was to attract and secure reliable workers.

The Soviet economics literature of the 1980s often discussed the issues of labour incentives and an "overly compressed" distribution of earnings which accorded inadequate returns to investments in education and training. However while skill differentials were narrow, the level of earnings inequality was not dissimilar to what is observed in Western economies – in other words, the fact that education and skills were not well-rewarded cannot be attributed to an overly compressed distribution of earnings overall. To quote Rutland (1986, p. 196)

> "... the Soviet problem with incentives is not, as is frequently assumed in the West, a result of a distaste for differentials per se. The difficulties stem from an inability to so organise the incentive schemes so as to reward efficient work".

That these problems persisted despite major wage reforms in the late 1960s and 1980s is perhaps largely explicable in terms of the extensive centralised controls over prices and output, and the peculiar incentives facing Soviet employers to meet output plans alongside pervasive shortages of other material inputs and soft budget constraints. These latter problems have been tackled as part of the economic reforms undertaken since independence, the subject of the next chapter.

Chapter 3

Transition and the Labour Market

3.1 Introduction

Over the past five years, liberalisation of the economy in Uzbekistan has been associated with a series of policies and features that would be expected to affect the operations and outcomes of the labour market. The range of instruments of state control has been gradually curtailed through reduced state orders, privatisation, and the relaxation of restrictions on private sector activity. At the macroeconomic level, the transition from a command economy in Uzbekistan, as elsewhere in the region, was associated with significant declines in output (IMF 1997).

Several changes in the labour market might be expected to be associated with the macroeconomic and structural changes in the economy. These include reduced demand for labour in the short term (increased unemployment and/or real wage cuts), and changes in relative wages. A widening in the distribution of earnings and higher returns to human capital investment would be expected to follow liberalisation of the wage tariff and in accordance with changes in product demand.

This chapter addresses some key questions about the impact of recent

macroeconomic and structural changes on wages in Uzbekistan. Its structure mirrors that of the previous chapter. The next section considers dramatic trends in the macroeconomy and in the supply and quality of labour. Section 3 reviews institutional and structural reforms that would be expected to influence wage outcomes. These include reforms to the legal framework governing labour relations, and in the agricultural, enterprise and financial sectors. Labour market outcomes – employment, unemployment and wages - are examined in a regional context in Section 4. Section 5 concludes the chapter.

For the most part, the focus is on the period 1992-1996, since the empirical investigation in PART II is based on data collected in mid-1995. The quantitative evidence in this chapter is limited mainly to official data, the nature of which has changed little since the Soviet era.[1] The regional context encompasses the 28 countries in transition in Europe and Central Asia; although the focus is on former Soviet comparators and neighbouring countries, for obvious reasons.

3.2 Determinants of Wages

3.2.1 Demand-side: Macroeconomic Trends

On the demand side of the labour market, one would expect wage outcomes to have been affected by dramatic deterioration of macroeconomic indicators during the transition period. This is true even if macroeconomic outcomes have not been as unfavorable in Uzbekistan as in other countries in the region. This is shown in Table 3.1. It is beyond the scope of this chapter, and thesis, to fully explain these outcomes, which have been explored by Pomfret (1995; 1997), and Klugman (1996; 1998). Here the main trends are simply summarised, in a regional context, as set out in Table 3.1.

[1] See Chapter 2 for a review of the Soviet sources and the associated problems.

Table 3.1: Macroeconomic indicators during transition, 1992-1997

	1992	1993	1994	1995	1996	1997
Real GDP (percentage change)						
Uzbekistan	-11.2	-2.3	-4.2	-0.9	1.6	2.4
Kazakhstan	-2.9	-10.4	-17.8	-8.9	1.1	2.0
Russian Federation	-14.5	-8.7	-12.6	-4.0	-5.0	1.0
Annual Inflation Rate (CPI Percentage Change)						
Uzbekistan	645	534	1568	305	54	65
Kazakhstan	1,381	1,662	1,892	176	39	18
Russian Federation	1,526	875	307	198	48	17
Government Expenditure (percentage of GDP)						
Uzbekistan	43.4	38.8	38.4	38.7	41.5	33.9
Kazakhstan	31.8	25.2	25.9	20.7	18.5	–
Russian Federation	65.8	43.3	45.0	37.7	38.7	-

SOURCE: TransMONEE 3.0 (UNICEF/ICDC 1998)

- Large Declines in Output. There have been massive declines in output in all the countries of the region.[2] Despite signs of bottoming out, in 1997 only Poland had recovered to 1989 levels of output (UNICEF 1998). Uzbekistan has done relatively well, by former Soviet standards. This is shown in the Table, relative to Kazakhstan and the Russian Federation. The cumulative decline in production amounted to about 14.5 percent through to the end of 1997, compared to, for example, 59 percent in fast reforming Kyrgyzstan.[3]

  The relatively better aggregate growth outcome in Uzbekistan has been attributed to a number of factors, including more favourable initial

[2]Real measures of output change are difficult to compute in a period of rapidly changing relative prices. This problem is considered in detail below in the context of real wages. However there is broad agreement among national statistical agencies and international organisations such as the EBRD, IMF and World Bank about the country rankings in terms of the relative magnitudes of decline.

[3]Still, however, CIS Goskomstat has estimated that the level of GDP in Uzbekistan in 1995 was no higher than that of twenty years prior (1974) (for Kazakhstan, 1995 output was equal to that of 1972): CIS STAT (1996).

conditions insofar as its main exports (cotton and gold) could be transported and sold for hard currency (Pomfret and Anderson 1998, p. 2).[4] It should be noted that there are sectoral differences in economic performance: industry, transport and communications and construction had negative growth in each year between 1992 and 1995; whereas the category of "other services" had expanded each year, as had agriculture (with the exception of 1994) (IMF 1997, Table 1).

- Slowdown in Inflation. Uzbekistan experienced very high inflation during the years 1992-1994, peaking in the last year at over 1,500 percent. This has been traced to a combination of monetary factors, including monetary financing of the fiscal deficit and the import of roubles while the republic remained in the rouble zone (IMF 1997).[5] One could also point to expectations-related factors after 1992, and the disruptions to input supply and trading arrangements that created output supply constraints. From late 1994 the annual rate of inflation was sharply reduced, to 117 percent by the end of 1995. The authorities moved towards stabilizing the economy since that time, through a combination of tight financial policies and a significant reduction in the fiscal deficit, albeit with some lapses (e.g. in the fourth quarter of 1996). At over 60 percent in 1997, the annual rate of inflation was still very high by international standards, and even relative to neighbouring Kazakhstan and Russia.

- Absence of Fiscal Crisis. That government revenue should decline during this period is not surprising, given that a reduction in the role of the

[4] On the other hand, the World Bank has argued that continuing government regulation and support tends to postpone, rather than avoid, output decline (World Bank, 1996a). The debate on this point is beyond the scope of this thesis.

[5] Between 1992 and 1994 large volumes of roubles flowed into Uzbekistan from other republics that had already introduced their own national currency (Shibarshova and Nabikhodjaev, 1997). Uzbekistan introduced the soum-coupon in November 1993 and the soum in July 1994.

state, with privatisation and growing informal sector activity, is inherent in the notion of transition. In many countries, however, there has been a virtual collapse in government tax collections that, in turn, has made the fulfillment of even minimal state functions difficult (UNICEF 1998, Chapter 1). The strong revenue effort and the limited extent of tax arrears in Uzbekistan stand in sharp contrast to many countries in transition. Total revenue as a share of national income has declined, but far less so than the mean for countries in transition reported by the EBRD (1995, Table 6.5).[6] Between 1994 and 1997, the budget deficit has been kept to around 4-7 percent of GDP without substantial reductions of the share of public spending in national income. However there have been arrears on the expenditure side - loans from the state budget were extended to the agricultural sector and the Pension Fund in late 1996 to help clear the accumulated arrears (IMF 1997).

In sum, the drop in output has been much less severe than experienced in neighbouring countries while, as recently noted by the World Bank (1998a), the Government is apparently committed to macroeconomic stability. In contrast to the macroeconomic performance of Uzbekistan, the record with respect to structural reform is generally regarded as less favourable. The World Bank's 1996 World Development Report, *From Plan to Market*, put the country in the bottom-ranked group on various indicators of reform. Reviews conducted by the European Bank for Reconstruction and Development (EBRD) have accorded a similarly poor ranking. Pomfret and Anderson (1997, Table 1) put Uzbekistan at the bottom of the list of Central Asian republics in terms of the speed and extent of liberalisation. The key elements of institutional and structural reforms affecting labour market outcomes are detailed in the next section. Before proceeding, however, changes on the supply side of the labour market and the implications for wages are considered.

[6] Still, tax arrears (ie. non-payment of tax obligations) were estimated by the IMF and government authorities to amount to 2.5 percent of GDP in Uzbekistan in 1994 and 1995.

3.2.2 Labour Supply Changes

Key changes on the supply-side of the labour market relate to changes in the aggregate numbers of working age people and their rates of participation in the labour force, and changes in the stock of human capital. In this section evidence is reviewed on each of these aspects; the focus is on education and the human capital dimensions, which have most relevance to the empirical analysis of earnings in PART II.

Official demographic data show that the working-age population has continued to increase at a high rate. Between 1990 and 1996, the amount of labour resources[7] increased by over 13 percent nationally, and faster in rural areas (Goskomprognostat 1997). The pace of population growth varies quite markedly by region (Klugman and Marnie 1998, Table 1.6). In particular, since 1990 the working age population of Tashkent city has fallen, while growth rates in excess of 20 percent have been experienced in such oblasts as Syrkhandarya and Kashkadarya.[8] This has been partially offset at the national level by the out-migration of many Slavs (Klugman and Schieber 1997, Table 7), who tended to dominate skilled occupations in the country (Lubin 1984). Between 1989 and 1995 about 721,000 individuals (3.6 percent of the population) migrated out of the country, but this was more than offset

[7]The Soviet concept of *labour resources* is the closest we have to the Western/ ILO notion of labour force participation (Klugman and Scott, 1997). It comprises the population aged between 16 and 60 years of age minus invalids and those on special pensions, plus people outside the age range who are working, and youth who are studying but available for work. An unknown proportion of individuals classed as part of labour resources would not actually be seeking work. Estimates of labour force participation based on representative survey data are presented in Section 4.

[8]The stagnation of the capital's population is somewhat surprising given the experience of many developing countries where metropolitan areas have expanded rapidly as people move to the city in search of work. The different situation in Uzbekistan can be attributed to (a) the outmigration of Slavs, who tended to live in the capital (see Klugman and Schieber, 1997, Table 1.2); (b) the legacy of residential control permits, known as *propiski*, which mean that individuals without a permit face harassment by the authorities; and (c) the strong cultural emphasis on the family which contributes to the low mobility of the rural population (Lubin, 1984). Rapid population growth in rural areas can also be attributed to lesser access to family planning services (Klugman and Schieber, 1997).

by natural population increase of 19.2 percent over the period.

On the supply side of the labour market, education is seen to have a key influence on wage outcomes. There are a plethora of empirical studies for established market economies which show that education has a positive impact on the level of earnings (see Psacharopoulos 1994, and the studies cited therein). The economic model underlying this empirical regularity, the human capital theory of earnings, is set out in the next chapter. Education also tends to enhance income earning opportunities by reducing the risk of unemployment, as will be shown for Uzbekistan later in this chapter, and might increase the ability of individuals to cope with change (see Chapters 4 and 7). Hence trends in enrolments are of clear relevance to the empirical analysis of wage outcomes in PART II.

Reforms in Education

To what extent has the inherited Soviet system of education been subject to reform since 1992? The structure of education in Uzbekistan, as well as its curricula, instruction methods and teaching training, are still strongly influenced by the socialist legacy (Tibi 1995, p. 93). These aspects were reviewed in the previous chapter, along with the associated shortcomings, and need not be revisited.

There have been substantial real declines in state financing of education in Uzbekistan, as elsewhere in the former Soviet Union (Klugman, forthcoming). Clearly, this would have placed significant pressures on the sector at all levels of education, and have made qualitative improvements difficult to design and implement.[9]

Since 1994, higher education institutions have been allowed to recruit up to 50 percent more students than their allocated quota, and to charge

[9] One academic visitor to Samarkand University paints a depressing picture of student apathy and lack of interest, which is attributed to (i) the pressure on living standards, which forces many students to take up outside work; (ii) lack of confidence in the relevance of the courses; and (iii) very low probability of failure (Esfahani and Thornton, 1997).

them fees. This approach is similar to that taken in Russia and the Ukraine (Thompson 1996, p. 6). In 1997, the proportion of fee-paying students was 24 percent for the republic as a whole. The fees charged are very high relative to the average wage: in 1997, the annual fee was 80,000 soum and the average wage was 5,000 soum. The higher education institutes are the only part of the education system (apart from some kindergartens) where cost recovery has been introduced formally on a widespread basis. Even for secondary education, however, there is evidence from sociological surveys that the costs tend to exclude for average families. A recent study of Ak Altyn raion in Syrdarya oblast (see Figure 1.1) reported that average annual expenditures per child in secondary school in 1997 were roughly 10,000 soum, compared to an average annual wage of 14,000 soum (Lubin and Zholdasov 1998, p. 5). The same study reported average annual household expenditures to cover a family member in higher education of around 26,000 soum.[10]

There have been changes in education, beginning with the 1992 law *On Education.* The concept of orders for graduates from the various ministries has given way to assessments of needs by the relevant ministries, although the basis for the current practice is not clear (Thompson 1996, p. 3). University entrance arrangements have been altered, so that there is one single exam for all institutions of higher education, sat concurrently by all candidates.[11] An important change on the curriculum side has been the introduction of a general subject component for the first two undergraduate years of all courses, to give greater breadth to the courses.

[10]These estimates are based on a random sample of 600 respondents from among the rural population in Syrdarya oblast.

[11]However each student can apply to only one instituition – if they don't secure sufficient marks for entry for that institution, they have to wait until the following year to apply there again, or anywhere else.

Declines in Enrolment

Since 1990, enrolment rates have fallen at all levels of education in Uzbekistan. This is shown in Table 3.2. The declines in university enrolment have been especially sharp. The rest of this section examines these overall trends in greater detail.

Table 3.2: Enrolment per 10,000 population, 1990-1994

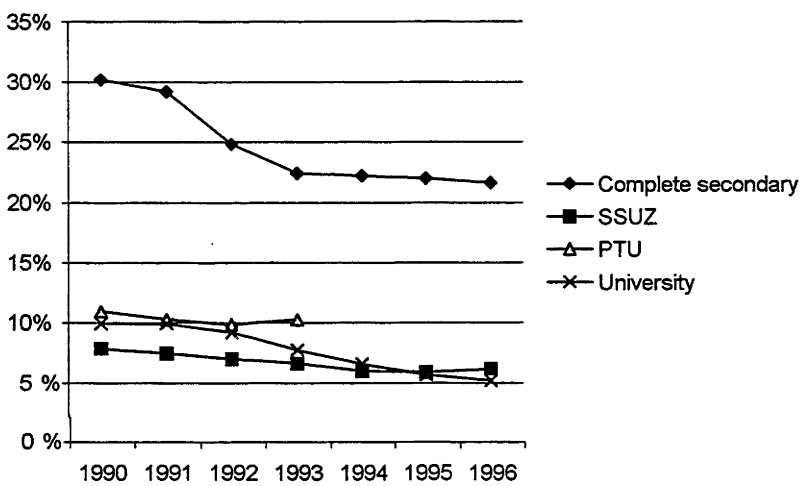
	1990	1994	% change
Secondary	2291	2220	-3.1
SSUZ	126	93	-26.2
PTU	11	10	-8.8
University	165	102	-38.2

Education is obligatory for all children between the ages of 7 - 16 years. According to official sources, 100 percent of the corresponding age cohort completes primary education, and 96-98 percent attends until reaching at least incomplete secondary (grade 9). UNICEF estimates show a somewhat lower and declining trend in the gross enrolment rate for basic education as a share of the 7 -15 year old age group, falling from 92.2 percent in 1989 to 88.6 percent in 1994 (UNICEF Transmonee 1998, Table 7.2). This pattern is similar to that observed for neighbouring republics, including Kazakhstan and Kyrgyzstan, where the basic enrolment rates fell from about 94 and 85 percent respectively to 90 and 76 percent between 1989 and 1996 (*ibid.*). In Uzbekistan, the decline in enrolment reportedly has been greater among boys, and repetition and drop-out, which were not traditionally serious problems, have been reported especially in rural and poor areas (UNDP 1995)

At 16 years of age, children face a choice between continuing in the general academic stream of secondary education, moving to vocational training, or joining the workforce (see Chapter 2). Figure 3.1 depicts the shares of the relevant age cohorts enrolled in different types of education. The share of the age cohort completing secondary education has fallen, partly as a result

of the introduction of examinations for entry into 10th class in 1992. The gross enrolment rate as a share of the 15-18 year old age group dropped from 37.5 percent in 1990 to 27 percent in 1996.[12] Similar declines have been experienced in Kazakhstan and Kyrgyzstan, where enrolments over the same period fell from 30 to 25 percent, and from about 37 to 27 percent, respectively.

Figure 3.1: Falls in education enrolment (full-time), 1990-1996



Given the declining rates of secondary completion, it is not surprising that there has also been a significant decrease in higher education enrolments (Figure 3.1). The share of the age cohort (18-22 years) enrolled in full-time tertiary education fell from about 9 percent to 5 percent between 1989 and 1996, or in absolute terms, by about 65,550.

[12]For those who do continue in the general academic stream, the transition has been associated with increased diversity of schooling choice. Klugman (forthcoming) examines the equity implications of the development of elite streams of education, often supported by state subsidies, in the former Soviet Union,

Hence the supply of new labour market entrants with higher education has fallen during the transition. This may be a rational, or even forced, response of individuals to the introduction of fees, current income constraints and significant levels of household poverty (Coudouel 1998), and lack of access to credit to finance investment in human capital. However this would be expected to damage their earnings prospects.[13] Another question is whether declines in the supply of university graduates have lead to wage premiums. These questions are investigated in depth in PART II, in particular, Chapter 7.

What has happened to enrolments in vocational training? There are two broad categories of vocational training that enrol similar numbers of pupils.[14] The tightening of requirements for entry to both complete secondary school and to higher education, together with the introduction of tertiary fees, might have been expected to bolster enrolments at PTUs and SSUZs in recent years, since full-time vocational training is free of charge and carries a student stipend. On the other hand, the relevance of Soviet-style vocational training under the new economic conditions is open to doubt, as suggested in Chapter 2.

UNICEF estimates show that as a share of the 15-19 year old age cohort, enrolments in SSUZ have fallen by over one-fifth, from about 7.9 percent in 1989 to 6.2 percent in 1996. By way of contrast, enrolment data for PTUs (available only through to 1993), show a lesser decline, from 11.0 to 10.3 percent since 1990.[15]

[13] Grants for university students in 1997 were 1,400 soum per month, or about one-third of the average wage. There are other in-kind subsidies – like student accomodation, for which only a token fee is charged.

[14] In 1993 (latest year available for enrolment figures for PTU), there were 226,000 individuals enrolled in PTUs and 240,130 enrolled in specialised secondary education.

[15] The enrolment figures for the various types of educational institutions distinguish between daytime (full-time) attendance, and evening and correspondence courses. In calculating the enrolment rates as a share of the age cohort, we count only the full-time students. The exception is for PTUs, where authorities only publish the total number of students.

The wage effect of the relative decline in the number of labour market entrants with vocational qualifications would depend on changes on the demand-side of the labour market. Does the market valuation of PTU and SSUZ qualifications differ from that which was determined by the planned economy? This question is investigated in Chapters 7 and 8.

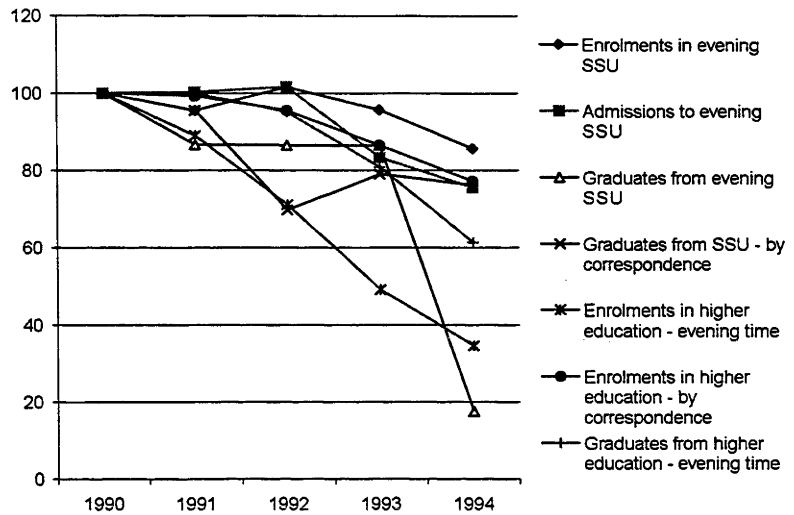
An important dimension of human capital accumulation is on-the-job training, which in turn is expected to have a critical influence upon the shape of the experience-earnings profile (see Chapter 7). While it is difficult to establish a complete picture in the absence of firm or individual specific data, trends in enrolment in adult and part-time education are nonetheless informative with respect to formal training. In 1990, enrolments in these courses amounted to about 235,000; by 1994 the figure had dropped to about 180,000. Figure 3.2 summarises the trends in adult enrolments relative to a 1990 base of 100, and reveals declines across-the-board.[16] This is despite the right to paid leave for education and training in the 1992 law *On Education.*

The sharpest falls can be observed for part-time enrolments in university. The annual number of university students admitted to evening courses plummeted by about 81 percent between 1990 and 1994. The trends in tertiary enrolment by correspondence show a fall of about 23 percent over the same period. At SSUZs, the drop in evening *enrolments* has been of the order of 20 percent between 1990 and 1994, the decline in the number of *graduates* has been even sharper.

This pattern of declining enrolment in adult education may be due to several factors. Reduced employer preparedness and capacity to finance such training might well be expected during the recent period of output decline. Individuals may themselves feel that the training provided is not useful in the new economic conditions, and face uncertainty about future employment

[16] Another way of looking at these trends is through the relative share of total enrolments that are part-time. The relative share of part-time enrolment at SSUs has dropped, for example, since 1989, from about 37 to 26 percent. Similarly, at tertiary institutions, the share has dropped from about 47 percent in 1989 to 34 percent in 1995.

Figure 3.2: Falls in adult education, 1990-1994 (1990=100)



opportunities. There are also greater demands on the time of adults (especially parents), who may be seeking secondary employment to help make ends meet, and/or having to deal with the consequences of reduced access to child care (Klugman, Marnie, Micklewright and OKeefe 1997).[17] On the education supply side, there is evidence of reduced state provision for evening courses: for example the number of teachers in evening secondary schools fell by some 10 percent between 1990 and 1996, even though the total number of teachers in the education system has increased (Klugman, forthcoming).

What would be the effects of reduced formal on-the-job training on wage outcomes? If it is true that such training was not relevant to the needs of market economic conditions, then the demise of this type of on-the-job training would not be expected to matter. However to the extent that such training augments individual productivity, one might expect the returns to

[17] Kindergarten enrolment rates (of childen aged between one and seven years) fell from about 34 percent in 1989 to 24 percent in 1996.

experience to be lower than previously. The studies reviewed in Chapter 4 (e.g. Flanagan 1998), suggest that there is some evidence that this has been the case in other transition economies. While it is impossible to make definitive statements about Uzbekistan on this point using a single data cross-section, Chapter 7 is devoted to exploring the experience-earnings profiles of different demographic groups in Uzbekistan.

3.3 Institutional and Structural Reforms

The pace of structural reform in Uzbekistan has been at best gradual, though cumulatively significant in a number of areas.[18] Progress has not always been linear. With respect to prices, for example, the IMF noted that the process of liberalisation was essentially completed by early 1995 (IMF 1996, p11), but later reported that price controls (cum rationing) had been introduced for key consumer goods in mid 1997. Reversal of earlier policy decisions also appeared with respect to the removal of state orders and foreign currency regulations. It is beyond the scope of this chapter to fully investigate the scale and nature of structural reform in Uzbekistan. Here the new legal basis for labour relations, reforms in the agricultural sector, and enterprise and financial policy, are considered with a view to the expected effects on the labour market and wage determination. The period under consideration is 1992-1996.

3.3.1 Legal Basis for Labour Relations

Chapter 2 painted a picture of labour relations under the Soviet regime characterised by significant formal constraints on enterprise decision-making. Legislation since independence has relaxed some of these controls, although the role of the employer still differs in key respects from what would be

[18]Parts of this section have been published by the author in "Uzbekistan: Institutional Continuity Helps Performance", MOCT/MOST, Volume 8: 63-82, 1998.

expected in a market context, as shown below.

A series of laws was enacted that was designed to provide the legal basis for market relations in the republic, including the national constitution and laws *On Employment*, *On Enterprises*, and *On Entrepreneurship* (see Saidova *et al.* 1996a, Appendix 1). The latter establishes the right of entrepreneurs to independently hire and release workers (in conformity with national legislation).[19] The *Constitution of the Republic of Uzbekistan*, adopted on 8 December 1992, provides the right of every individual to free choice of work and to fair labour conditions, and for support for the unemployed according to the law.

The law *On Employment* (13.01.92) formulates general principles of state policy in the sphere of employment and state guarantees for labour in a market economy, in particular, the functions, duties and rights of the state employment service.[20] The concept of unemployment was legally recognised for the first time in Uzbekistan, and the law provides for registration of the unemployed and guarantees of material support in the event of retrenchment.

Even under the new conditions, the autonomy of a firm is still potentially limited by social obligations to its employees and the authority of government agencies to intervene in its operation. Thus, for example, Article 1 of the law *On Enterprises*, entitled "Main Tasks" states that the realisation of the firm's objectives must "ensure the social and economic interests of working collective members, as well as management interests". At the same time, Article 19 states that the "Labour incomes of every worker... shall be determined by his personal labour contribution with due account of final results of the enterprise's operation.. and not regulated by maximum amounts", and that "forms, systems and the amount of labour payments as well as other

[19]The individual or private economic activity that was permitted in the Soviet period did not extend to allow hiring of employees.

[20]This is the basic law on employment enacted after independence. There had of course been legislation governing employment during the Soviet period (see Marnie (1992) for a summary of the rules relating to recruitment and dismissal, for example).

incomes of the workers shall be fixed by the enterprise independently."[21]

Similarly the Labour Code establishes that wages are agreed upon between employer and employee, subject to the legal minimum wage, and that the form and system of pay will be set in collective agreements. While these provisions suggest that enterprises would determine wages along the same lines as used in market economies, in practice, as will be shown below, government mandated indexation decrees have been a regular feature of the transition period in Uzbekistan.

Enterprises have a range of social obligations that have carried over since the Soviet era. For example, the state can oblige all firms employing more than 100 employees to reserve a quota of 7 percent of all jobs for "disadvantaged" workers, which are defined to include invalids, and women with many children (Klugman and Marnie 1998). The law *On Enterprises* includes a section on social guarantees with obligations to, for example, "constantly improve the conditions of labour and life of women, provide work for women with young children with reduced working hours and transfer pregnant women to easy work."

In sum, the scope of employer autonomy with respect to wages and redundancy has been significantly enhanced since 1991. However the government still appears to attribute social obligation to the employer (whether in the state or private sector). This would imply some benevolence on the employer's part, and accord importance to non productivity related factors in wage and employment decisions. The extent to which this is borne out is examined in PART II. For example, Chapter 6 investigates female earnings profiles in depth and Chapter 9 examines the priority of wage payments in the event of shortfalls in the size of the wage fund.

[21]The law also establishes a legal basis for the working collective of the enterprise, which signs collective agreements on behalf of the workers. The scope of the collective agreements is to "regulate production and labour relationships at the enterprise, issues of labour protection and social development of the collective and its members" (Article 30). Hence it seems that unions are restricted to issues related to work conditions and social benefits, and would not normally be involved in negotiations over wages.

3.3.2 Agricultural Reforms

Agriculture is of primary interest, not least because the sector accounted for 30-40 percent of formal employment in the mid-1990s. Changes in the economic and institutional framework surrounding agriculture have included a sharp decline in the prices paid for major outputs, the abolition of the *sovkhozy* and the expansion of individual farming.

Agricultural output has fallen, though by much less than in industrial production. The decline has also been less than in other former Soviet republics where agricultural production has dropped by 20-40 percent (World Bank 1995a, p. 3).[22] Employment in agriculture has actually risen, though this might be due more to its role as a residual sector in absorbing excess labour supply and recent technical changes in the sector, as discussed below. Between 1990 and 1995, the share of agriculture in GDP fell from 33 to 29 percent, but over the same period the agricultural share in employment rose from 25 to 30 percent (Goskomprognostat 1997; see Table 3.7 below).

After independence there was an adverse price shock generally against agricultural goods, and in particular against cotton. This can be traced to the withdrawal of many subsidies formerly provided to cotton, and the continuation of state orders for the bulk of cotton and grain at prices set by the state (Table 3.3).[23] Although estimates are very sensitive to the choice

[22]The World Bank identified two factors to explain the good performance of agriculture in Uzbekistan relative to other former Soviet republics (World Bank 1995a). First, domestic production of essential agricultural inputs (fertiliser, pesticide and some farm equipment) meant that the trade collapse was less disruptive to farm production than tended to be the case elsewhere. Second, alternative cotton export markets have been found. To this, a third factor might be added: the inheritance and subsequent expansion of private sector activity in agriculture. The share of agricultural output produced in household plots and private farms increased from 28 percent in 1990 to 52 percent in 1996 (CIS STAT 1997).

[23]Herman (1998) writes that the terms of trade have moved strongly against agriculture as a result of low output prices, monopolistic prices for inputs and reduced subsidies. He estimates that the sector has lost 65 percent of its "purchasing power" since 1990. For example, in nominal terms the price of fertilizer has risen 60 times while the price of cotton increased only 6 times. In 1996, the Government announced an increase in procurement

of price index and the exchange rate, the state procurement price of cotton in 1994 was clearly only a small fraction of its 1990 level (Khan 1995, p. 80), and well below world market prices (World Bank 1995; Herman 1998).

Table 3.3: State orders, 1991-1996 (percentage of crop subject to procurement)

	Cotton	Grain
1991	95	100
1992	85	85
1993	80	80
1995	60	50
1996	40	25

SOURCE: Khan (1995)

An associated issue is that government authorities tend to delay payment for procured output. Together, these factors imply heavy net taxation of agriculture, that has likely constrained Uzbekistan's agricultural producers, especially in the formal sector, and led to a weak financial condition. It has meant, *inter alia*, that farms are often unable to pay wages, an issue which is investigated in depth in PART II.[24]

The disadvantages imposed on farmers by government regulations do not appear to be offset by potential advantages in terms of extension services and access to credit. Agricultural producers' access to credit is constrained (World Bank 1996c), which could be expected to exacerbated cash flow problems and hence arrears in the agricultural sector. From a peak of 10-12 percent of GDP prior to independence, budget subsidies to agriculture have dropped to about 3-4 percent of GDP (Herman 1998, p. 8). The largest subsidy comes in the form of free irrigation.

prices for cotton to 70 percent of world prices, and to 75 percent for grain; while state orders were reduced to 40 and 25 percent respectively (see Klugman, 1998).

[24] On January 1, 1997, farm enterprises owed a total of 53 billion soum to their suppliers, workers and revenue authorities, of which about 9 billion soum was owed to workers (IMF, 1997, p. 64).

After 1992, the *sovkhozy* were transformed into *kolkhozy*, a change that has been attributed to fiscal pressures as well as efficiency reasons (see Khan 1995). Thus nearly all state farms were removed from direct state control and the assets formally transferred to the workers. This is shown in Table 3.4. There has been an ongoing tendency of the *kolkhozy* to enter into individual contracts with their members, whereby the parent *kolkhoz* provides some services and inputs, subject to the individuals providing their share of the output quota (World Bank 1995a).

Table 3.4: Distribution of sown land (percent), 1990-1994

	Kolkhoz	Sovkhoz	Private	Other
1990	34.9	58.7	0.1	6.3
1991	34.0	57.7	0.1	8.1
1992	36.4	51.8	0.4	11.5
1993	47.5	39.0	0.6	12.9
1994	75.3	1.0	2.1	21.6

While the agricultural sector remains dominated by large production units – out of the 4.5 million hectares of cultivable land, 3.6 million hectares is occupied by collective farms and farm co-operatives – individual farming has been allowed to expand. By 1996, an estimated 25 percent of total cultivated land was under private control, and official reports stated that over half of all agricultural output and 80 percent of all meat and dairy products came from the non-government sector. There are two main types of direct private control of land:

(i) small household plots have existed since Soviet times and were an historically important source of marketed output, especially for perishable products. The plots average 0.2 hectares in size and accounted for about 9 percent of total land area in 1994. There has been a significant increase in the number of personal plots, and relaxation of size limits thereon. By 1995 they were estimated to number 2.9 million (Pomfret 1998, p.3).

(ii) the right to use land allocated from collectives and state farms, which

by the end of 1995 had been given to about 14,250 farmers.

However as Pomfret (1998) points out, the *kolkhozes* dominate agriculture not just by their size, but because they have authority for the distribution of water, and thus retain crucial leverage over leasehold farms. Moreover, since farm workers lose their plots if they cease working in the *kolkhoz*, this link may help explain why farm workers apparently tolerate payment of wages often months late (Herman 1998, p. 5). Chapter 9 investigates patterns of non-payment of wages in some detail.

The labour absorption capacity of agriculture has already been noted. Beyond the expansion of individual agricultural activity and small-holdings, this has taken place through the demechanisation of cotton harvesting. In the late 1980s over half the harvest was mechanised, but this had fallen to less than 5 percent by 1997 (Pomfret 1998, p. 6). This may be an appropriate development given the abundance of labour resources in Uzbekistan and the perceived higher quality of handpicked cotton.[25] At the same time, one might expect these technological changes to have reduced labour productivity in agriculture and have a negative impact on wages in the sector.

3.3.3 Enterprise and Financial Policy and Arrears

The leadership of Uzbekistan has consistently emphasised the social orientation of its approach to economic reform and the desire to avoid, as far as possible, the social costs of transition experienced by its neighbours (Karimov 1998).[26] One might expect this to be reflected in the government's enterprise and financial policies. Such policies raise a number of key questions from a labour market perspective, including: to what extent has employment shifted

[25] Demechanisation may have produced overall efficiency gains in the economy through savings in fuel and maintenance, and in resources used to produce new machines; but the old cotton-picking machinery has no alternative uses and was apparently simply abandoned (Craumer 1995, p. 20-1).

[26] On the social costs of transition elsewhere in Central Asia see, for example, Pomfret and Anderson (1998) on the experience of Kyrgyzstan, and World Bank (1998b) on Kazakhstan.

out of the state sector; how much enterprise restructuring has taken place; and how might wage outcomes in the state and private sectors be expected to differ. These issues are considered in this section, by way of background to the detailed empirical analysis in PART II.

The structure of employment by enterprise ownership shifted significantly away from the state between 1990 and 1995, as shown in Table 3.5.[27] The share of state enterprises and government has declined from almost two-thirds to less than 40 percent as the non-governmental sector has expanded. The share of joint stock companies, in particular, increased as corporatisation of state firms proceeded. In fact most medium and large scale enterprises have been incorporated as joint stock companies (IMF 1997, p. 24). The new private sector (as opposed to formerly state, privatised firms) accounts for only a small share (2.7 percent) of total employment. The vast bulk of private agriculture comprises individuals working their own plots; in 1995 only about 1.4 percent were employed on private farms.

Table 3.5: Changes in employment by ownership, 1990-1995 (per cent)

	1990	1993	1995
state	64.7	54.7	39.6
kolkhoz	14.4	20.7	22.4
joint stock	0.2	1.3	11.2
leased, co-op, etc	5.3	2.9	2.0
self employed	0.2	1.4	3.6
private agriculture	15.4	18.7	19.9
total	100	100	100

SOURCE: World Bank (1996b), Table 1.1

[27]The following definitions are used: *state* sector refers to state-owned enterprises, administration and public institutions run by government; *kolkhozes* are collectively owned farms; *joint stock* companies include former state enterprises which have been corporatised; *leased* enterprises are state enterprises that have been leased, usually to their employees; *self employed* refers to individual labour activities, legalised in 1986; and *private agriculture* includes small private plots, which have been less restricted in recent years, as well as small independent farms which were always allowed to exist, though only in neglible numbers until recently.

In a pattern familiar to many transition economies (see World Bank 1996c), the approach to privatisation involved several phases. Phase I focussed on small scale enterprises and housing, and resulted in privatisation of over 90 percent of the stock. By the end of 1995, about 95 percent of the 10,400 small enterprises – retail shops, trade and service establishments – had been privatised, as had about 96 percent of the housing stock. Privatisation in this phase typically meant transfer of ownership to existing staff.

Phase II includes corporatisation and partial privatisation of medium and large-scale enterprises. In 1995, 1,600 medium and large scale enterprises had been targeted for privatisation, of which about 1,000 had already been "partially privatised" through sale of shares to managers and employees.[28] The privatisation programme to date has tended to transfer assets to insiders, managers and employees, a pattern that was also observed in Russia (Commander and Yemtsov 1997). Thus the extent to which the level and structure of wages would differ between state and newly privatised firms is unclear. It is possible that private ownership would not make much difference to wage outcomes, a hypothesis that is directly tested in Chapter 8.

Implementation of the stabilization program in early 1995 significantly tightened financial discipline on enterprises (IMF 1997). Budget subsidies and directed credit through the Central Bank to enterprises were eliminated. Since April 1995, Central Bank credit was only available at the refinance rate, which in mid-1996 stood at 80 percent per annum compared to projected annual inflation of 30-35 percent.

The financial system remains dominated by banks owned by the state that are heir to the largest sectoral banks of the Soviet era: *Promstroibank* (industrial bank); *Phatbank* (cotton bank); and the National Bank, the former foreign trade bank. In late 1995 there were 29 banks, many of which have a specific sectoral focus according to Government priorities (World Bank

[28]For the remaining 600 enterprises, the Government has decided to pursue a privatisation Investment Fund (PIF) scheme that will promote public participation through issuing a low priced category of shares, although implementation was delayed.

1996c, p.12).[29]

Arrears in inter-enterprise payments for inputs have become prevalent, a pattern which has also characterised some other former transition countries.[30] Arrears refers to delays in payment for obligations to individuals, firms or to the state. Wages are often paid late (wage arrears), firms fail to pay other firms in a timely fashion for inputs (inter-enterprise arrears), and firms may fail to pay their tax obligations when these fall due (tax arrears). The real effect of arrears is magnified by the high rates of inflation that have prevailed in these economies (see Table 3.1). This is shown in Chapter 9, which considers the implications of arrears for real wage levels.

While arrears on taxation and bank loan payments have been limited, there was significant growth in inter-enterprise arrears during 1995. Arrears rose as a share of GDP from 2 to 7 percent in the year to January 1996, and as a share of payables from 8 to 27 percent. This phenomenon suggests that several factors could be at work: enterprises attempting to maintain production levels despite slack demand for their product, difficulties in access to credit, and/or expectations of future government support.

In response to arrears, the authorities imposed penalties on banks that accumulated arrears on refinancing and interbank borrowing. Similarly, Presidential Decrees in May 1995 and January 1996 penalized enterprise managers who allowed their enterprise accounts to fall into arrear. In fact preliminary data suggests a significant fall in the real value of inter-enterprise arrears in the first half of 1996 (IMF 1997).

3.3.4 Summary

Recent changes in the institutional and structural framework in Uzbekistan have eliminated a range of distortions, even if substantial controls remain on economic activity. Most prices in the economy have been allowed to adjust

[29] New legislation has been drafted that would, among other things, take away the special advantages enjoyed by the National Bank.

[30] See, e.g., Corricelli (1996).

to market conditions, so that one would expect radical shifts in the relative prices of inputs, including labour, as well as in the relative prices of different goods and services. Of course the scope for redeployment of labour partly depends on the technical nature and flexibility of the capital stock (Flemming and Micklewright forthcoming p.31), as well as the institutional constraints that limit the extent of adjustment in wages.

The main messages for the determinants of wages that emerged from the consideration of structural and institutional change can be highlighted as follows:

- Institutional constraints and norms continue to place formal social obligations on employers, that could be expected to influence their employment and wage decisions in favour of "disadvantaged" groups, including women with children.

- Agriculture is an important source of employment in the economy, given recent technological changes and the associated scope for private productive activity. However *kolkhozes* remain subject to substantial competitive disadvantages which would in turn affect the level of wages in agriculture and their ability to pay wages on time.

- There has been a substantial expansion in private sector employment in the economy, although the nature of the privatisation process and capital constraints has hampered restructuring and investment in the private sector. This would be expected to limit both employment and wage adjustments in the private sector.

- Arrears have become an important dimension of enterprise and government behaviour, that can be attributed in part to the operation of the financial sector and to delays in government payments. However little is known about arrears in wage payment.

These points are the subject of detailed empirical examination in PART II. In the next section official data are used to cast light on the process of adjustment in the labour market.

3.4 Labour Market Outcomes

3.4.1 Introduction

Levels of employment and wages have fallen substantially everywhere in the early phase of the transition.[31] There has been a divergence, however, between the outcomes generally experienced in the Central and Eastern Europe (CEE) and the Former Soviet Union (FSU). For the CEE the decline in aggregate employment has at least matched the fall in output, whereas massive output reductions have occurred in most of the FSU but adjustments to employment have been limited.

This section investigates trends in Uzbekistan, primarily on the basis of official national statistics. These are the main sources of information used by government decision makers as well as international agencies, including the EBRD, World Bank and IMF. The official wage and employment figures for Uzbekistan (and most of the other countries in the region) are based on enterprise surveys that are limited to established state or formerly state firms, and generally under-represent small business and private sector activity (Saidova *et al.* 1996b).

Official sources suffer various biases, the net effect of which is unclear (Klugman and Scott 1997). For example, employment figures include people who are formally on the books but not working (i.e. overstate employment) but also tend to exclude private activities (and hence underestimate employment). Also the wage data would generally ignore delays in payment of wages (arrears), so that their real value is overstated; an issue investigated in

[31] Recent studies of labour markets in the transition economies include Barr (1994); Commander and Corricelli (1995); Esrtin and Svenjar (1996); Allison and Ringold (1996) and Rutkowski (1995) and Rutkowski (1996b).

Chapter 9. The need for an examination of the Uzbek labour market using a more reliable and representative data source is a recurring theme in this chapter. Indeed this is an important motivation for the analyses undertaken in PART II.

The existing aggregate data, despite its shortcomings, nonetheless enable a comparative picture of trends during the transition period to be established. It suggests that recent trends in employment in Uzbekistan are, in regional terms, quite unusual. The same is true of wages. This is presented in Table 3.6, and summarised below.

Table 3.6: Regional levels in the labour market: official data

	1990	1991	1992	1993	1994	1995
Average Real Wage Index						
Belarus	100.0	96.0	76.0	70.5	45.3	42.1
Kazakhstan	100.0	87.2	56.4	50.9	33.3	29.9
Latvia	100.0	73.9	49.6	54.7	55.0	55.0
Russia	100.0	96.6	67.6	70.9	65.2	45.9
Uzbekistan	100.0	78.3	77.3	144.9	88.2	73.5
Registered Unemployment (%)						
Belarus	0.0	0.0	0.5	1.4	2.1	2.7
Kazakhstan	0.0	0.1	0.5	0.6	1.0	1.7
Latvia	0.0	0.1	3.0	5.3	6.4	6.4
Russia	0.0	0.0	1.0	1.5	2.3	3.2
Uzbekistan	0.0	0.0	0.1	0.2	0.3	0.3
Change in Total Employment since 1990 (cumulative %)						
Kazakhstan		-1.3	-2.6	-9.2	-11.8	
Russia		-2.0	-4.4	-5.8	-7.0	
Uzbekistan		3.9	4.1	2.6	2.7	4.0

SOURCE: Rutkowski (1995), except Uzbekistan, author calculations based on World Bank (1996b)

- Rise in Employment. Between 1990 and 1995, total employment in Uzbekistan increased by about 2.6 percent, compared to declines of

about 7 percent in Russia and of more than 15 percent in Kazakhstan. Between 1994 and 1997, 340,000 new jobs were created in Uzbekistan, implying an annual employment growth rate of 1.3 percent (Uzbek Economic Trends 1998). However official levels in employment are misleading to the extent that hidden unemployment is ignored, as will be shown below.

- Low Registered Unemployment. Levels of registered unemployment are low in many of the former Soviet republics, despite the large falls in output and employment.[32] The associated measurement problems are investigated in the next section.

- Real Wage Reductions. Throughout the FSU, very high price inflation and large declines in output resulted in significant cuts in the real wage (e.g. Rutkowski 1995). The official indices show that in many countries the real wage continued to decline at least until 1995. In Uzbekistan, the official data suggest more limited reduction over the whole period.

Measurement of trends in the real wage, as with output, is fraught with problems in a context where high inflation has prevailed. Price indices, which are weighted averages of individual prices of bundles of goods, are used to deflate movements in nominal prices and wages over time. Since the prices of individual items change at differing speeds, the choice of the basket of goods and of the index used to compute aggregate price levels has a substantial effect.[33] Therefore when relative prices are undergoing massive and repeated

[32]The estimated ratio of registered to open unemployment in 1995 ranged from 31 percent in Bulgaria and 34 percent in Romania, up to 53 percent in Poland and 77 percent in Russia (Commander and Tolstopiatenko 1997, Box 1).

[33]Koen (1997, p. 27) concludes that "not only do extremely large discrepancies emerge (between the consumer price index and the retail price index), but even the direction of bias is not uniform, with one index rising much more in some (Central Asian) countries, and much less in others". He shows that for Kazakhstan, the "average real wage seems to increase from 1992 to 1993 based on the retail price index, whereas it seems to fall based on the consumer price index...the average 1993 level of the real wage is more than twice as high using the (former) index".

shifts, as has been the case in Uzbekistan (and the rest of the former Soviet Union), caution is needed in interpreting real wage series. A final point to note here is the relevance of the base period: in particular, whether the base period precedes the initial general liberalisation of prices in January 1992 affects the apparent path of the average wage. The sharpest rises in prices (and hence declines in the real wage) occurred in the immediate wake of price liberalisation.

In the sections that follow, trends in employment, unemployment, and the level and structure of wages in Uzbekistan are considered and compared to neighbouring republics.

3.4.2 Employment

The buoyancy of employment levels in Uzbekistan is quite unusual in the former Soviet context (Table 3.6). Table 3.7 shows changes in sectoral shares of employment, which include a significant rise in the share of agriculture, and a fall in that of industry. Institutional reforms (expansion of private holdings) and technical changes (demechanisation) in agriculture that were considered above help explain this trend. The employment shares of the retail and trade sectors also rose relatively strongly, by about 24 percent, albeit from a low base. The shares accounted for by traditional public and social services – health, education and public utilities – remained fairly stable. There may well have been further changes within the large category of "other" employment, but its overall share was stable.

Recall from Table 3.5 that there has been a large decline in the employment share of the state sector, to less than 40 percent of total employment. This partly reflects the rise in the share of *kolkhozes* and expansion of private subsidiary agriculture (private plots). Individual labour activity has increased, albeit from a very low base.[34] The vast bulk of working individ-

[34]CIS Goskomstat figures show that 20.4 percent of the employed population in Uzbekistan in 1995 was self-employed compared to, say, 10.2 percent in Russia but higher levels

Table 3.7: Sectoral shares of employment, 1990-1995 (per cent)

	1990	1991	1992	1993	1994	1995
Agriculture	25.3	27.2	28.3	29.6	28.8	30.0
Industry	15.5	1.6	13.7	14.3	12.7	12.1
Retail	3.7	3.6	3.6	4.2	4.5	4.6
Transport	3.3	3.1	2.9	2.7	2.7	2.6
Public utilities	1.6	1.5	1.5	1.4	1.5	1.5
Health	3.8	3.8	3.9	3.8	3.9	3.9
Education	8.9	8.9	8.8	8.3	8.6	8.3
Administration	1.0	0.8	0.8	0.7	0.7	0.7
Other	24.9	24.5	24.7	23.8	25.3	25.4
Total	100	100	100	100	100	100

SOURCE: World Bank (1996b)

uals are still employees, although the boundaries between employment and unemployment may be unclear, as shown in the next section.

3.4.3 Unemployment

According to official statistics, Uzbekistan has not experienced a substantial increase in unemployment. This is in contradistinction to outsiders' predictions (e.g. World Bank 1993), and despite a sizeable drop in national income. Before proceeding to consider this pattern, a review of the concepts of unemployment that are used in transition economies, and the associated caveats and problems, is in order.

Definitions

Analyses of unemployment in transition economies typically rely on at least three concepts of unemployment: registered, hidden and open. The issue of labour force participation also warrants review. The concepts differ not only in terms of definition, but also imply different data sources, as shown below.

in Kazakhstan (24 percent) and Kyrgyzstan (51.1 percent) (CIS STAT 1996).

Registered unemployment is a concept that is familiar to Western observers and comprises those individuals who are out of work and actively seeking work and are registered with the authorities as such. This category of the labour force has only been legally permitted since 1992. As in Western countries like Australia (Norris 1996), rates of registered unemployment tend to be lower than the figures obtained from labour source surveys. In Uzbekistan, this can be explained by incentive-related and other factors, specifically: (a) restrictive eligibility for unemployment benefits – fewer than half (48 percent) of the registered unemployed in Uzbekistan received unemployment benefits, compared to 80.5 percent at the end of 1992 (Interfax 1997); (b) that the unemployment benefit is low and limited in duration;[35] and (c) that hidden unemployment is widespread.

Hidden unemployment refers to workers who are formally attached to the enterprise although they are not in fact working (that is, their current marginal product is close to zero). This phenomenon reflects a continuation of the Soviet phenomenon of labour hoarding that reflected the then prevailing firm incentives and constraints on redundancy dismissals (see Chapter 2). During the transition, such workers have often been unpaid and/or on unpaid leave (Klugman and Marnie 1998). Employees may prefer to stay registered with their employer, even if they are not being fully paid, for several reasons:

(i) pension regulations still grant privileges (supplements) to those who have an uninterrupted work record (*stazh*) with one employer;

(ii) in some cases the Soviet inheritance of firm-based provision of social benefits may also be an incentive for individuals to retain an attachment to their employer, though the scope of such benefits (e.g. kindergartens) has tended to decline during the transition (Klugman *et al.* 1997); and

(iii) formal sector jobs facilitate individual activities in the second unoffi-

[35]The receipt of unemployment benefit is limited to a maximum of six months, and the amount is linked to previous earnings. The benefit amount has averaged only 15 percent of the average wage. In Russia unemployment benefits have fallen below 10 percent of the average wage (Klugman and Braithwaite, 1998).

cial economy. Due to the compressed wage levels and widespread arrears in payment, many citizens are obliged to pursue some other forms of income-earning activity. Being registered officially with a firm reduces the risk of attracting the attention of officialdom to such activities, and can also provide a useful base and network from which to take on secondary employment (access to materials, connections, etc.).[36]

The preference of employers for hidden unemployment can be attributed to the following (Klugman and Marnie 1998). After decades of Soviet ideology, and a tradition of the "paternal" firm, employers are still uncertain about firing workers, and in some cases (e.g. following privatisation) are expressly prohibited from doing so. They typically have no resources to invest in restructuring and updating technology and equipment, so still rely on large numbers of unskilled workers to keep production going. The high payroll tax (for social insurance; 36 percent of the total wage bill) should act as an incentive to limit the number of employees, but until now firms have reacted by keeping official wages low (or incurring wage arrears) rather than reducing their workforce.

Open unemployment is unemployment in the sense used generally in western countries and by the International Labour Organisation (ILO) (see Hussmans 1994). It refers to individuals of working age who are not currently working but are actively seeking work and able to accept a job offer – they need not be officially registered as such. Estimates of open unemployment are generally obtained through representative labour force or household surveys.

Hence one would expect open unemployment to be higher than registered unemployment, and hidden unemployment to be still higher. It is clear that the analysis of representative survey data would enhance our understanding of the extent and profile of unemployment and labour force participation in Uzbekistan. The available official data and survey evidence, including the

[36]There are no official figures on this practice, although it is consistent with the author's observations from field trips to Tashkent city, Tashkent oblast, Khorezm and Karakalpakalstan.

results of the household survey that is described more fully in Chapter 5, are analysed below.

Trends

Table 3.6 showed that, relative to the scale of output decline, the rate of registered unemployment has been extraordinarily low in many of the former Soviet countries, including Uzbekistan. In 1995, the number of registered unemployed was only 29 400, or about 0.3 percent of the labour force. By 1997, the rate had not risen beyond 0.7 percent (Goskomprognostat 1998). The average CIS rate in 1996 was 2.9 percent, with Russia, for example, having an official unemployment rate of 3.2 percent.

It is widely recognised that registered unemployment significantly understates the true magnitude of joblessness in transition economies (see, e.g., World Bank 1996a). However alternative estimates for Uzbekistan have been scarce. One estimate of the unemployment rate in 1994 was 4.5 percent of the workforce (UNDP 1996), though the source of this figure is unclear. It is, by its nature, also difficult to estimate the extent of hidden unemployment. The European University Institute/ University of Essex Survey of Uzbekistan (EESU) 1995, provides a handle on the extent of hidden unemployment, with direct questions about the non-payment of wages (arrears) and involuntary leave.

Table 3.8 compares several labour force measures for mid 1995. Internationally comparable measures of unemployment and labour force participation were estimated using the data set described in Chapter 5. Calculations of a measure of "hidden" unemployment are presented based on the extent of non-payment of wages and involuntary leave.

The measure of open unemployment is much higher than the registered rate. The share of the working-age sample who described themselves as "not working but actively seeking work" amounted to 9.5 percent, about 20 times larger than the rate of registration. The reasons underlying this difference

Table 3.8: Alternative labour force measures, 1995 (percentage of working-age population)

Registered unemployment		0.4
Unemployment (ILO definition)		9.5
"Hidden" unemployment, of which:		24.7
	Unpaid	23.9
	On forced leave	0.8
Labour force participation rate (ILO)		62.3
Official participation rate		72.0

SOURCE: Author estimates based on EESU; see Chapter 5.

were set out in the previous section.

An even larger share of the sample, almost one in four individuals of working age, fell into the category of "hidden unemployed". Virtually all of these individuals comprised those who had not been paid any wages in the previous month (i.e. the amount reported as owing was equal to their contract wage). Hidden unemployment, in the form of workers who are formally attached but not paid their wages on time, is an important phenomenon in a number of former Soviet republics, and is the subject of detailed analysis in Chapter 9. The extent of involuntary leave, on the other hand, was quite limited, at less than one percent.[37] This figure, which was estimated from the EESU, is less than that presented by the IMF (1997, Table 17) of about 2 percent of employment.[38]

The estimates of labour force participation based on the EESU household survey are far below estimates of employment rates based on official sources (see Chapter 2). However, it is unclear whether these surprisingly low rates are a result of transition since, as noted above, it is difficult to establish trends over time. The labour force participation rate for women, which is

[37] In contrast, estimates for Russia for mid 1994 are around 8.6 percent of the employed (Commander and Yemtsov, 1997, Table 6.3).

[38] The source of the IMF figure is "Goskomprognostat, Ministry of Labour and staff estimates".

even lower, is the subject of detailed investigation in Chapter 6.

Given the very different magnitudes of registered and open unemployment, differences in the incidence of unemployment by demographic group might also be expected. Discussions about policies for the unemployed are generally based on official data, but this profile may be misleading, as Table 3.9 reveals. Table 3.9 compares two profiles – that is, a profile of the registered unemployed, and a profile of the individuals who were not working and actively seeking work in the EESU survey.

Table 3.9: A comparison of profiles of the unemployed, 1995

	Officially Registered	Survey-based
male	0.32	10.9
female	0.28	5.3
Age (in years)		
16-18	0.55	24.3
19-30	0.72	13.0
31-50	0.25	14.3
50+	0.01	4.0
Education level		
Higher education	0.25	2.6
Special secondary	0.41	10.4
Complete secondary	0.45	11.7
Incomplete secondary	0.55	7.4
Average	0.4	9.5

SOURCE: Official estimates from Ministry of Labour.
Author survey estimates based on EESU; see Chapter 5

The profile of the officially registered unemployed shows that women and men are almost equally affected, and that first time jobseekers as well as individuals under 30 years of age have experienced above average rates of registered unemployment. There is also an inverse relation between unemployment incidence and the education level of the group, with the highest rates among those with only incomplete secondary schooling.

The picture drawn from the representative household survey is somewhat different. The rate of unemployment among women is only about half that for men.[39] New labour force entrants are experiencing high rates of unemployment, but the rate drops to much closer to average for the 19-30 year old group. Interestingly, while university education is still associated with unemployment rates significantly below the average, the education groups with the highest rates are vocational training and complete secondary. Incomplete secondary has a rate close to the average – the fact that their employment prospects are not disadvantaged by incomplete education may be partly explained in terms of job opportunities having motivated those individuals to leave school in the first place.

The foregoing analysis suggests that the official unemployment data is problematic. Not only is the magnitude of the problem significantly understated, but a misleading impression is given about the composition of the unemployed, and the demographic groups worst affected. The next section examines trends in the real wage based on official data.

3.4.4 Wages

There have been significant shifts on the price side of the labour market in Uzbekistan during the transition. This section reviews available evidence about trends in the level, and extent of differentiation, of earnings.

[39] Although it should be noted that women may be more likely to become "discouraged" and cease actively searching for work.

Trends

The need for caution in the interpretation of real wage series in light of problems inherent in the price indices has already been stressed. The currency reform that took place in 1994 (see Section 3.2 above) together with high rates of monthly inflation over much of the period, makes the construction of a real time series quite difficult. The available evidence nonetheless shows that there has been significant downward adjustment in the real wage in Uzbekistan, with some fluctuations over the period of transition (Table 3.6). Official data suggests that the real wage rose significantly in 1993. In 1994 the Government apparently ceased any attempt to maintain real wage levels, and introduced regulations that restricted increases in the wage bill at state enterprises to 70 percent of the growth in nominal output. Subsequently, according to IMF estimates, the minimum and average wages fell, in real terms, by about 70 and 40 percent respectively during 1994-5 (IMF 1997, p. 19).[40]

Inter-sectoral Differentiation

Wage differentiation among sectors has increased during the transition (Table 3.10). Yet the inter-branch ranking of wages has been fairly stable over time, with only limited changes in relativities.[41] The most important change has been the relative fall in agricultural wages, from above average levels just prior to independence (109 percent of the pre-transition average in 1991), down to only 68 percent of the average in mid 1995. Somewhat unexpectedly, given output trends, industrial workers have been able to protect their above average position.[42] This may have been due to a compositional effect: if the structure of industrial employment has shifted in favour of relatively better

[40] Valued at the official exchange rate, the average monthly wage was around US$40 in 1995.

[41] The same is true of Russia, for example (Mikhaelev and Bjorksten 1995).

[42] The industrial sector has contracted in each year between 1991 and 1995 and the share of industry in GDP fell from 27 to 19 percent over the period.

paid sub-sectors. Unfortunately available data is fairly aggregated, though it does show that the share of construction has fallen (World Bank 1996b, Table 1.2) suggesting that compositional effects have not driven the rise in the average industrial wage.

Table 3.10: Trends in relative wage by branch, 1992-1995

	1992	1993	1994	1995
industry	124.6	134.5	148.7	146.8
agriculture	101.4	71.5	80.9	68.0
retail, trade	59.8	58.4	65.9	64.1
health	72.9	65.0	53.0	67.0
education	84.9	90.5	63.0	67.0
finance	166.8	170.4	175.1	143.2

SOURCE: Goskomprognostat 1997
NOTE: National average equals 100

The evidence reviewed in Section 3 suggested that the pace of enterprise restructuring has been slow, and the extent of change limited. Employment levels have not generally been adjusted and industrial sector wages remain above average, despite significant declines in industrial output, particularly in manufacturing. Several factors help explain the pattern of aggregate wages in the enterprise sector, including:

(i) Privatisation to "insiders" (existing management and employees), which tends to have been associated with a slow pace of enterprise restructuring in transition economies (World Bank 1996a).

(ii) Extensive directed credits to enterprises at subsidized rates through the financial system and extra-budgetary funds, that continued until late 1994 at least.

(iii) The numerous restrictions on the profile and activities of enterprises. For example, a substantial portion of asset sale proceeds go to the GKI (government privatisation agency), reducing the incentives for firms to re-structure.

Employees in the financial sector continue to be relatively well paid on average. As elsewhere in the FSU, workers in the so-called budget sphere, including health and education, tend to have done relatively badly and dropped further behind. Wages in the sector labelled "trade, catering, material supply and procurement" remain significantly below average, and by mid-1995 had actually slipped to the bottom ranking, behind the traditionally low-paid social sector occupations.

Government wage policy is still largely based on the inherited wage tariff whereby centralised scales are used to set rewards for different jobs according to skill, working conditions and so on (see Chapter 2). Up until late 1994, this was accompanied by periodic decrees of the President mandating that all wages shall rise by, say, 30 percent, requiring a proportionate across-the-board increase in wages.[43]

In the budgetary (state) sector, levels of remuneration are linked to the minimum wage, which is periodically increased to compensate for price inflation.[44] In 1995 the differential between the lowest and highest wage categories was 5.3, and there were 28 budgetary wage categories.

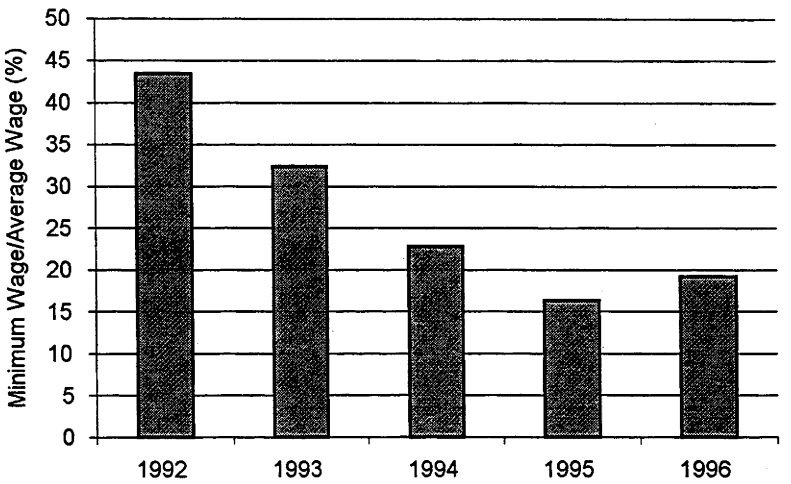
Trends in the level of the minimum wage relative to the average for the economy are suggestive of changes in the wage distribution. In a number of transition economies the minimum wage has been allowed, through non-indexation, to erode to very low real levels; Russia, where the minimum wage dropped from 25 to only 8 percent of the average between 1991 and 1994 being a case in point (Klugman and Braithwaite 1998).

In Uzbekistan, by way of contrast, the minimum wage was about one-third of the average during 1993 and 1994. The relative position of the minimum wage went on to deteriorate in 1995 and 1996, possibly as a result of the stabilisation effort and lagged indexation, so that in March 1996 the

[43] In Russia, by way of contrast, centralised wage setting is limited to the budgetary sector. Infrequent indexation caused substantial erosion in the relative position of budgetary workers (Mikhaelev and Bjorksten, 1995).

[44] In 1995, for example, the minimum wage was raised four times in nominal terms.

Figure 3.3: Minimum relative to the average wage, Uzbekistan, 1992-1996



minimum wage was only about one-sixth of the average. This is shown in Figure 3.3. Trends in the level of the minimum wage raise the issue of inequality.

Earnings Inequality

The general expectation has been that the level of earnings inequality would increase during the transition, and this has indeed been the case, although to varying extents in different countries. The trend can be shown for several Eastern European countries, where the transition to a market economy typically began earlier and has advanced further than in Uzbekistan (Table 3.11). Note however that these estimates are based on official data compiled at the enterprise rather than at the household level, and therefore exclude informal economic activity. Also, agricultural workers are excluded as are, typically, smaller firms (less than 50 employees). The private sector is excluded altogether in Bulgaria and Slovakia. The expected net effect of these

omissions would be to understate the degree of inequality. It is nonetheless apparent that levels of earnings inequality have increased in all countries in the sample since the late 1980s.

Table 3.11: Trends in earnings inequality: selected transition countries, 1987-1993

	1987		1993	
	Decile ratio	Gini coefficient	Decile ratio	Gini coefficient
Bulgaria (1990)	2.57	.213	3.13	.251
Czech Republic	2.60	.198	3.20	.257
Hungary (1988)	3.14	.268	3.67	.315
Poland	2.76	.230	3.03	.257
Romania (1989)	1.95	.156	2.76	.229
Slovakia	2.45	.194	2.54	.197

SOURCE: Rutkowski 1996b, Table 4

Flemming and Micklewright (forthcoming) present evidence for a number of European countries and the Russian Federation revealing that the changes in earnings inequality in the former are dwarfed by what they find for Russia using representative survey data. In Russia, the decile ratio leapt to over 8 in 1992, the first year of the price liberalisation, then doubled again to 15 in 1993, before falling back to 9.5 in 1994 and 10 in 1995. They conclude that the surge in inequality in Russia has been driven by changes at both ends of the earnings distribution. Similarly, Milanovic (1998, Table 4.2) reports that increases in the Gini coefficient for the distribution of earnings amounted to between .04 to .08 Gini point increases in Eastern Europe (ranging from .034 points in Poland between 1987 and 1995, up to .078 in Bulgaria between 1989 and 1995), compared to an increase of .178 in the Gini coefficient for earnings in Russia between 1989 and 1994.

In Uzbekistan, estimates based on official data suggest that increases in earnings inequality has been less dramatic than in the Russian Federation, although the analysis to date has been rather limited. Saidova *et al.* (1996) look at changes in the earnings distribution over the course of 1995, relative to

a base of January 1994, as indicated by the standard deviation and the share of workers with below average wages. Based on official data, they estimate that the standard deviation almost doubled in real terms over the course of the year (rising from 2292 to 4541) and that the share of workers with below average wages fluctuated between 56 and 65 percent. Consistent with the picture presented above, Saidova *et al.* (1996) suggest that employees in the social sectors tend to have wages much lower than the average, while there is a group with wages much higher than the national mean that includes workers in industry, construction and the financial sector. The extent of earnings inequality in Uzbekistan is revisited in PART II, including an evaluation of the role which arrears have played in widening the wage distribution.

3.5 Conclusions

This chapter has reviewed a range of recent economic and institutional changes that have occurred in Uzbekistan. Many of these mirror trends that can be observed for transition countries of the region, including a period of very high inflation, substantial output decline and falls in the real wage. It was shown that the pace of structural reform in Uzbekistan has been deliberately gradual, and extensive state intervention in the economy continued at least until 1997.

Aggregate trends in the levels of employment and unemployment, the real wage and the extent of earnings inequality have been relatively less adverse in Uzbekistan than elsewhere in Central Asia and the FSU. There are a number of features that distinguish the Uzbek experience in the labour market, not least the apparent robustness of total employment levels and the more limited extent of real wage declines. Employment and to a lesser extent output has been maintained in agriculture, for example. The increase in measured inequality does not seem to have matched the trends seen elsewhere in the economies in transition, although given data constraints any

conclusions about Uzbekistan at this point must be tentative.

At the same time, national data suggest significant structural shifts in the composition of employment, in terms of sector as well as type of ownership, even if the pattern of relative wages by branch has been fairly stable. There have also been marked shifts on the supply-side of the labour market, in particular, substantial declines in higher and vocational education for youth, and also among adults undertaking part-time study.

The chapter has pointed to a series of key questions about the determinants of wages and wage outcomes. For example, do the rates of return in Uzbekistan approximate those in other transition countries, despite the slower pace of economic reform? How have the declines in the shares of labour market entrants with higher education and vocational training affected their relative earnings? Are there significant differences in wage outcomes between the private and state sectors? Can the impact of protective employment legislation on designated "disadvantaged" groups, like women with small children, be discerned? These are among the questions subject to investigation in PART II.

Our understanding of these processes has previously been significantly constrained by the nature of official data sources. There is need for circumspection and caution in the interpretation of trends in the labour market as reported in official statistics. This is an important part of the motivation for the micro-analysis in PART II, which investigates the labour market in Uzbekistan in depth using representative survey data collected in 1995. Before proceeding, the next chapter examines theory and evidence about the determinants of earnings in transition.

Chapter 4

Wages in Transition: Theory and Evidence

4.1 Introduction

Chapter 2 suggested that the Soviet labour market was one of the least regulated aspects of the planned regime, and that it possessed several features resembling those in western economies, including the freedom of workers to choose the extent of schooling and among types of jobs. On the other hand, wage setting took place within the context of the Soviet planned economy and had its own idiosyncratic features. Since at least 1991, however, many of the planning controls have been liberalised or eliminated, as shown in Chapter 3. There have also been substantial changes in the macroeconomy that would have affected the demand for labour, as well as a series of changes affecting the supply-side of the labour market.

This chapter sets out the basic model that is applied in the detailed empirical analysis of earnings that comprises the rest of the thesis. The general framework is the theory of equalising differences, which refers to observed wage differentials required to equalise the total monetary and nonmonetary advantages or disadvantages among work activities and among workers themselves (Rosen 1986). Human capital theory has developed within this frame-

work, focussing on the idea that occupations requiring greater expenditure of time and money on education and training pay higher wages to compensate both for the direct expense and for the foregone earnings. Observed earnings differentials between different levels of schooling provide a basis for imputing rates of return to education. Human capital theory has been used with widespread success to explain individual earnings outcomes in a range of Western economies.

This chapter is structured as follows. Section 4.2 presents the general theoretical framework of equalising differences. Section 4.3 sets out human capital theory and the functional relationship between earnings and human capital developed by Mincer (1974). The subsequent sub-sections critically examine some of the underlying assumptions of human capital theory that pose potential problems in empirical analysis. Section 4.4 reviews recent empirical evidence on earnings functions, with particular reference to the economies in transition in Europe and Asia, drawing attention to issues of methodology as well as the actual results.

4.2 The Theory of Equalising Differences

The theory of equalising or compensating differences has been described as "*the* fundamental (long-run) market equilibrium construct in labour economics" (Rosen 1986, p. 640). Its empirical importance lies in its implications for the determinants of wages in the economy (*ibid.*). It is a framework which can be used to analyse the supply of workers to jobs that are differentiated by various attributes – skills, location, working environments, and other job requirements. This section reviews the theory of equalising differences,[1] before the next section goes on to consider its most popular form in empirical labour economics, the application of human capital theory.

In a standard market model, with identical economic agents, the identi-

[1]The discussion of the theory of equalising differences draws heavily on Rosen (1986).

ties of the traders is immaterial to the final outcomes. By way of contrast, efficient allocation of labour entails matching and sorting among specific workers and firms. A basic difference between the theory of equalising differences and most market models is that the identity and characteristics of the traders is a key aspect. The labour market transaction is viewed as a "tied" sale in which the worker simultaneously sells (rents) her labour services and "buys" the attributes of the job. Job attributes vary from job to job, so that the worker can choose her preferred type of job and employer. Similarly, worker characteristics (skill, experience etc.) differ among workers. The actual wage paid can therefore be seen as the sum of two conceptually distinct transactions: one for labour services and worker characteristics, and another for job attributes. This set of transactions requires sorting and matching of individuals and jobs.

Given perfect information on both sides of the market, the set of wages and the measurable attributes and characteristics associated with all such assignments are the equalising differences observed in the market. "Such associations underlie virtually all empirical estimates of wage functions estimated in actual data and have become a focal point in labor economics" (Rosen 1986, p. 643). At the same time, the existence of job search and information costs mean that this theory cannot explain all wage variation in a specific data set, even in the absence of measurement error. In practice, imperfect information as well as omitted factors sustain wage variability among measurably "identical" individuals and jobs. In other words, the explanatory value (coefficient of variation or R^2; see Appendix 2) in the typical wage regression is not large.

A simple binary-choice model of equalising differences and its empirical consequences can be illustrated by a case where different types of jobs offer two different levels of some disamenity. It is assumed that this disamenity (e.g. dirtiness) of the job can be objectively measured. The compensating variation in the wage is the additional money needed to make the worker

indifferent between the two types of job. Rosen (1986, pp. 645-650) sets out a formal presentation of preferences, opportunities and worker choices, which need not be reproduced here. A straightforward generalisation extends the binary choice model to the more realistic case of multinomial choice where job attributes exhibit more variation.

A simple presentation is as follows. In equilibrium, there is an equalisation of individual utilities across the economy. An individual's net utility, U, is a function of her gross wage or monetary compensation (w), net of any pecuniary or non-pecuniary costs (C). Examples of pecuniary costs include educational expenses and the cost of travelling to work; examples of non-pecuniary costs include health related risks or unpleasantness associated with the job. That is,

$$U = U(w - C)$$

Clearly the assumption of equalisation of individual utilities is a strong one. It relies on individuals having the same opportunity sets, in particular the same potential wage rates (e.g. ability). Indeed this assumption implies that there is no inequality of earnings, once the differing attributes of jobs are accounted for.

In the context of the equalising differences model, there is a range of factors that would be expected to affect earnings outcomes. A number of these have already been reviewed in Chapter 2 in considering the factors that influenced Soviet planners. In international studies, the measurable job attributes on which compensating wage differentials have been shown to arise empirically include onerous or dangerous working conditions, inter-regional differences associated with variations in climate, urban crowding, and the skills necessary to perform different types of work (see Rosen 1986 and references cited therein).

The assumption of perfect information that underlies the theory of equalising differences has already been noted. It is also assumed individuals are mobile. Labour markets are imperfect if, for example, individuals are unable

to move in response to job opportunities due to administrative regulations or housing shortages, in which case differences in earnings need not be equalised.

Of course the underlying assumptions about market perfection do not generally apply, at least in their strict form, to established market economies. This has not prevented the successful empirical application of earnings functions around the world. The question is whether these assumptions are so remote from the economic conditions that prevail in the transition economies, and in particular Uzbekistan, as to render the theory of equalising differences irrelevant. The review of the Soviet period indicated that the theory was relevant to explanations of central planners's decisions about wage differentiation. For the transition period, this is an empirical question that is addressed in the chapters that follow.

The next section focuses on individual worker skills and the human capital theory of earnings determination.

4.3 The Human Capital Earnings Function

> "As a statistical model, the human capital earnings function developed by Mincer has provided the basis for a vast body of empirical research...(which) reveals some striking regularities concerning the structure of wage differentials which hold over periods of time and across societies which differ dramatically in technology, patterns of demand, and forms of economic and social organisation"
>
> R.J. Willis (1986), p. 540

The most important application of earnings functions has been to study the effects of the investments in education and post-school training on the level, pattern and distribution of earnings (Willis 1986, p. 235). This has followed the pioneering work of Becker (1964), Becker and Chiswick (1966) and Mincer (1974), although the major outline of human capital theory is

found in the *Wealth of Nations* where Adam Smith notes that occupations requiring greater time and expenditure on training must pay larger wages to compensate for that (see Rosen 1986, p. 676). This section considers the conceptual underpinnings of human capital theory, and examines the major criticisms that are relevant to studies of economies in transition.

Human capital theory explains why earnings in occupations requiring large entry costs (more education/ skill) are higher than in those where entry is easier. Earnings differences must compensate for educational cost and training differences among occupations.

The most widely assumed relationship between earnings and human capital is quite simple. The logarithm of earnings is a linear function of years of schooling and a quadratic function of work experience. This method involves using ordinary least squares (OLS) procedures to fit individual level cross-sectional survey data to a semi-logarithmic function of the following form:

$$w_i = \alpha + bS_i + cT_i + dT_i^2 + u_i \tag{4.1}$$

where w_i represents the natural logarithm of labour earnings for individual i, S_i represents years of schooling for individual i, T_i represents years of work experience for individual i, and u_i is an error term which satisfies the full set of assumptions necessary for the use of OLS. The conventional functional form assumes a quadratic relationship between the natural logarithm of earnings and labour force experience.[2] When schooling is expressed as a continuous cardinal variable, the coefficient on the years of schooling variable can be interpreted as the percentage increase in annual labour earnings from an extra year of education.[3]

Labour market experience is sometimes directly observed in the sample data. This was the case, for example, with Ofer and Vinokur's (1992) study of Russian emigrěs. More often, however, the length of work experience has

[2]The validity of this assumption is investigated fully in Chapter 7 below.

[3]Note that direct or indirect monetary costs of education are neglected.

to be assumed. The convention, following Mincer (1974), has been to assume that experience equals *potential* experience, which is defined as the age of individual minus the years of schooling minus school entry age. In the case of Uzbekistan, this would imply that

$$T = age - s - 7 \tag{4.2}$$

where *age* is the age of the individual in years and the normal school entry age is seven. This measure of potential experience is often known as Mincerian experience.

The semi-logarithmic form of the earnings function arises due to the definition of the present value of schooling, and can be derived as follows, by drawing on Freeman (1986). The basic idea is that education represents an investment of current time (and money) for future payoffs. In a simplified context, an individual, i, faces the option of either working full-time or going to school full-time and investing in her human capital. Her earnings at time t are proportional to the amount of human capital already accumulated:

$$\widetilde{w}_i(t) = \widetilde{w}.S_i(t) \tag{4.3}$$

where $w_i(t)$ is earnings,$\widetilde{w}$ is the rental price of human capital and $S_i(t)$ is the amount of human capital. If, starting at time t, the individual spends (t_e) years in full-time education, the amount of human capital will increase according to an education production function:

$$S(t + t_e) = f(t_e) + (1 - \sigma)^{t_e} S(t) \tag{4.4}$$

where f is the production function translating time in school (t_e) into additional units of human capital and σ is the depreciation rate. In this framework, it is clear that the cost of schooling is $\widetilde{w}S_i$, that is, the forgone earnings plus any direct costs associated with education. The return to schooling depends on $\widetilde{w}$, which may change over time (say due to labour market conditions), $f(t_e)$ and σ. Demand for education would be higher the longer

the future working life, the more productive is time spent in education and the smaller the discount rate. The effect of depreciation of human capital has an ambiguous effect on demand for education (Freeman 1986, p. 368). The underlying intuition is that depreciation on the one hand necessitates retraining, but on the other hand, makes education less attractive because individuals would know that they need to undergo retraining or need to be "replaced" in the future.

As an example of how the semi-log earnings function can be derived in this framework, consider the example of an individual with a university degree. The rate of return to investment in an university degree can be calculated as that number r that satisfies the following equation:

$$\int_0^n W_t e^{-rt} dt = \int_0^s (W_{et} - D) e^{-rt} dt + \int_s^{n_s} W_{st} e^{-rt} dt \qquad (4.5)$$

where W_t is the wage of individuals, at date t, without a university degree; n is the retirement age of those without university education minus year of leaving school (i.e. number of years that such individuals work); W_{st} is the wage, at date t, of individuals with a degree; and n_s the number of years that they devote to both work and education; W_{et} represents wages for individuals during the period of university; D is the direct (flow) cost of university and s the duration (in years) of the university degree.

The term on the left hand side of equation 4.5 is the present value of earnings for those who do not go on to university, discounted at the rate r. The first term on the right hand side measures earnings during university net of direct costs. The second term on the right hand side is the value of earnings for individuals with education after they graduate, discounted back to time $t = 0$ (i.e., the beginning of the degree). The left and right hand sides of the equation are set equal to obtain the rate of return because the internal rate of return (r) is that which makes the net benefits of university education equal to zero.

It is then assumed (i) that annual earnings do not change with age/ experience; (ii) that university education is full-time (so that $W_{et} = 0$) and

net earnings at university are zero (i.e. the first term on RHS of equation (4.5) equals zero); and (iii) that workers with degrees retire s years later than those without degrees. With these assumptions, equation (4.5) becomes:

$$\int_0^n We^{-rt} = \int_s^{n+s} W_s e^{-rt}$$

or

$$\frac{W_s}{W} = \frac{e^{-rn} - 1}{e^{-r(n+s)} - e^{-rs}} \text{ assuming } D = 0$$

Taking logs, we obtain:

$$\log w_s = \alpha \log w + rs + \text{other terms} \tag{4.6}$$

This last equation is the widely used log earnings function that was set out as equation (4.1).

In practice, earnings functions are usually estimated in a more generalised form to control for the factors that the theory of equalising differences would suggest to be significant determinants of earnings. The basic functional form – with only human capital variables on the right hand side - can be augmented with a range of independent variables expected to impact upon individual earnings. These are the "other terms" included in equation (4.6). The variables included might extend to, for example, region of residence, occupation and industry.

Equalising differences for locational amenities, for example, has long been an area of empirical inquiry in labour economics (Rosen 1986, p. 673). A number of studies have sought to explain the persistent differences in wages across the United State among workers with the same measured productivity (education, experience and so on) – in particular, the lower level of earnings in the South.[4] It is clear intuitively that differences in locational amenities must

[4]For example, some have argued that the observed wage premium associated with larger cities is compensation for the impersonality and difficulties associated with metropolitan living (Nordhaus and Tobin 1972).

be associated with differences in prices to attract people to less attractive areas – otherwise mobile individuals would simply move.[5]

As noted at the outset, this empirical specification of human capital theory has enjoyed very widespread popularity in the study of determinants of individual wages. Indeed Griliches (1977) described the earnings functions thus specified as "the most stable econometric relationship in the area of applied economics". Of course that does not mean that the model is entirely uncontroversial.

4.4 Criticisms of the Human Capital Model

There are a number of debates that surround human capital earnings functions, a full review of which is beyond the scope of this study (see, for example, Behrman (forthcoming) and Dougherty and Jimenez 1991). The debates which are directly relevant to the application of the model to Uzbekistan obviously do warrant some attention, however. These include questions of functional form and the use of potential experience measure to proxy for actual labour market experience of women. In some cases, the literature suggests that a new consensus is emerging whereas other issues remain subject to debate. The rest of this section introduces some of the major methodological and theoretical questions that are subject to fuller empirical investigation in the chapters that follow.

4.4.1 Linear Specification of Human Capital Variables

In equation (4.1) the relation between education and earnings in the conventional basic model is highly constrained in the sense that an additional year of education, whether it be the pentultimate year of secondary school (Year 11, to take an Australian example), or the successful completion of a PhD,

[5]This could be true even in the absence of free mobility - for example, its relevance can be seen the system of regional coefficients that were used to raise wages in otherwise unattractive parts of the USSR (see Chapter 2).

has the same marginal effect on an individual's earnings. This is unlikely and unduly restricts the regression (Greene 1994, p. 234). In other words, in the conventional form of the earnings function presented in equation (4.1), the coefficients necessarily yield an average wage increase associated with an additional year of education. There is also evidence that the conventional relationship between experience and earnings in the basic human capital model of earnings may not be sufficiently flexible, even with the inclusion of a quadratic term to allow for declining marginal increments to wages.

Fortunately there are ways to alleviate these constraints that are well-established in the literature, including the use of dummy variables for the completion and non-completion of different levels of education and the inclusion of interaction terms. Another approach of growing importance is the use of non-parametric specifications of experience terms. Each of these modifications are introduced in this section, and explored more fully in the chapters that follow.

The present data set, with information on complete and incomplete education at each level, allows the basic earnings function model to be extended to estimate private gross returns to different educational levels. The continuous years of schooling variable (S_i) in equation (4.1) can be replaced by a set of mutually exclusive discrete educational variables. In Uzbekistan, individuals in the sample reported one of nine educational categories as their highest educational attainment.[6] These categories consist of the following:

1. individuals with a primary education or less;
2. incomplete secondary education;
3. complete secondary;
4. incomplete vocational (PTU) education;
5. complete vocational;

[6]The small number reporting "other" education were deemed to be missing.

6. incomplete teknikum (SSUZ) or college;

7. complete teknikum (SSUZ) or college;

8. with incomplete higher and, finally,

9. those with a university qualification.

In the regression analysis, the education categories are used to construct a set of discrete dummy (or binary) variables that adopt a value of one if the individual is in a given category and zero otherwise. These nine categories can be denoted

$$Z_j\,,\, j = 1, ...9$$

We can then rewrite equation (4.1) as

$$w_i = \alpha + \sum_{j=2}^{9} \beta_j Z_j + \psi T_i + \delta T_i^2 + u_i \tag{4.7}$$

where u_i is an error term which satisfies the full set of assumptions for the use of OLS. The lowest education category, that of primary or less, is omitted from the specification. Note that the estimated coefficients on the set of binary educational variables do not represent the estimated returns to the qualification in question. Appendix 1 to this chapter shows how private gross rates of return to the different qualifications can be derived from information about the coefficients and years of schooling.

Even when different levels of education are allowed for rather than a linear years of schooling variable, as in equation (4.1), once workers enter employment the age-earnings profiles for each educational attainment group are parallel to one another. This is a highly restrictive form to impose on the data, even if it has tended to be standard in the literature. It means that the regression results stand counter to the stylised facts that the age-earnings profiles of those with the lowest levels of schooling tend to rise relatively slowly after the first few years of work experience, whereas individuals with

higher levels of education tend to enjoy increasing earnings throughout their working lives (Psacharopoulos and Layard 1979; Dourgherty and Jimenez 1991). The latter has been attributed to the greater learning opportunities and occupational mobility afforded by higher levels of education.[7]

A more flexible specification of the earnings function is enabled through the inclusion of interaction terms. Whereas the model specification without interaction terms is constrained to measure an *average* effect of experience across individuals with different levels of education, the inclusion of interaction terms means that this effect may vary with education. We can thus return to the simplest education definition (i.e. years of schooling) to illustrate,

$$w_i = \alpha + \beta S_i + \psi T_i + \delta T_i^2 + \varepsilon S_i T_i + \phi S_i T_i^2 + u_i \tag{4.8}$$

where $\varepsilon S_i T_i$ and $\phi S_i T_i^2$ admit an interaction between the number of years of schooling (S) and experience (T). When dummy variables are used, each level of schooling can be interacted with other independent variables thought to be relevant.[8]

It has been argued that the conventional quadratic term in labour force experience is also highly restrictive, and possibly misleading (Murphy and Welch 1990; Borland and Suen 1994; Will 1998). It suggests too slow an increase in the early part of an individual's career and too rapid a slowdown in the latter part. In Chapter 7 alternative specifications of experience are tested, leading to a different preferred functional form.

In sum, the conventional form of the basic earnings function is highly restrictive in a number of respects, although methods have been developed to overcome some of the drawbacks. The refinements in method are tested and utilised in PART II of the thesis.

[7] See Alba-Ramirez and Segundo (1995) for the case of Spain, for example.

[8] When experience-education effects are introduced into the regression model, the earnings functions cease to be isomorphic and it is no longer possible to interpret the coefficient on the schooling variable as the rate of return (Dourgherty and Jimenez, 1991).

4.4.2 Measurement of Independent Variables

Accurate measurement of the variables of interest is always a potential problem in econometric analysis. Deaton (1997, p. 99) refers to measurement error in survey data as a "fact of life". In the present context, the measurement of the experience term raises special concerns. The conventional specification of experience explicitly assumes an uninterrupted working life on the part of the individual. This has been the subject of critical debate.[9] Criticism was prompted in part by the increasing frequency and prevalence of unemployment in Western industrial countries that has rendered this assumption less tenable since the mid-1970s (Main and Elias 1987).

Involuntary unemployment is probably less of an issue for the measurement of work experience in Uzbekistan, at least in 1995 (although there is evidence of surplus labour during the Soviet period and the transition, as discussed in Chapters 2 and 3). More problematic, however, is that the use of potential experience for women is compromised by high fertility rates and the likelihood of career interruptions due to child-bearing and family responsibilities.[10] If this is the case, the use of potential experience will lead to inconsistent regression estimates, that are biased downward since potential experience is greater than actual experience.

Direct evidence on the extent of measurement error is of course rare. But in cases where comparison of Mincerian estimates and actual experience has been possible, like the analysis carried out on Australian data by Kidd and Shannon (1997), the differences have been demonstrated to be substantial. This problem is investigated for the case of Uzbekistan in Chapter 6, and methods are adopted to counter its effects.

Another potential measurement problem relates to labour compensation and the role of non-pecuniary benefits. In Uzbekistan, as in other parts of

[9] See, for example, Psacharopoulos and Layard (1979); and Rummery (1992) for an application to Australia

[10] For example, the likelihood of extended career breaks is high in the former Soviet Union given the right to three years maternity leave.

the former Soviet Union, employers provided a range of services that were part of total remuneration. These included access to free or highly subsidised child care, for example (see Klugman *et al.* 1997). The amount of *monetary* earnings therefore would fail to reflect the total benefits that attach to a given job. The inclusion of "fringe benefits" is, of course, an issue in Western countries also (see Fleming and Micklewright forthcoming, p. 29). The present data set includes a number of direct questions on non-monetary benefits, and asks the respondents to value such services. However the total net earnings figure may be subject to under-reporting (see Chapter 5, Section 3).

Finally with respect to the dependent variable it is noted that data limitations mean that the monthly wage specifications cannot be corrected for potential endogeneity of hours. Nonetheless, the problem may be minimal insofar as the focus is on employees in their main job, and official administrative data suggest that only 2 percent of the employed workforce worked less than full-time (see also Chapter 6). The presence of random measurement error in the dependent variable does not bias the regression coefficients, because it simply adds to the variance of the equation as a whole (Deaton 1997, p. 99). However such errors do reduce the precision with which the parameters are estimated.

4.4.3 Omitted Variables

A common problem in the specification of regression models is the omission of relevant variables. The use of OLS assumes that the systematic or deterministic part of the equation can be accurately specified. If, however, systematic components of the relationship are contained in the error terms, the estimated coefficients are subject to bias. Not even the direction of the bias caused by omission can be deduced if there are multiple regression coefficients (Greene 1994, p. 246).

The problem of omitted variables frequently affects empirical analysis of

earnings because information is lacking on certain variables that one would expect to influence earnings outcomes. This could affect our interpretation of the coefficients on the education and experience variables.

For example, most of the existing studies of the impact of schooling on wages/ productivity do not control well, if at all, for the behavioural decisions that determine who goes to what type of school, for how long, and with what degree of success (Behrman, forthcoming). Freeman (1986) refers to the role of the family in education as "perhaps the most important element missing from the model" (p. 367). One might expect that individuals with higher investments in schooling would be relatively more likely to have higher levels of ability and motivation and come from better-off family backgrounds. This pattern seems to have been true in the formerly planned economies in spite of the ostensibly egalitarian objectives of the socialist regimes (see Shavit and Blossfeld 1993; Coudouel and Fajth forthcoming). There is also a growing literature on the endogeneity of schooling choice and the role of ability in determining earnings and schooling (see, for example, Blackburn and Neumark 1993; Card 1995).

The extent to which the omission of such controls as family background, ability and school quality affects the estimated effect on schooling attainment is not however clear (Behrman forthcoming, p. 39).[11] The present data set does not allow these issues to be investigated here, except to the extent that regional controls reflect variations in school quality.

The interpretation of returns to experience is also affected by omitted variables. Experience is generally taken to be a proxy for time spent in on-the-job training. But even if experience is correctly measured as time in the labour force, empirical tests of human capital theory do not usually

[11] Behrman (1990) claimed that the studies of developing countries that do incorporate controls for such factors as unobserved family background suggest that the "standard estimates" (without controls) may overstate the impact of schooling attainment by as much as 40 to 100 percent. However as Behrman (forthcoming) notes, more recent work in the US suggests that the standard studies may not have overestimated the effects to this extent.

distinguish between general and specific training. General training is, by definition, completely transferable among firms whereas firm-specific training is not. Theory suggests that the individual worker will bear the costs of the former (in terms of lower current wages), while the costs of specific training will tend to be shared between the worker and employer.[12] The inclusion of tenure allows a segregation of estimates of returns to general and specific human capital (Chapman and Tan 1980). Unfortunately such information is not available in the present case, so that experience, as measured, would tend to confound firm-specific training and general experience.[13] Further caveats with respect to the interpretation of coefficients on the experience variable are addressed in the next section.

4.4.4 Experience and Productivity

It has been widely observed that earnings tend to increase with experience in the labour market. Human capital theory posits that this occurs because a worker's productivity is augmented by on-the-job training. However it is very difficult to empirically test this proposition in the absence of accurate measures of each individual worker's productivity.[14] One suggestion is that upward earnings profiles, which reward individual tenure (experience) with the firm, raise worker productivity because workers are motivated to work hard in order to remain with the firm until retirement and thereby obtain the benefits associated with longer tenure (Lazear 1979).

There are other potential explanations of the relationship between experience and earnings, such as seniority provisions, that are independent of productivity growth. Some of the reasons to be cautious in interpreting the

[12] See Blau and Ferber (1992), pp. 164-166.

[13] In any case, the effect of tenure on earnings remains a controversial point, with some studies supporting the human capital explanation and others refuting it. Studies supporting the human capital/ training hypothesis include Topel (1991) and Brown (1989). Negative studies include Medoff and Abraham (1980).

[14] Studies which support the training-human capital hypothesis include Topel (1991) and Brown (1989).

observed correlation between experience and earnings in terms of increases in individual worker productivity can be highlighted as follows.

First, there is some direct evidence, using individual performance ratings as a proxy for individual productivity, that human capital derived from on-the-job training cannot explain a substantial part of the observed return to labour market experience (Medoff and Abraham 1980).[15]

Second, technical change would be expected to affect the rate of growth of individual worker productivity, and would vary by sector and also over time. There is evidence for Australia that formal training (general and specific) has a much larger effect on wages in industries experiencing rapid rates of technological change (Chapman and Tan 1992). On the other hand it is possible that during periods of rapid technological change, the skills that workers had acquired at "school" (prior to labour force entry) may become obsolete, a tendency which would be more likely with longer time in the labour force and in more technical fields, like engineering (Medoff and Abraham 1980, p. 731).

Third, societal norms about "just" relative compensation may require a positive association between experience and earnings, regardless of the individual's level of productivity. Such norms would tend to be economy-specific. However it should be noted that, in theory at least, the Soviet system of wage determination did not take seniority into account: see Chapter 2.3.

The foregoing calls for caution in interpretation of the returns to the experience variable in earnings regressions. These alternative possibilities are borne in mind in the interpretation of the estimated returns to experience in PART II.

[15]Specifically, using the personnel records of two major U.S. corporations, Medoff and Abraham (1980) find that greater experience moves white male employees toward the upper part of the relevant (grade) earnings distribution, but it does not move them toward the upper tail of the relevant performance distribution.

4.4.5 Education: Productivity versus Signalling

The conventional view of the positive correlation between education and earnings, based on human capital theory, is that the latter augments earnings through increasing the individual's productivity. But one can think of other explanations to account for the positive correlation. As noted in Chapter 2, higher education may be associated with higher earnings because of the signal imparted to the employer about the capacity of the individual and/or because personal connections are acquired at university that lead to better jobs.

Economic theories have been developed to support the signalling interpretation: that is, that schooling serves to identify those individuals who are more productive, without the education process itself necessarily adding to their productivity (Wolpin 1977). Spence (1973) developed the theoretical basis of the signalling model, on the assumptions that there is imperfect information about the individual's actual productivity and that it is prohibitively costly to identify each individual's productivity within a workplace. Readily observed information, such as a university degree, is used as a signal by employers to label individuals as more productive, who are then able to obtain a higher wage. It was suggested in Chapter 2 that in the Soviet system, a university degree could be seen to signal an individual's capacity to (i) memorise vast amounts of detailed information in a disciplined fashion; and (ii) work in close-knit groups (the study collective). Both were valued in the Soviet economy, the latter because the administrative command system depended very much on the acquisition and development of personal relationships.

The empirical predictions of the human capital and screening hypotheses both involve a positive relation between education and earnings, and for this reason it is difficult to disentangle the operation of the hypotheses in practice. That is, if one observes that individuals with university education receive higher wages, that finding *per se* is consistent with both the human

capital and signalling theories of wage determination.[16] Various tests have been proposed for distinguishing between the impacts of the human capital and screening impacts of education (see, e.g. Miller and Volker 1984; Wolpin 1977), but the results of these tests have been inconclusive.[17]

One way to disentangle the data on education and earnings is to test for the existence of so-called "sheepskin effects". If education was valued by employers for its effect in enhancing productivity, one would not expect that the award of a degree or diploma after, say, three years of tertiary education to have a dramatic effect on earnings relative to the effect of two years of university. If the receipt of a degree does have such an effect, this is known as a sheepskin effect.[18] Sheepskin effects have been fairly widely documented in a range of country circumstances, from Pakistan (Shabbir 1991) to the USA (Hungerford and Solon 1987). The econometric techniques which have been developed to investigate whether or not sheepskin effects exist are employed in Chapter 8.

Signalling and human capital theories share the common framework of a competitive labour market where employers must reward workers according to their productivity, even if information constraints are an explicit el-

[16] An indirect test of the signalling hypothesis is to compare the earnings of employees and the self employed, who in general have similar levels of education (Wolpin 1977). However accurate measurement of net earnings of the self-employed is difficult – e.g. distinguishing between returns to capital and returns to labour. In addition, the sample investigated by Wolpin is arguably a rather special one: World War II veterans. See also Riley (1979), who partitions the dataset into sub-sets with high and low mean education, and high and low earnings, and concludes that the screening hypothesis is a more complete explanation of observed behaviour than human capital theory.

[17] For example, Katz and Ziderman (1990), using Israeli data found strong screening effects, whereas de Oliveria *et al* (1987) for the US did not, and Boissiere *et al* (1985) found support for human capital theory in Kenya. Recent papers have explored the causal link between education and earnings using natural experiments: e.g. Ashenfelter and Krueger (1992).

[18] Where a continuous education variables (e.g. years of schooling) is used in an earnings model, sheepskin effects are taken to exist where there are statistically significant discontinuities in the returns to education in the year of completion. It is thus called because employers are paying for a mere "sheepskin" – that is, literally for the material used for medieval diplomas.

ement in the former model. By way of contrast, if licences and personal connections determine wage outcomes, education is not important either as a productivity-enhancing process nor as a signal of individual capacity. The value of education is solely as a route to developing personal contacts to be relied upon in later working life. Knowing people would matter if markets are not competitive, so that employers can make decisions about employment and wages that are not related to individual productivity. Again, however, it is difficult to disentangle this explanation of the correlation between education and earnings empirically. It would imply a segmented labour market - with one part engaging individuals with higher education and higher earnings - and little mobility between the segments.

4.5 A Review of the Evidence

Earnings functions based on human capital theory have been applied in many industrial and developing countries (for surveys, see Willis 1986; Behrman 1990; Behrman forthcoming). Empirical studies of earnings determination in the context of the formerly planned economies are, however, relatively scarce. The basic constraint has been lack of access to representative micro data, although this is being steadily overcome as governments in the region undertake the reform of household and labour force surveys (see Falkingham and Micklewright 1997; Milanovic 1998). In this section recent findings for industrial and developing countries about returns to human capital are highlighted before turning to review in greater detail the evidence available for transition countries. Attention is drawn to the methodologies that have been employed, as well as to the results that have emerged.

4.5.1 Evidence from Elsewhere in the World

By way of introduction, a table from a widely cited survey of returns to education is reproduced (Psacharapoulos 1994, Table 1). Although this survey

does not include a category for the transition economies, the general picture provides useful background. The regional averages for coefficients for years of schoolomh range from about 13 percent in Sub-Saharan Africa and 12 percent in Latin America, down to about 7 percent in the OECD (Table 4.1).

Table 4.1: Schooling coefficients, regional averages

Region	Schooling (years)	coefficient (percent)
Sub-Saharan Africa	5.9	13.4
Asia	8.4	9.6
Middle East/ North Africa	8.5	8.2
Latin America	7.9	12.4
OECD	10.9	6.8
World	8.4	10.1

SOURCE: Psacharapoulos 1994, Table 1

The associated "stylised facts" include: (i) rates of return to schooling in developing countries are high, and do not decline very rapidly with the level of development; and (ii) rates of return are highest for primary schooling. The apparent inverse relationship between rates of return and the level of economic development is explained by the generally more limited access to education and therefore lower supply of skilled individuals in poorer countries (Psacharapoulos 1985).

Rates of return to education need not be stable over time, even in economic conditions that are far more stable than has been experienced by transition countries in recent years. An important stylised fact for the US, for example, is that over the 1980s there were sharp increases in the return to schooling estimated with conventional wage regressions. A number of explanations have been put forward, including changes in the relative demand for workers at different educational levels resulting from shifts in trade patterns and/or changes in the structure of the economy, as well as changes in

the relationship between ability and schooling outcomes (see Blackburn and Neumark 1993; Katz 1998).

The most recent estimates for market economies in the World Bank's lower-middle income per capita range, the category into which most socialist economies including Uzbekistan would fall, recorded education coefficients of over 11 percent (Psacharapoulos 1994). But given the widespread access to education and relatively larger supply of skilled individuals in the republic (Chapter 2; Falkingham *et al* 1997) the rates of return to education would be expected to approximate the lower levels that tend to be found in the higher income industrial economies. The fact that Uzbekistan's economy is less developed than established market countries with similar levels of education suggests the risk of a relative over-supply of skilled labour, which would also tend to lower the rate of return to schooling.

Evidence is also available with respect to returns to experience, derived from many different data sets but using comparable methodological approaches. Typically direct evidence about actual time in employment is missing, and a Mincerian proxy is used. Estimates of the returns to experience need to be presented at specific numbers of years of experience, because of the effect of the quadratic term which means that earnings rise with experience at a diminishing rate.

Table 4.2 presents estimates of the rate at which wages rise with additional years of labour market experience, expressed as an annual percentage increase. This suggests a range of effects of experience on wages even among the OECD countries, with Australia and the United Kingdom at the bottom end, and Japan at the top. The relatively flat experience-earnings profiles in Australia have been linked to (i) narrowly defined job positions which tend to discourage both multi-skilling and worker identification with employer training needs; and (ii) binding minimum wages which bias short term labour utilisation in favour of production rather than training (Borland, Chapman and Rimmer 1992, p. 112). Empirical evidence from the US and Japan is

Table 4.2: Effect of an additional year of experience, selected countries

Country	Number of years of experience	
	10	20
Australia	2.27	1.36
West Germany	2.72	1.77
US	3.39	2.37
UK	2.11	1.08
Israel	2.50	1.33
Japan	3.77	2.74

SOURCE: Borland *et al.* (1992).

also suggestive of a direct link between technological change and training, which would show up in returns to experience (Lillard and Tan 1986).

The level and nature of economic development in Uzbekistan that was described in Chapters 2 and 3, in particular the relatively low per capita income, rural predominance and young population structure, suggests that findings from developing countries are most relevant. At the same time, however, rates of literacy and general levels of schooling are significantly higher in the FSU than in developing countries of comparable per capita income (UNICEF 1998; Cusan and Motivans forthcoming). The institutional framework and the nature of the education system implies that occupations would tend to be defined narrowly, which might be expected to flatten the experience-earnings profile.

4.5.2 Evidence from Transition Countries

Changes in the structure of earnings over the course of transition from a command economy is a subject that has generated considerable recent interest. Studies are available for several Eastern European countries, including the Czech and Slovak Republics (Flanagan 1994 1998; Vecernik 1995 and Chase 1997), East Germany (Bird *et al.* 1994; Krueger and Pichke 1992), Poland (Rutkowski 1996a) and Slovenia (Orazem and Vodopivec 1995 1997) and a

number of countries covered in Commander and Corricelli (1995). The only detailed country study of returns to human capital in the former Soviet Union is limited to Russia (Newell and Reilly (1996) which focussed on the gender wage gap). A recent paper by Newell and Reilly (forthcoming) computes rates of return for nine transition countries (including Uzbekistan).

A general motivation of many of the studies has been to test whether rates of return to educational qualifications have risen during the transition (Svenjar forthcoming). The expectation was that economic liberalisation and structural change would increase returns to higher education from formerly repressed levels: according to the World Bank (1996a), "Wages are starting to assist reform by creating incentives to work hard and acquire skills" (p. 73). The story that emerges from the Eastern European studies is not uniform across countries, however, so it is worth comparing the findings and providing some detail on the methodology and data sources that were used in each case. Unfortunately the functional form adopted in many of the studies has been quite restrictive, which might leave the results open to question.

Methodology

The methodological aspects of the existing studies of wages in transition warrant review, since the findings are at least potentially sensitive to the details of those studies. The nature of the data sets also vary, some are based on household data, while others use administrative sources (e.g. collected by social insurance agencies), or firm-based surveys.

Table 4.3 summarises some key aspects of model specification and sampling issues for the existing studies. It shows that the studies to date share a number of common features in terms of measurement of variables and model specification, viz. (i) the use of age or Mincerian potential experience; and (ii) a quadratic term on experience. The studies based on official sources like administrative records typically exclude private sector employees.

The use of Mincerian potential experience is likely to lead to overesti-

Table 4.3: Methodology of selected studies of wages in transition

Study (author)	*Year*	*Specification*		*Source*
		Education	*Experience*	
Poland (Rutkowski 1996a)	1987 & 1993	linear	Mincerian + quadratic	individual
Czech Republic (Flanagan 1994)	1992	dummies	Mincerian + quadratic	grouped
(Flanagan 1998)	1988 & 1996	dummies	Mincerian + quadratic	individual
Czech and Slovakia (Chase 1997)	1984-1993	linear	Mincerian + quadratic	individual
Slovenia (Orazem & Vodopevic 1997)	1987 & 1991	dummies	Mincerian + quadratic	admin.
Russia (Newell and Reilly 1996)	1992	dummies	age + quadratic	individual

NOTES: Further details on each study are provided in the text.

mates of the number of years of experience, especially for women, and correspondingly low estimates of the returns to experience (Rummery 1992). This problem has not been directly addressed by any of the studies of wages in transition economies to date. Rather, the studies tend to assume that close to full employment during the period of central planning makes this issue less of a concern for the economies of the region.

While the use of potential experience (and associated assumption of continuous work) may be valid for men, this is untenable for women in Uzbekistan. First, while labour force participation rates for women rose earlier in the region than in a number of western countries, the levels never came close to being universal, especially in Soviet Central Asia (see McAuley 1981). Second, women were entitled to leaves and concessions in the event of childbirth that were generous by Western standards (see McAuley 1981; Katz 1994).[19]

[19]The motivation for these concessions can be traced to three factors: first, in the European parts of the region in particular, low birth rates were a source of concern to government, so that these policies were explicitly pro-natalist; second, the benefits for

Indeed, formal rates of participation were high partly because of the extensive concessions granted to women with children which allowed them to take up to three years off work after birth. While she was officially considered to be working for the purpose of pension and other entitlements,[20] one might well expect that she would not be gaining what employers would consider to be productivity-enhancing experience. An examination of the results of the transition studies (Table 4.4), shows that the coefficient on experience for women is generally significantly lower than that for men, adding weight to the suspicion that experience has been mismeasured. This problem is addressed in Chapter 6 and Chapter 8, Section 4.

A number of recent studies in the international literature on earnings functions have emphasised the importance of functional form with respect to experience. As noted above, there is a growing number of studies that suggest that the simple quadratic relationship does not fit the data well (Murphy and Welch 1990; Borland and Suen 1994; Pagan and Ullah forthcoming). The specification of experience may significantly affect the measured coefficients on experience, the measured contribution of experience to earnings, and so on. This topic is investigated in depth in Chapter 7.

Sample exclusion of private sector workers has often characterised enterprise-based and labour force surveys, which are generally based on a pre-transition sample frame of state-owned enterprises. This would tend to detract from the value of the findings, insofar as the interest is in change during the transition, and the private sector – both privatised, and new private, firms – could be expected to be primary sources of change in the structure of earnings.

Finally it is noted that some studies have utilised a linear variable for education. As noted above, this specification is likely to unduly constrain

mothers and children tended to redistribute income toward the poorer republics of Central Asia, offsetting the distributive effect of old age pensions which benefited the Western parts of the Union; and third, given the perception of labour shortages in the Soviet Union, measures such as these, together with the provision of childcare etc. were taken in order to facilitate women's participation in the labour market.

[20] That is, she would have an uninterrupted official work record (*stazh*).

estimates of the return to education. It also heightens the risk of mismeasurement or misinterpretation, since it has to be assumed that the various levels of education are completed in exactly the standard number of years.[21]

Results

A general finding of a number of studies, particularly those in the fast reforming Eastern European countries, has been that returns to education are now in the range observed for established market economies. Those studies which have a series of cross-sections or panel data have tended to find that returns to education have risen over time (e.g. Rutkowski 1996a, for Poland). Some have found that the returns to experience acquired during the socialist period have declined (e.g. Flanagan (1998) and Chase (1997) for the Czech Republic).

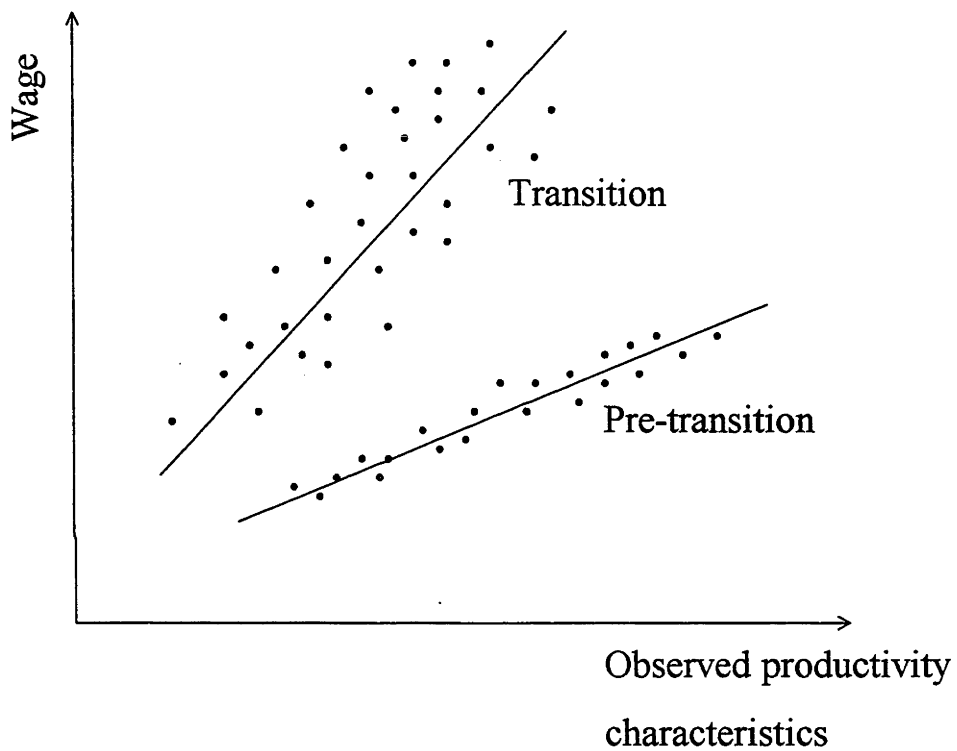
At the same time, however, the explanatory power of the basic human capital model, as revealed by the coefficient of determination (R^2) has tended to decline in those studies which trace changes over the period of transition (eg. Orazem and Vodopevic 1995; 1997, for Slovenia). Moreover it seems that the conventional human capital earnings function does a better job of explaining earnings in the state sector than in the new private sector. Neither of these results are unexpected, however, for similar reasons.

In a centralised economy, planners' seek to constrain individual managerial discretion. Earnings are determined by reference to central guidelines (the wage tariff) that are based on such "objective" standards as education and experience. Hence earnings outcomes are closely associated with the observed characteristics of workers. One would expect transition to be associated with greater variation in earnings outcomes as the controls on wage setting are relaxed. Returns to other important, albeit unobserved, factors

[21]There is evidence that school repetition rates have risen during the transition (UNICEF 1998). In the US, up to 15 percent of the sample may complete their educational qualifications in more or less time than the standard assumed duration (Jaeger and Page 1996). See Chapter 8.2 for further discussion in the context of sheepskin effects.

are expected to rise. At the same time the returns to the observed characteristics is expected to rise.

Figure 4.1: Effect of transition on explanatory power of earnings functions



This is depicted hypothetically in Figure 4.1. During the period of central planning, wage outcomes are concentrated around the (flatter) curve that depicts the earnings profile. In transition, the curve steepens (due to, for example, higher returns to university education), but there is also greater variation, thereby reducing the co-efficient of variation. Alternatively the curves may be thought of as the public and private sectors respectively, with

the latter exhibiting higher returns but also larger variance.

Table 4.4 provides an overview of the estimates of education and experience coefficients from a range of studies of transition economies. The methodological approach and results of each of these studies warrant a brief review. This is organised by country and individual study, rather than on a thematic basis, given the differences among the papers in the depth of treatment of various topics. Note, however, that the variation in the nature and coverage of the studies – for example, some are based on single cross-sections whereas others exploit more than one round of data (Table 4.3) – is inevitably reflected in the somewhat uneven nature of this review. The concluding section of this chapter attempts to highlight the main themes of the earnings function literature for transition economies.

Table 4.4: Human capital coefficients, selected transition countries

Country and Year	Education		Experience	
	Men	Women	Men	Women
Czech Republic 1996 (Flanagan 1998)	0.045	0.070	.022	.018
Poland 1993 (Rutkoski 1996a)	0.074		0.021	
Slovenia* 1991 (Orazem and Vodapevic 1997)	0.094	0.094	0.018	0.011
Russia 1992 (Newell and Reilly 1996)	0.089	0.060	0.045	0.028

NOTE: * return to a university degree

In Slovenia over the period 1987-1991, Orazem and Vodopevic (1995;1997) found that returns to human capital rose dramatically. Average returns to each completed level of education rose, although by relatively less for vocational education. The data source, the earnings records of the national social insurance fund, provided several cross-sections for analysis, allowing changes in the coefficients over time to be identified. A drawback is that workers in private enterprises were excluded. The authors found rising returns to education and experience over the period, as well as rising wage inequality. At the same time, however, the variance of wages among workers with "identical skills" (defined as the same level of completed education) in-

creased and the explanatory power of the regression (reflected in the R^2) fell significantly between 1987 and 1991. While Slovenia is atypical among the transition countries, being relatively rich and more Western oriented prior to the reforms, the country shares the inherited characteristics of social ownership of enterprises and full employment, coupled with substantial hidden unemployment and an egalitarian wage structure (*ibid.* p.3).

The Czech Republic, which shares with Slovenia the characteristics of relative affluence, success in transformation, and renewed growth (at least until 1997), has been the subject of three studies. Flanagan (1994), using grouped data, found that the returns to education generally rose during the transition, while returns to potential experience fell. At the same time, however, the rate of return to vocational qualifications fell.

Investigations of microdata collected before and during the transition have been undertaken by Chase (1997) for the period 1984-1993, and Flanagan (1998) for a more recent period (1986-1996). Chase (1997) found that the coefficients on education were quite low during the Communist era, in the range of 2.5 percent, and then increased markedly, to around 5 percent by 1993. In general, education coefficients were higher for women, although men had enjoyed the largest relative gains during the transition. Significant relative gains were also observed for workers with general secondary education, which was attributed to their greater capacity to adapt compared to workers with specific vocational training. Returns to experience tended to fall. Each of these trends was found to have been more pronounced in the faster reforming Czech Republic, than in Slovakia.

A study using more recent Czech data reported that schooling coefficients had risen to almost 8 percent (Flanagan 1998). The rise tended to be most significant at the university level, especially for women. This study also confirmed the observed declines in returns to potential experience: in 1996, ten years of (potential) experience brought about half the wage effect it would have produced in 1986 (p. 307). An investigation of differences by sector

found that employees in the private sector receive a wage premium of about 15 percent over the state sector. Interestingly, the gender wage differential also appears to be larger in the private, relative to the state, sector, suggesting that the former administrative system of pay determination had limited the size of such differences.

In Poland there was a significant jump in the education coefficient and a dramatic rise in the premium for white collar skills between 1987 and 1993 (Rutkowski 1996). In the early 1990s an additional year of education yielded a return of around 7.5 percent, as against 5 percent in 1987. More specifically, whereas an individual with university degree earned on average 19 percent more than someone with basic vocational training and 37 percent percent more than a person with only primary education in 1987, by 1993 these differentials had risen to 46 and 52 percent, respectively.

At the same time the returns to secondary and primary education both rose relative to vocational training in Poland. There were increased returns to white collar skills, especially in the private sector. Over the same period, the age-earnings profile became flatter, which suggests that experience gained under the centrally planned system lost much of its value. The standard human capital factors explained less of the total variation in earnings in the 1990s than they had prior to the onset of reforms in 1987 (i.e. the R^2 fell over the period). The earnings functions for Poland were estimated using a household data set whose sampling frame virtually excluded the informal sector and small private firms.

In the former Soviet Union, a representative household survey – the Russian Longitudinal Monitoring Survey (RLMS) – allows analysis of earnings functions in Russia. Newell and Reilly (1996) present estimates for males and females for a basic Mincerian and augmented earnings functions for 1992. The augmented equation included education, age, marital status, location (region), ethnicity, health status, position and occupation. They describe the estimated rates of return to education, at 0.033 for men and

0.030 for women in the augmented wage equation as "striking(ly)" low. The explanatory value (R^2) of the basic Mincerian wage equation is low – only 0.049 – rising to 0.261 (men) and 0.149 for women in the augmented model.

Recent findings are also available for China. China obviously differs significantly from the countries reported above, not least because of the much higher levels of illiteracy (reported by the World Bank to be 27 percent for women and 10 percent for men in 1995) and the different nature of labour market regulation. Until the adoption of economic reforms, individuals in China were directed to specific employers – who had discretion over the price paid, but not over the quantity of labour employed. Even in the 1980s, job assignments were normally made without regard to the wishes of either the employer or employee (Knight and Li 1990 p. 9). At the same time China is a useful case for comparison with Uzbekistan for several reasons, including the common labour surplus problem, significance of the rural sector in the economy, and the lingering state control over firm decision making.

Meng (1992) analysed returns to schooling in the town and village enterprise (TVP) sector in rural China, based on 1985 household data. She found that the coefficient for years of schooling was not statistically significant; indeed the sign was negative in two of the four models estimated (p. 92). This was consistent with earlier investigations of the same data set (Gelb 1990) as well as the subjective belief expressed by a strikingly high share (98 percent) of employees in the sample that education was not an important variable in wage determination. Experimentation with the specification of education, and the use of a series of dummy variables rather than a continuous years of schooling variable, did not yield a significant education effect.

Knight and Song (1995) report results separately for rural and urban China. In a model specified with gender, level of education, type of ownership, position and age cohort as independent variables, they find that among urban workers surveyed in 1988, the premium on education increased monotonically with completion of each level. Separating employees by type

of firm ownership, the evidence suggested that education was better rewarded where employers had greater autonomy from the government. However the effect of education on earnings – with coefficients ranging from 0.038 for primary school completion through 0.181 for a college graduate relative to less than three years education – was described as "remarkably slight compared to other countries" (p. 103). The regression for the rural sector had a poorer overall fit (explaining only 19 percent of the variance in income, compared to 46 percent in the urban sector). Consistent with Meng (1992), the coefficients on the education terms for rural employees are in a similar range to those in the urban sector, but most are not statistically significant.

Finally the approach and results of Newell and Reilly (forthcoming) are examined. This paper aimed to provide an analysis of rates of returns to education in a way that allows cross-country comparability. The main novelty is that it provides estimates on returns to educational qualifications across a variety of transitional economies and through time. Nine countries are included, with a geographic range covering Central and Eastern Europe (CEE), Russia, a number of countries of the Former Soviet Union (FSU), and the Federal Republic of Yugoslavia. The basic drawback is that the desire for a common framework across these countries means that the specifications are at least partly driven by the lowest common denominator in terms of data availability.

The basic specification Newell and Reilly (forthcoming) includes four levels of educational qualification plus age, age squared and, on the full sample, a gender indicator. The extended specification adds controls for occupation, industry and public/private sector. Their focus is limited to education, ignoring the other determinant of human capital, experience. Indeed only the estimates for higher education are presented for all countries; for a subset, estimates of returns to vocational training are given. Moreover the interpretation and analysis of national results is, perhaps inevitably, limited given the ambitious number of countries covered.

The results presented by Newell and Reilly (forthcoming) are summarised in Table 4.5, which shows estimated coefficients relative to the omitted category of primary education or less. The estimated coefficients associated with a university qualification are highest in Yugoslavia and the Central Asian republics but lowest in the Czech and Slovak republics. The countries of Central and Eastern Europe and Russia generally register estimates that are in the range of the estimated returns to higher education reported for high-income market economies (see Table 4.1 above and Psacharopoulos 1994).

Table 4.5: Education coefficients in nine transition countries

Country	Year	$\overline{R}^2$	Secondary	Technical	Higher
Kazakhstan	1994	0.135	n.a.	6.5	7.3
	1996	0.077	n.a.	6.7	14.3
Azerbaijan	1995	0.114	n.a	8.6	13.8
Uzbekistan	1995	0.155	n.a	8.2	12.3
Russia	1992	0.144	n.a	3.8	5.4
	1994	0.115	n.a	10.3	13.2
	1995	0.095	n.a	5.9	9.7
	1996	0.073	n.a	4.6	8.7
Hungary	1992	0.312	n.a	n.a	6.4
Poland	1992	0.339	n.a	n.a	7.2
	1993	0.333	n.a	n.a	9.7
	1994	0.345	n.a	n.a	9.9
	1995	0.353	n.a	n.a	10.4
	1996	0.356	n.a	n.a	10.1
FRYugoslavia	1995	0.514	11.0	n.a	15.2
	1996	0.554	10.5	n.a	18.0
Czech Republic	1984	0.419	n.a	n.a	1.3
	1992	0.263	n.a	n.a	5.5
Slovakia	1984	0.399	n.a	n.a	2.8
	1992	0.245	n.a	n.a	5.0

SOURCE: Newell and Reilly (forthcoming), Table 4.1
NOTE: The omitted category is primary (8 years) or less.

These results suggest that vocational qualifications in the FSU still appear to command reasonable premia. This is surprising given the concern that the Soviet style vocational training would be made redundant by the changing structure of the economy and the movement away from heavy industry (see, e.g. World Bank 1996a; Rutkowski 1997b; Heynemann 1997a). Indeed in most transitional economies vocational enrollments have exhibited steady declines (Cusan and Motivans forthcoming). There has been a decline in supply of vocational skills has occurred alongside (or possibly as a result of) a decline in demand for such skills. The net effect is nonetheless a continuing premium for vocational skills, a finding which stands in contrast to other studies, including Flanagan (1998) who finds a deterioration in the wage and employment prospects for Czech males with vocational qualifications, especially in the private sector.

Newell and Reilly (forthcoming) examine trends in the returns to higher educational qualifications over time for the subset of countries where the data permits. Increased returns are observed for the Czech and Slovak republics (from a very low base in 1984), Russia, and Yugoslavia, which are statistically significant at conventional levels. For Poland, the estimated returns to higher education rose from 7.2 to 10.1 per cent between 1992 and 1996. However the authors find that once additional controls are entered, the apparent inter-temporal differences in returns become insignificant in all the countries studied.

Newell and Reilly (forthcoming) also investigate age and gender dimensions of the wage structure. One question they address is whether younger workers are more advantaged in transition than their older counterparts who are less able to adjust to changing conditions. For male employees in the CEE economies, Uzbekistan and Russia, the age/wage relationship is as expected and younger workers seem to do relatively well. For Russia in 1996, the estimated age effect suggests that *ceteris paribus* young male workers receive a mark-up of over 17 percent compared to their older counterparts.

In Kazakhstan, Azerbaijan, Russia and Yugoslavia, on the other hand, the age effects are poorly determined.

Newell and Reilly (forthcoming) find little evidence of a systematic gender differential in returns to higher educational qualifications. While the evidence on vocational returns provides a more mixed picture, they conclude that women have not suffered reduced returns relative to men in the transition to a market economy.[22]

4.6 Conclusions

This chapter has set out the theoretical framework that will be subject to empirical testing in PART II. The focus was on the human capital theory of individual earnings differentials. This theory has enjoyed widespread popularity in labour economics, and has been empirically tested for virtually all the countries for which data is available. Earnings functions have now been estimated for a number of formerly planned economies, to test the hypothesis that the returns to education would increase from formerly repressed levels.

A review of the literature provided some important insights. While the transition country studies differ in terms of the focus of the analysis, the major themes that have emerged can be highlighted as follows.

First, the evidence generally bears out the expectation that returns to years of schooling tend to rise as a result of economic liberalisation. This tendency has been most marked for university graduates.

Second, the returns to formal vocational qualifications have generally not held up well during the transition, and in several cases have actually fallen over time. Not all studies support this proposition however, and one recent cross-country study concluded that vocational qualifications are still associ-

[22]There is still a gender wage gap (see, for the FSU, McAuley 1981; Ofer and Vinokur 1992; Katz 1994; Newell and Reilly 1996) - but their analysis suggests that this has not worsened during the transition. It is noted that this finding stands in contrast to other studies, including Flanagan (1998), as reported above.

ated with wage premia.

Third, a number of studies have found that experience-earnings profiles are fairly flat. The studies which have exploited more than one cross-section of data have tended to find that the returns to pre-transition experience has fallen over time.

Fourth, and relatedly, some of the studies have pointed to cohort effects and the possibility that more recent entrants to the labour market have benefitted from transition.

Fifth, the studies which included information on private sector employees have tended to indicate a wage premium in the private sector.

Finally, all the studies which address gender effects indicate a male wage advantage. At the same time, however, there is no direct evidence of a widening in the gender wage gap and in several cases, women have experienced larger relative gains in education returns than men.

This review has also highlighted that human capital theory, as conventionally formulated and applied in empirical analyses, raises certain difficulties. Interpretation of coefficients on key variables – in particular education and experience - requires caution. Attention should be given to alternative explanations of observed correlations with earnings outcomes. For example, measurement error can arise with respect to experience when direct information is unavailable, especially for women. The debates that are most relevant to a study of wages in Uzbekistan were considered, as were the methods available to address shortcomings of the human capital approach. This thesis will address questions of measurement and functional form, so that a better understanding of the determinants of earnings in transition might be developed. Following a summary, Chapter 5 opens PART II by describing the data set, the variables and presenting basic results of the human capital model for Uzbekistan.

4.A Calculating Rates of Return to Education

If schooling is expressed in years, as in equation (4.1), the estimated coefficient on the schooling variable is an estimate of the *ceteris paribus* effect of an additional year of schooling on earnings. If foregone earnings represents the only cost of an extra year of schooling (i.e. where there is no direct cost recovery for schooling, as has been the case in the former Soviet Union), b provides an estimate of the average private rate of return to an additional year of education. As noted above, the basic model is constrained such that this would be the estimated rate of return regardless of the level of education to which the additional year refers. This is unrealistic, however, and a preferred approach is to use dummy variables to represent different levels of education.

When the model is specified using dummy variables for education rather than a continuous years of schooling variable, the interpretation of the coefficients is less straightforward. The estimated coefficients on the set of binary educational variables do not represent the estimated returns to the qualification in question. The private rates of return to the different qualifications are derived from the following expression where N_x denotes the number of extra years required to complete the xth level of education, $x = 1, 2, 3...9$, in addition to those required for the comparison or base case (e.g. primary level).

For example, the private returns for the group with completed secondary education can be calculated as

$$r_{\text{sec}} = \frac{b_{\text{sec}}}{S_{\text{sec}} - S_{\text{prim}}} \tag{4.9}$$

where $S_{\text{sec}} = 10$ and $S_{\text{prim}} = 6$. Similarly for the group with vocational certificates (which is essentially a stream parallel to completed secondary)

$$r_{voc} = \frac{b_{voc}}{S_{\text{voc}} - S_{\text{prim}}} \tag{4.10}$$

See Johnes (1993) p. 30.

As noted in the next chapter, for Uzbekistan the following values for years of schooling are imputed for each level:

$S_{\text{prim}} = 6$,

$S_{\text{sec}} = 11$ (the number of years completed at the end of secondary school),

$S_{\text{voc}} = 12$ (the number of years completed at the end of vocational training), and

$S_{\text{uni}} = 16$ (the number of years completed at the end of university).

Part II

Microeconometric Analysis

Summary of Part II

The objective of PART II is to understand the determinants of wages in Uzbekistan in transition. The formal analysis of the role of education is complemented by a focus on transition-specific issues – like the effect of transition on the returns to experience and the issue of wage arrears – as well as linkages to the broader economic, structural and institutional context.

The initial results suggest that there are a number of reasons to be cautious about the usefulness of the conventional approach to modelling earnings, applied in its simplest form, even though this has been widely used in studies of transition economies. A building-block type approach is employed, whereby the results of successive chapters are utilised in constructing a useful model of earnings.

PART II comprises four chapters, which are structured as follows.

Chapter 5 introduces the data set upon which the econometric analysis in the thesis is founded. The European University Institute/ University of Essex Survey of Uzbekistan (hereinafter referred to as the EESU) is a large survey of 1,500 households carried out in three regions of the country in June 1995. The dependent and independent variables are elaborated. Initial results about the returns to education and experience in Uzbekistan are presented.

Chapter 6 addresses the problems raised by intermittent work attachment for the measurement of experience. An imputation method based on the sample characteristics is implemented for the female sample. Attention is drawn to caveats to be borne in mind in interpretation of the results.

Chapter 7 investigates alternative specifications of the earnings model

with respect to experience. The analysis leads to several conclusions about methodology and the value of non-parametric analysis, the preferred functional form and, more generally, about the cohort effects associated with structural change and economic transition.

Chapter 8 develops extensions to, and applications of, the basic human capital earnings model in four areas. First, an extended model of earnings is estimated, using an augmented set of controls like region and sector that, based on earlier analysis, would be expected to affect earnings. Second, tests are applied to ascertain whether or not completion of study programs is being relied upon as a signal by employers, which would lead to earnings premiums (or "sheepskin effects") for graduates. Third, the significance of apparent differences in the returns to human capital between individuals who are affected by arrears and those who are not are formally tested. The fourth task is an application of an imputed experience variable. The estimated extent of unexplained gender wage differences varies depending on whether a conventional measure of potential experience or the imputed experience variable is used. The results also demonstrate the sensitivity of the conclusions about the extent of "discrimination" to alternative approaches to decomposition of the gender wage gap.

Chapter 9 considers wage arrears in detail. A conceptual framework is established, within which a series of hypotheses are set up. Systematic patterns in the distribution of arrears are then investigated using descriptive statistics and multivariate techniques that cast light on the incidence and size of arrears. The consequences of arrears are also examined at the individual level, by considering the frequency of non-monetary payments, and at the macro-economic level, through estimating the impact of alternative repayment scenarios on the level of real wage.

The main themes and findings of PART II can be summarised as follows:

Education and Earnings

- Education coefficients in wage estimates are of the same order of magnitude as in the other transition economies of Russia and Poland, for example. The (gross) return to an additional year of schooling is around 7.7 percent for the pooled sample, which is also close to the regional average reported in the literature for Latin America.

- Coefficients for different levels of education are estimated using alternative specifications of the human capital earnings model. In the basic model the coefficient associated with a university degree is 16.4 percent, which is among the highest reported for transition countries and well above the OECD regional average of 12.3 percent. The inclusion of controls for sectoral, regional and other factors in an extended model reduces the coefficient from 8.8 and 11.4, to 8.1 and 11.0 percent for men and women respectively. These coefficients are still well above those which have been reported for most Eastern European countries. Higher returns to university education for women are not uncommon in international studies, and reasons for this, related to relative supply and signalling, are suggested.

- Earnings premiums associated with completion of different levels of education, known as "sheepskin effects", have been found to exist in a range of industrial and developing countries, although there are no published studies for transition economies. The initial results suggest that sheepskin effects might exist in Uzbekistan, although formal testing is used to show that the apparent differences in earnings associated with completion and non-completion are statistically insignificant. This analysis suggests that pooling of individuals with complete and incomplete education at each of the respective levels of education is the appropriate approach.

Experience and Earnings

- The returns to potential experience are low by international standards, particularly for women. The orders of magnitude are nonetheless similar to those reported for other transition countries, where age-earnings profiles in multiple cross-sections have tended to become more flat. This has been interpreted as indicating that pre-transition experience is now of lesser value in the workplace. However the results raise the question as to whether experience is being appropriately measured by the conventional proxy of *potential* years of work, which will always tend to bias the coefficients on experience downward. This is especially true for women, since the coefficients on potential experience for women are significantly below that for men.

Measurement of Female Experience and The Gender Wage Gap

- The intermittent pattern of female labour force attachment in Uzbekistan means that the amount of experience is typically much less than the number of years since leaving school. Rates of labour force participation among working-age women are much lower than 100 percent, and there is an unusually high incidence of adult women on maternity leave (around 30 percent of the sample).

- An imputation method based on the characteristics of female participants in the sample is used to correct for this problem. The returns to an imputed (lower) measure of female experience is about three times higher than potential experience. In the absence of time series effects (i.e. changes over time in the factors affecting the participation decision), the imputation procedure would, *on average*, provide a true measure of experience. But it does *not* follow that the resulting imputation will be correct for every individual. This calls for caution in interpretation.

- The measurement of experience is important for analyses of unexplained gender differences in wages. The use of potential experience (or age) in decomposition of the sources of gender wage differences in Uzbekistan, and by implication, in the Russian Federation and elsewhere, will tend to overestimate the extent of measured gender wage "discrimination". At the same time, however, the extreme sensitivity of the results to the method of gender wage decomposition demonstrates the need for caution in drawing any firm conclusions about the magnitude of discrimination using these methods.

- Overall differences in productivity-related characteristics between men and women, rather than wage "discrimination" appear to be the primary source of earnings differences. In particular the tendency toward large families result in lower levels of experience for women as well as possibly deterring the pursuit of higher education. It is likely that feedback effects influence female "choices", which could be conditioned by societal norms as well as individual earnings expectations.

Specification of Experience and Implications

- A number of international studies have cast doubt on the appropriateness of the quadratic model of experience, which has been the standard specification in human capital earnings functions. Conventional diagnostic tests suggest that the quadratic model of experience performs badly in Uzbekistan, though they do not indicate a clear preference among alternative polynomial specifications of experience. Local or non-parametric regression techniques are valuable in indicating the preferred model when the results of the conventional tests are not unambiguous.

- The use of non-parametric methods provide major insights. First, the non-parametric analysis suggests that the quadratic model can be misspecified because it is too simple to pick up the unusual patterns of

experience and earnings observed in transition for recent cohorts. In Uzbekistan, this is especially true of university and college educated males. The higher order polynomial specifications of experience, in particular the cubic, appear to provide a more adequate description of the experience-earnings profile for different education groups. Second, the analysis illustrates a limitation that is inherent in cross-sectional analysis of earnings profiles, that is, that the effects of individual experience and time may be confounded. The risks of so-called cohort effects are even larger in the context of large-scale economic change. Third, the results show the need for caution in the interpretation of cross-sectional analysis, which might be the case for other transition economies. Hence, the studies of earnings in transition economies (reviewed in Chapter 4) that have proceeded on the basis of a quadratic on experience, could suffer from model mis-specification, especially in the absence of multiple cross-sections of data.

- It is unclear *a priori* whether recent cohorts would be adversely affected, or relatively advantaged, by the economic transition. The results suggest that, even in depressed macroeconomic conditions, some individuals have done relatively well – younger, better educated people appear to be best placed to gain from new openings and high wage opportunities that emerge as a result of liberalisation of the economy.

Additional Effects on Earnings

- For both men and women, fixed effects for region and ethnicity are found to be significant determinants of earnings. There is a premium associated with living in the capital; somewhat less expected is the finding that Fergana has a larger negative effect than the better-known poor region of Karakalpakstan. The data suggests that the traditional advantages associated with Slavic ethnicity have persisted, although

this may be due to selection effects given the large-scale migration of Russians since the early 1990s.

- The sectoral effects confirm the picture that was presented in PART II: higher earnings are associated with all sectors of employment relative to the agricultural *kolkhoz*. There is also a premium associated with private sector employment.

Wage Arrears

- Uzbekistan exhibits a number of characteristics that are peculiar to economies in transition – in particular, the late payment of wages, which affects almost two in five workers. In an extended human capital earnings model, a dummy variable for arrears has large and significant negative effects, and interaction terms indicate that this effect is compounded for residents of Fergana and non-Uzbeks.

- The possibility of statistically significant differences in the returns to human capital between those individuals who are affected by arrears, and those who are not, are investigated. Estimation of separate earnings functions for the two groups (and by sex) with the net wage received as the dependent variable show large differences in the returns to education and experience. However formal F tests reveal that the differences are not statistically significant. These results confirm the appropriateness of the modelling approach adopted in this thesis, which pools individuals regardless of whether or not they have been affected by arrears.

- The amount of arrears is calculated as the amount reported as owing to the individual from the past month from the main place of work. The amount of money that the individual had contracted to receive in the preceding month (May) can be simply derived by adding the net wage

plus the amount of arrears owed. This is referred to as the "contract wage", and is used in the analysis of the incidence and size of arrears.

- A conceptual framework is established, within which a series of hypotheses about the nature and extent of arrears are set up. In particular, it is possible that arrears are a route to greater efficiency in the labour market, reducing the real value of payments to workers whose contract wages are, for institutional or other reasons, higher than productivity would imply; however it is also possible that arrears are simply a reflection of government intervention in the economy.

- Analysis of microdata on the pattern of wage arrears reveals distinct patterns. Adopting a two-step approach, the analysis illustrates who was affected by arrears, and second, among those affected, by how much. In general the individual characteristics most frequently associated with the presence of arrears were also associated with larger amounts of arrears. In particular those working on collective farms and people living outside the capital were found to be most affected. These regional and rural/urban disparities are compounded by the fact that the individuals with low contract wages are more frequently and worst affected by arrears. Hence arrears have a distributive impact.

- The extent and incidence of arrears provide support for the efficiency hypothesis: that arrears are one way for employers to shift net wages toward market-clearing levels in the face of institutional and other constraints. It is shown that arrears account for between half and two-thirds of the widening of the earnings distribution that has occurred since 1989, and in this sense may be contributing to a more efficient labour market. However there is only mixed support for the hypothesis that indicators of individual productivity reflected in human capital variables would be a significant factor in explaining the pattern of arrears.

- Even so, the analysis shows that a political economic perspective is a fruitful approach to thinking about wage arrears. The pattern of arrears can be interpreted largely in terms of domestic political and fiscal considerations. On the one hand, the government has regularly announced decrees which have indexed all contract wages. But on the other hand, the government is concerned about macro-economic stability and unemployment, and seeks to limit growth in labour costs. The regional patterns of arrears, revealing that workers in the capital are least affected, provides support for the political economy hypothesis. It is argued that the concentration of arrears in agriculture is an outcome, albeit possibly unintended, of government priorities. The resulting reduction in labour costs may have facilitated expansion of agricultural employment, and thereby enabled what would otherwise be surplus labour to be formally employed.

- In the presence of the high rates of inflation that have characterised much of the transition, delayed payment will reduce the real value of earnings and the measured rate of wage inflation. However this fact has not been taken into account in the construction of official statistics on wages by domestic and international agencies. Wage simulations are used to establish upper and lower bounds for the effect of arrears on real wage trends and levels. The implications are substantial, even if the delay in wage payments was limited to only one month.

Chapter 5

The Data and Basic Results

5.1 Introduction

Uzbekistan, alongside the other republics of the former Soviet Union, has experienced tremendous social, economic and institutional changes since gaining independence in 1992. One would expect, among other things, significant changes in the labour market to follow. To date, however, understanding about the labour market in Uzbekistan has been significantly limited by a paucity of data. The problems arising from simple lack (or suppression) of data and its unrepresentative nature has been compounded by Soviet measurement concepts that are not useful or relevant in a market economy. This is true at the aggregate level with respect to unemployment, for example. Understanding of the determinants of individual wages has also been constrained.

The recent availability of representative microdata allows some major gaps in understanding to be filled. It enables, for example, empirical investigation of the determinants of individual labour earnings during the economic transition. This will shed light on the question as to whether the shift to a market economy has been associated with significant adjustments in *inter alia* the structure of wage relativities and the returns to human capital, as is often expected (see, e.g., Rutkowski 1995).

In this chapter the data set is introduced, and a detailed description of variables is provided. Attention is given to the regional and ethnicity variables that are shown to have key relevance in the later empirical analysis. A basic model of earnings is estimated using the Uzbek data. This highlights the need to consider a range of adjustments to the simple model, in terms of the measurement of key variables and the appropriate functional form.

The chapter is set out as follows. Section 5.2 introduces the data set that is subject to investigation, and the basic profile of the sample. Section 5.3 highlights the key variables used in the analysis of earnings and, in particular, the ethic and regional dimensions that are specific to Uzbekistan. The next section presents a basic Mincerian model of wage determination, points to some apparent peculiarities on the education side, and draws attention to the need to treat men and women separately. The chapter concludes that adjustments are needed to the basic model before proceeding to an augmented model that includes regional as well as "transition-specific" variables such as arrears.

5.2 The Data Set

The data were collected in a household survey conducted in June 1995. The European University Institute/ Essex Survey in Uzbekistan (EESU) collected data on about 500 households in each of three different oblasts (regions) of the country that together represent over 25 percent of the total population. The oblasts were: the capital, Tashkent; the densely populated Fergana in the south-east of the republic; and the traditionally poor region of Karakalpakstan adjacent to the Aral Sea. (A regional map and detailed background analysis of regional and ethnic aspects are presented below.) Data were collected, *inter alia*, on a range of basic demographic and education indicators, and on labour market behaviour and outcomes.

The labour market module, answered by all individuals in the household

over the age of 15, elicits information on employment, earnings and education. Table 5.1 describes the main variables used in the estimation. The variables fall into three broad groups : demographic (sex, ethnicity, marital status and the presence of young children); human capital (experience and education) and labour market (type of employer, location and whether they receive in-kind benefits). Specifically, on employment, the individual is asked about primary and secondary jobs, sector of employment, and seasonality of work, for the present time and for one year ago.

A series of questions obtain information on all sources of income and any in-kind benefits received from the employer. There are further earnings-related variables, in addition to the main dependent variable of net earnings, that are needed because of the problem of arrears, or non-payment of wages. The next section provides details about those variables that are specific to the Uzbek context, namely the regional and ethnic dimensions, as well as elaboration of the earnings variable and the concept of arrears.

The analysis of the determinants of earnings are generally restricted to the sample of individuals whose *contract* wage was positive at the time of the survey.[1] Individuals whose main employment was home production or self employment were excluded, given the well-known problems involved in interpreting information about the earnings of the self employed. While there have been some attempts to estimate earnings equations for the self employed (e.g.. Rees and Shah 1986; Kidd 1993), most studies of the determinants of earnings exclude this group. The basic difficulty stems from the lack of a clear distinction between returns to labour and returns to capital (Covick 1984; Bradbury 1997). In the Uzbek context, there are significant problems involved in ascertaining or valuing home consumption of rural households.[2]

[1]See Table 5.1 for summary definitions. This inclusion rule is preferable to the more common restriction to "individuals with positive earnings", because of the phenomenon of arrears. Section 5.3.1 elaborates the concepts of wage arrears and the concept wage as used in the thesis.

[2]Survey respondents were asked to value home consumption, but the results suggest

Table 5.1: Main variables used in estimation

Variable	Description	Comments
Demographic		
sex		58.8 percent are male.
married		84.5 percent married.
kids	Children under 7 years in the household	
Experience		
pexp	Potential experience: exp=age-yrsch-7.	School entry at age 7
aexp	adjusted experience for females	See Chapter 6
Education		See Chapter 2
yrsch	Years of schooling	Imputed,
elem	Elementary (primary) or less	see Chapter 5.4
hgh	Incomplete secondary	
dhgh	Complete secondary	
incvoc	Incomplete vocational	
voc	Complete vocational	
incol	Incomplete teknikum or college	
col	Complete teknikum or college	
incuni		
uni	Complete higher	
Ethnicity		See Chapter 5.3.2
uzbek	Uzbek	
Slavic	Russian, Ukrainian or Belorussian	
karal	Karakalpak	
kazak	Kazakh	
cenasia	Other Central Asian	
other	Other (e.g.) European, Korean and Tatar	
Employer		See Chapter 3
soe	State owned enterprise or organisation	
kolhkoz	Collective farm	
hire	Private or privatised firm	
miloth	Military or other	
benefit	Reported non-wage benefit	See Chapter 3.1
tenure	More than one year in present job	
Region		See Chapter 5.3.3
KKP	Karakalpakalstan	
Tashkent	Tashkent	
Ferg ana	Fergana	
Earnings		
wage	Net amount received in preceding month, including bonuses	
arrears (dummy)	Non-payment of full wage in preceding month	See Chapter 9
contractw	Equals wage + amount of arrears	

The exclusion involved 5.8 percent of the adult sample (3.5 percent of women and 7.4 percent of men).

Table 5.2 presents the main characteristics of the data for the restricted sample used in the estimation. The average age of this sample is about 36 years. A majority (52 percent) have above high school education, and about 16 percent have university degrees. Ethnically, 57 percent are Uzbek, with several sizeable minority groups, viz. Slavic (13 percent), Karakalpak (10 percent) and Kazakh (9 percent). The structure of employment shows the state sector to be dominant (68 percent of employed) alongside the former state farms (kolhoz) which employ over 20 percent. About 7 percent are hired in the private sector. The vast majority (91 percent) of the sample have been in their present employment for over one year. There is a substantial gap between the average earnings of men and women, of the order of 45 per cent. A somewhat higher share of men than women have completed university degrees (19 versus 14 per cent).

It is also of interest to examine the same breakdown for the entire adult sample. This is provided in Table 5.3, which indicates the rates of employment and unemployment, and rates of participation in the labour market in the overall adult sample. The employment rate for the adult sample (under 60 years) was about 57 percent; but significantly higher for men (67 percent) compared to women (46 percent). The unemployment rate, based on those who described themselves as "not working and looking for work or retraining", was 9 percent. The reported rate for men was double that for women (11.9 versus 6 percent). Labour force participation rates for individuals between 16 and 60 years of age (55 for women) were constructed based on the ILO definition of those working plus those looking for work or retraining.[3] The overall participation rate was 65.5 percent, but was significantly higher for men (79.2 percent) relative to women (52.3 percent).

significant undervaluation (see Coudouel, 1998).

[3] Ages 55 and 60 are the respective pension eligibility ages for women and men.

Table 5.2: Summary of variables, restricted sample

Variable	females	males	total
Demographic			
age (years)	35.4	35.6	35.7
married (per cent)	71.6	82.6	78.1
pexp (years)	16.1 (11.5)	16.7 (12.1)	16.4 (11.9)
Education (per cent)			
elem	1.3	1.8	1.6
hgh	13.3	13.7	13.5
dhgh	33.5	33.1	33.3
incvoc	0.6	2.0	1.5
voc	11.0	12.1	12.7
inccol	0.5	2.0	1.5
col	12.9	12.1	12.7
incuni	1.8	1.6	1.7
uni	14.0	19.0	16.4
yrsch (years)	12.4	13.0	12.0
Ethnicity (per cent)			
uzbek	54.4	59.1	57.1
Slavic	15.9	10.2	12.6
karal	9.9	10.2	10.1
kazak	7.4	9.3	8.5
cenasia	4.5	5.7	5.2
other	7.8	5.4	6.4
Employer (per cent)			
soe	73.3	64.7	68.3
kolkhoz	19.0	21.2	20.3
hire	5.6	7.9	7.0
miloth	0.9	2.8	2.0
tenure	90.4	92.9	91.9
benefit (per cent)	12.0	15.3	13.8
Region (per cent)			
kpak	31.2	33.3	32.6
tash		31.0	32.5
ferg	34.1	33.3	35.0
Earnings (soum per month)			
wage	415.1	762.2	494.9
arrears	252.5	338.1	302.0
contractw	667.6	1226.1	796.9
N	1029	1415	2444

Table 5.3: Summary of variables, unrestricted adult sample

Variable	total	males	females
Demographic			
age (years)	38.4 (16.4)	37.4 (15.5)	39.4 (17.2)
married (per cent)	72.8	76.7	69.2
Education (per cent)			
elem	7.9	5.5	10.1
hgh	18.9	18.5	19.3
dhgh	32.1	32.3	31.9
incvoc	2.0	2.3	1.7
voc	11.8	12.8	10.9
incol	1.4	2.0	0.8
col	10.2	10.2	10.2
incuni	2.1	2.3	1.9
uni	13.6	14.2	13.0
Ethnicity (per cent)			
uzbek	57.1	58.8	55.4
rub	10.8	8.9	12.4
karal	10.7	10.8	10.6
kazak	10.2	10.6	9.9
cenasia	5.1	5.6	4.5
other	6.2	5.3	7.1
Region (per cent)			
kpak	36.7	37.3	48.0
tash	29.4	27.8	46.2
ferg	34.0	34.9	47.1
Labour Force Status (per cent)			
Work	56.6	67.3	46.3
Unemployed	8.9	11.9	6.0
Maternity Leave	15.4	0.6	29.9

There are additional groups outside the restricted sample of employees that are worth highlighting. First, about 4 percent of the sample described themselves as "not working", but then listed "employed in home production" as most accurately describing their current position. Second, there is a small group who described themselves as being on involuntary leave (0.7 percent). Third, and most important, is the prevalence of maternity leave. The concepts of involuntary leave and the incidence of maternity leave in the Uzbek context deserve some elaboration.

Forced leave (generally unpaid) has been a widespread phenomenon in a number of former Soviet republics. As noted in the previous chapter, together with arrears in wage payments, involuntary leave has been used by employers as a counter approach to outright labour shedding. In Russia, for example, in 1994, about 8 percent of workers in firms with more than 200 workers had experienced involuntary leave in the first quarter of the year, averaging about one month (Commander and Yemtsov 1997, Table 6.3). Since official data on involuntary leave is not available, the Uzbek survey questionnaire asked direct questions on this point. The results show that involuntary leave, *per se*, was much less important in Uzbekistan than might have been expected, at least based on self reporting in 1995. At the same time, wage arrears are quite prevalent (see section 3 below), so the distinction between forced leave, and being in work but not being paid, may be one of semantics.

About 30 percent of women described themselves as being on maternity leave at the time of the survey (recall from Chapter 2 that women are entitled to three years off work after childbirth). This may effectively amount to forced leave, with (limited) income support being paid out of the state Social Insurance Fund by way of maternity benefits. There is however insufficient information to ascertain the extent to which women in this group have genuinely chosen to take time out of the labour force, or whether they have *de facto* been forced to take leave by their employers as a way of cutting firm labour costs.

In Western and international literature, women on maternity leave are conventionally treated as not participating in the labour market. The fact of their inclusion in Soviet concepts of work may partly explain the widespread belief that women's labour force participation rates were unusually high in the former Soviet Union, a topic that is subject to detailed investigation in the next chapter.[4]

5.3 The Variables

This section elaborates upon the main variables used in estimating labour earnings in the empirical analysis that follows. In particular, details are provided about the earnings variable, ethnicity and region. Extensive background on the education system and the structure of the economy was presented in Chapters 2 and 3.

5.3.1 Earnings

The dependent variable used in the earnings equations is the log of monthly cash earnings received from the main place of work, post-tax. Earnings from secondary jobs or from home agricultural production are excluded, given the focus of the thesis on the determination of employees' wages. Nor are benefits provided in non-monetary form by the employer included. This section introduces the phenomenon of wage arrears, and considers the system of individual wage taxation and the extent of non wage benefits.

Arrears

Arrears or delays in payment have been a pervasive theme of economic transition in most countries of the former Soviet Union. As described in Chapter 3, there are different types of arrears, which can arise between enterprises,

[4]The rate of female labour force participation would rise to about 76 percent if women on leave were to be included.

in payment of tax obligations to government, in payment of social transfers to individuals, and in payment of contracted wage obligations to workers. The last is known as wage arrears. The payments may be received in a later month, in part or in full, or not at all. There is typically no indexation of payments if and when these are eventually made.

Since wages are normally calculated on a monthly basis, arrears refer to payments not received in the month due. The amount of arrears is calculated as the amount reported as owing to the individual from the past month from the main place of work.[5] The amount of money that the individual had contracted to receive in the preceding month (May) can be derived by adding the net wage to the amount of arrears owed. This is referred to as the "contract wage".

One unfortunate complication is that the amount received (which is referred to here as the "net wage") may not have been owed for May. That is, the amount received may include payment of arrears owed from earlier periods. The income question simply asks: "Please tell me the net sum of money (after income tax) which you received in the last calender month from the following sources....monthly wage at main place of work". It is possible that the respondent reports all wage income received that month (including past amounts owed), rather than the monthly wage received for that month. However this seems unlikely, since the average (contract) wage reported by respondents in the survey for the month of May (approximately 800 soum, after tax) is consistent with the economy-wide average gross (pre-tax) wage of 1,082 soum for the third quarter of 1995 reported by the IMF. Details about rates of personal income tax are given in the next section.

Unless otherwise noted, the earnings regressions in the thesis use the

[5]Immediately after the question on sources of income received, the respondent is asked "Were you paid everything due to you in the last calender month? I will read again the various sources of income and you tell me please, if you are owed money for any of them. But remember that I am only interested in the last calender month, and not for any earlier period". Then the interviewer is instructed to read out each sources and write down the amount of sums owed: the first source is monthly wage at main place of work.

net wage received as the dependent variable. The sample of employees is pooled regardless of whether they have been affected by arrears, though the appropriateness of this approach is explicitly tested in Chapter 8. Chapter 9 presents a detailed investigation of wage arrears in Uzbekistan.

Taxation

The survey collects data on earnings net of taxes. In this section, the system of personal income taxation is briefly described, and the question as to whether the derivation of pre-tax earnings would be appropriate is considered. This enables an evaluation of how the interpretation of results of the earnings regressions could be affected by the use of post-tax earnings.

The basic legislation governing taxation on earnings is the law *On Income Tax for the Citizens of the Republic of Uzbekistan 1992.* The system of taxation of labour earnings has undergone frequent changes during the transition period however, as Presidential Decrees have frequently amended the relevant thresholds and rates of taxation. In general, the different rates of tax and the tax-free threshold have been linked to the national minimum wage (and multiples thereof).

At the time of the survey, in mid 1995, the tax-free threshold was equivalent to twice the minimum wage (2 times 150 soum). Earnings over the tax-free threshold were subject to the following marginal rates, which were set as multiples of the minimum wage. The rates are set out in Table 5.4. In principle, the tax applies to income received in cash or in-kind.

Table 5.4: Personal income tax rates, June 1995

Earnings (sum)	Tax rate (percent)
301-800	25
801-1,500	35
above 1,500	40

Collective farm (*kolkhoz*) workers are not legally subject to personal income tax.[6] Instead, there is a tax on the wage fund of *kolkhozes*, set at a flat rate of 8 percent, for all earnings over the tax-free threshold (as per above). Again, in principle, bonuses and payments in kind are subject to the tax.

Ideally, the empirical analysis of earnings in this thesis would proceed from a measure of pre-tax earnings. It is pre-tax earnings, that is, the cost of labour to employers, that is normally considered to be the relevant dependent variable in earnings functions.

The rate structure of taxation is fairly simple, as shown above, and it could therefore be argued that earnings be proportionately adjusted. In fact, however, such an adjustment would introduce substantial measurement error because of the subtleties of the tax system, as well as transition-specific problem of arrears.

There is a complicated system of exemptions and deductions for different types of income and, more relevant in the present case, for different types of individuals. The types of income that are listed as exempt include, for example, cost of living allowances for gold miners; pay of military personnel; income of war veterans, invalids and the legally blind; and wages of workers assigned to agricultural work. There is a list of deductions from taxable income that includes donations to charitable organisations; "for certain invalids", 50 percent of income; for single mothers with two or more children, 30 percent of income; for one of the parents of an invalid child, for both parents with three or more children and an invalid child, 30 percent of income; and for one parent with three or more children, 30 per cent of income.

A further complication is raised by the presence of arrears. In principle, the tax rate is calculated on the basis of the contract wage. However as described in the preceding section, the contract wage is often not paid in full. It is possible that individuals are just being taxed on the basis of the

[6] As is typical in Uzbek legislation, there is a series of exemptions: which range from "hero mothers" (women with more than five children) to war veterans to Chernobyl victims.

amounts actually received, but these amounts could well vary from month to month, in which case varying amounts of repaid arrears would have to be somehow taken into account as well.

The foregoing considerations suggest that any attempt to adjust the net wage figures by the simple proportionate amounts listed in the tax schedule would introduce substantial measurement error. The dependent variable is therefore simply the net wage received, after tax. It is noted that the average net earnings for the sample falls into the lowest marginal tax rate category, and that most of their earnings actually fall below the tax-free threshold (300 soum). Approximately three-quarters (74.8) percent of the sample have earnings below 801 sum, where the 35 percent marginal tax rate takes effect.

The fact of reliance on net earnings is nonetheless worth bearing in mind in interpreting the results of the earnings regressions. The associated estimates will still be consistent (i.e. otherwise unbiased), but there are a couple of caveats.

First, to the extent that there is a positive correlation between observed characteristics and the level of earnings, given a progressive system of personal income taxation, the coefficients on those estimates would tend to be under-estimated. This could be relevant for the coefficients on education and experience, for example. If the coefficient on university education is, say, 10 percent in an earnings regression based on the post-tax wage, then the pre-tax coefficient could be closer to 11 percent. Likewise, for the characteristics that are inversely associated with the level of earnings, the effect will be over-estimated. Second, and relatedly, this tendency needs to be borne in mind in any cross-country comparisons with studies that use gross (pre-tax) earnings as the dependent variable.[7]

[7]In some of the studies it is unclear whether the dependent wage variable is pre- or post-tax: for example, the multi-country study of Newell and Reilly (forthcoming) refers to "monthly log wage" as being the dependent variable, though we know that at least for the case of Uzbekistan, this is a net (post-tax) figure.

Wages in-kind

Ideally non-wage payments would be included in the earnings measure, since the provision of housing, childcare and food on a free or highly subsidised basis was an important activity for Soviet employers, especially for large firms and in the industrial sector (Commander and Jackman 1993). This has been an active area of Western research related to the theory of equalising differences that was set out in the previous chapter (Rosen 1986, p. 669). From the employer's point of view, the relevant cost of labour is obviously total compensation including fringe benefits as well as cash.

Official sources based on firm-level data suggest that until the mid 1990s at least, non-wage compensation was important in Uzbekistan (World Bank 1994; 1995b). Information is available from Goskomprognostat on enterprise social spending, that is spending by enterprises on non-wage benefits and services. This data suggests that, over the period of transition, measured enterprise social expenditures have declined relative to national income (see Klugman and Marnie 1998, p. 63). In 1993, about 80 percent of enterprise spending took place in the industrial sector.[8] With the exception of mining in Navoi oblast, the regional distribution of spending tends to favour urban areas, and in particular Tashkent and its environs (Newell 1995). Enterprise social expenditures were equivalent to about 10 percent of total public social spending in 1993, although about 30 percent of the total could be traced to a mining company in Navoi (World Bank 1995b).

However there are problems in incorporating non-wage benefits into the dependent earnings variable. These arise from both the under-reporting of incidence and under-valuation. It is difficult for individuals in Uzbekistan to place an accurate value on such benefits, partly because markets and prices for these services did not exist in the Soviet period.

[8]This reflects a continuation of the Soviet pattern, where enterprise social provision was more extensive in the industrial sector, and in larger firms (Commander and Jackman, 1993).

The incidence of firm benefits may be under-reported since service provision (for example, education and health care) was often financed by a mixture of firm and state budget sources, so that it is unclear whether the benefit should be regarded as part of labour compensation or as part of the state welfare system. Moreover, given recent changes, individuals may not even be aware of the current source of financing. The most obvious example of this has been the transfer of large numbers of kindergartens formerly financed by employers to the local authority budget (Klugman *et al.* 1997; UNICEF 1998). During field work in Karakalpakstan and Khorezm in mid 1997, for example, local authorities reported increasing financial pressures on their budgets to the transfer of facilities formerly operated and financed by enterprises (Klugman 1997a; 1997b).

There is a direct question in the EESU survey about the receipt of non-monetary benefits, which reveals two important points. First, the share of employees reporting receipt of such benefits is small.[9] Only about 8 percent of working adults reported receipt of "non-wage benefits" from their employer. In addition, small proportions of the sample reported receipt of specific items - that is, food (3.4 per cent); animal food (2 per cent), medical care (1.3 per cent); agricultural items, and housing (only 0.5 percent). Second, however, for those individuals who do receive such benefits, the value is relatively large. For recipients, the amount of non-wage benefits averaged 305 sum (with a range from 15 to 2210), almost double the average cash wage received (169 sum) for this group overall. However once those who did not receive their cash wage in the preceding month are excluded, the non-wage share falls to (a still sizeable) 57 percent of the average cash wage (N=67).

In the analysis that follows, information about access to non-wage benefits is used to create a dummy variable indicating receipt of any benefit, that is included as an explanatory variable in the extended model of earn-

[9]It is possible that respondents under-reported receipt of free or subsidised items from their employer.

ings. Information about non-wage benefits is also utilised in investigating specific questions, for example in the analysis of arrears. This is the first study of earnings in transition to have included such information in earnings regressions.

However the dependent variable on remuneration includes only cash received. This may give rise to measurement error if the error is correlated with the right hand variables. This type of error, like measurement error on the right hand side (independent variables) will decrease the precision with which the parameters are estimated (Deaton 1997, p. 99).

5.3.2 Ethnicity

The majority of the population is Uzbek, with sizeable minorities of Karakalpaks, Slavs, Kazakhs and other Central Asian groups. Karakalpaks reside mainly in Karakalpakstan, the northernmost part of the republic (see Section 5.3.3).

In many respects, Soviet policies were aimed at destroying traditional identities and communities in order to foster individual loyalty to the state. The forced relocations associated with collectivisation were one manifestation of this phenomenon, alongside the undermining of religious (Islamic) structures. In rural areas, the *kolkhoz* chairman became the local source of authority with power to determine the allocation of jobs, garden plots and so on. Two group identities – that of being a Soviet citizen, and of being an Uzbek in Uzbekistan – were promoted to replace pre-existing attachments based on lineage and religion, although not always successfully (Schloerbein-Engel, 1994).[10]

Earlier analysis of the ethnic dimensions of Uzbek society nonetheless suggests its continuing relevance for studies of the labour market. Sociological studies have pointed to an interplay between ethnicity and gender. Relying

[10]For example, the Kipchaks and the Turkic-speaking people of Uzbekistan, were officially absorbed into the Uzbek population.

on census data up to the late 1970s, Sacks (1982) argued that different gender/ethnic groups occupied different rungs of the job hierarchy, with Russian men occupying the most desirable positions, Russian women and Uzbek men occupying roughly equal positions, and Uzbek women located on the bottom rung. Data on the occupational structure of the workforce by ethnic group is scarce, however. Based on official sources, Marnie and Motivans (1993) report that Uzbeks were relatively under-represented in industry, construction and science (53, 50 and 39 percent of the workforce respectively), while accounting for shares of agriculture and education (76 and 69 percent) much closer to their share in the population.

Lubin's (1984) comprehensive sociological analysis of labour and ethnicity in the late Soviet period investigated the general perception that Slavs dominated industrial sector jobs which tended to have higher pay and prestige.[11] She found no evidence of discrimination against indigenous nationalities; to the contrary, the local nationalities had greater opportunities to pursue employment and training through implicit affirmative action—type programmes – for example that they had priority in entrance to many training programmes and that once enrolled, grading policy was often easier for them (pp. 156-157).[12] Lubin (1984, pp. 171-224) suggests that the apparently paradoxical preference of local nationalities for work in the (low-paid and low prestige) service and agricultural sectors can be explained by the associated access to home production and preferences for more traditional consumption patterns.

More recently, Smith (1995) undertook an empirical analysis of ethnicity based on a survey in Tashkent. Although the sample size was small (130), and the income variable was not defined (in particular, it is unclear whether

[11] See, in particular, Chapter 5, "Who Gets Hired For What?".

[12] An analysis of admissions data by ethnicity presents various examples where the acceptance rates for Uzbeks were much higher than for Slavs - eg for the Bukhara State Pedagogical Institute in 1978, one in three Uzbek applicants were accepted, compared to one out of seven non-Uzbeks.

the variable refers to only labour income or total income including transfers), the results are of interest. He found that, on average, Uzbeks had lower educational qualifications and were younger than Russians, and that Russians had higher average incomes. In an OLS model, being Russian as opposed to Uzbek had a significant positive effect on income, holding constant the influence of sex, age, education and occupation (Table 4, p. 104). Other results cast light on attitudes to economic opportunities and to change: Uzbeks were more likely than Russians to believe that their economic position was better in late 1994 than in 1990 (37 versus 15 percent respectively).

A full investigation of ethnicity and the associated expectations, perceptions and cultural factors are beyond the scope of this thesis. The effect of ethnicity on wage outcomes is nonetheless important, as will be shown in Chapter 8. The existing evidence leads to several specific expectations, namely that (i) Slavic ethnicity will tend to be associated with higher levels of education; (ii) Slavic ethnicity will tend to be associated with higher earnings; and (iii) in the formal sector, at least, individuals of Uzbek ethnicity will tend to be concentrated into agricultural and unskilled occupations, and therefore be lower paid to the extent that these occupations are low paid.

5.3.3 Region

This section provides background to facilitate interpretation of the regional effects on earnings, and to identify the patterns that might be expected to emerge from the micro-analysis in the chapters that follow. The detailed focus is on the oblasts covered in the micro-analysis, *viz.* the capital Tashkent, Fergana and KKP. The information is based on official administrative data, obtained from the national and local statistical offices (Goskomprognostat), and several field visits by the author over the period 1993-1997.

There is significant regional differentiation in the labour sphere. Tashkent, Karakalpakalstan and Fergana differ quite markedly in the structure of employment (Table 5.5). The share of formal employment in industry ranges

Table 5.5: Regional employment by sector, 1993

	Total	Fergana	KKP	Tashkent
Industry	16.7	21.9	10.2	27.2
Agriculture	32.3	31.7	34.4	0.7
Construction	8.7	7.2	12.7	12.3
Trade and Catering	6.6	6.3	6.0	8.7
Transport and Comm.	5.3	4.9	5.8	9.8
Education and Culture	16.2	15.7	17.6	19.3
Health and Social Services	7.2	6.2	7.6	9.1
Other	7.0	6.1	5.7	13.0
Total Official Employment	100	100	100	100
MEMO: share of labour resources in home production	24.8	26.0	20.7	21.2

SOURCE: Ministry of Labour, Uzbekistan

from 27 percent in Tashkent city to about 10 percent in KKP. Conversely, the share of agriculture varies from less than one percent in the capital to about one-third in Fergana and in KKP. The shares engaged in education and health and related services are also higher in the capital.[13]

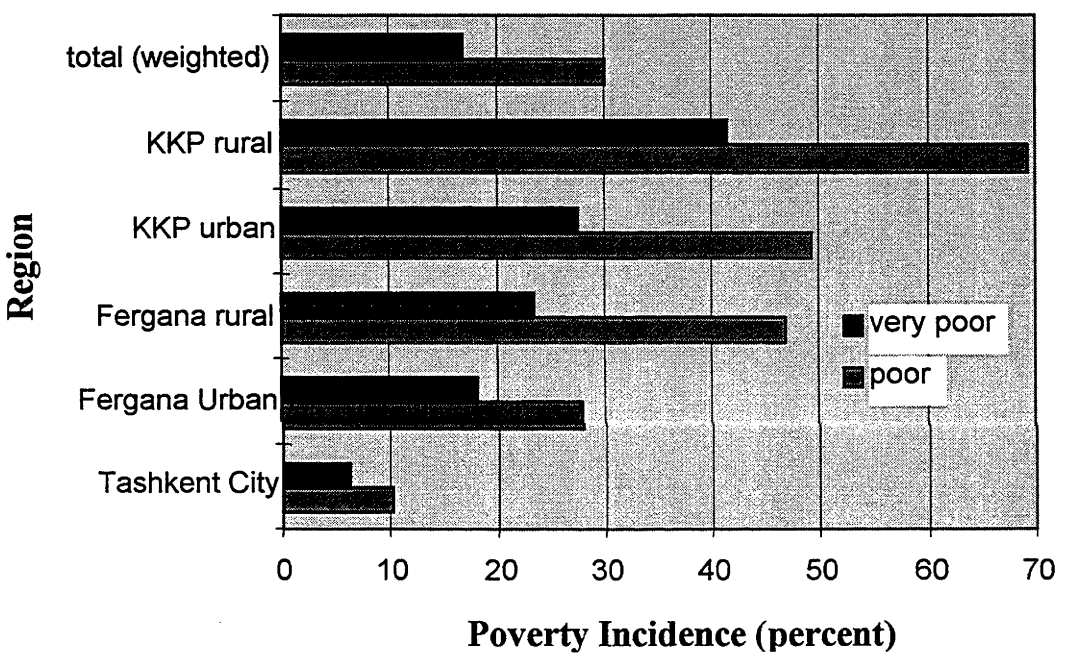
Table 5.6: Relative wages by region, 1991-1995

	1991	1992	1993	1994	1995
Karakalpakalstan	97.0	89.2	86.8	76.8	81.6
Tashkent	105.2	118.2	119.5	121.5	131.2
Fergana	92.9	91.7	94.7	88.8	87.1
national average	100.0	100.0	100.0	100.0	100.0
memo: minimum wage	23.1	39.8	30.5	24.9	16.4

SOURCE: Goskomprognostat, 1997

[13] Official labour statistics suggest that the share of the working aged population engaged in the "official economy" is similar in the three oblasts (66, 68 and 67 percent in Fergana, KKP and Tashkent respectively).The share engaged in home production and private plots is highest in Fergana (26 percent) and lowest is KKP (21 percent).

Figure 5.1: Incidence of poverty, by region, 1995



Official data shows that average earnings in Tashkent oblast are more than 30 percent higher than the national average (Table 5.6). The average wage in both KKP and Fergana was similarly low in 1995, about 80 percent of the national average. The differences between the top and bottom ranked oblasts have widened significantly over the transition. Adjustment for differences in regional price levels does not change the ranking of the oblasts (Goskomprognostat, 1997). Even at the regional level, of course, averages can be misleading. Available data also suggest significant intra-republic variation in level of average incomes and earnings.[14] The appendix to this chapter details intra-oblast variation in earnings using the case of KKP.

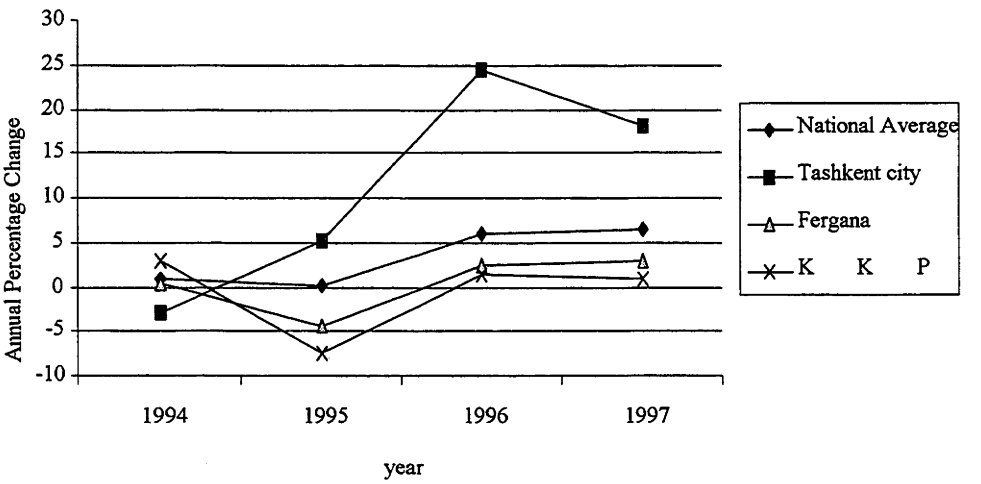
Consistent with this inter-regional pattern of wages, Figure 5.1 presents the incidence of poverty by oblast. The percentage of households with income (from all sources, including public and private transfers) under the poverty line (set at the minimum wage), and less than half the poverty line in mid 1995 was calculated by Coudouel (1998). The incidence of poverty nationally was about 30 percent in 1995, of whom about 17 percent were very poor (Coudouel 1998). The incidence of poverty was much higher in both rural and urban Karakalpakstan, standing at rates of 69 and 49 percent respectively. The estimated rate of severe poverty (defined as 50 percent of the minimum wage per capita) was 41 percent in rural and 27.5 percent in urban KKP. The rates are significantly higher than those found in Tashkent and Fergana, although poverty incidence in rural Fergana approached that for urban KKP.

Tashkent

As the national administrative and commercial capital, one would expect the economy and labour market of the city of Tashkent to provide greater labour market opportunities than more remote areas. Table 1.1 indicated that the population, of about 2.1 million people, is classified as 100 percent

[14] A household survey undertaken in April 1996 revealed that per capita monthly incomes in the south of KKP were double those in the north (US$14 versus $7). Average incomes in the centre of KKP lay between these extremes, at US $11 (Expert Centre, 1996).

Figure 5.2: Trends in industrial output by region, 1994-1997



urban. Tashkent (city and oblast) accounts for close to 30 percent of the economy's industrial production (Uzbek Economic Trends, 1998, page 40). Recent official data on trends in industrial output suggest that firms in the capital have not been adversely affected by the transition. This is shown in Figure 5.2.

Overall national trends in industrial output suggest some recovery following fairly flat levels of output in 1994 and 1995. By way of contrast, following an earlier period of output contraction, industrial output in the capital has grown substantially in the years 1995-1997. This would be expected to have direct effects on the demand for labour and wages in industry.

Karakalpakstan (KKP)

KKP, adjacent to the Aral Sea, has been widely recognised as a region with serious ecological and poverty problems (see e.g. World Bank 1993). The most important sectors of employment are agriculture, followed by various public social services. In 1996, the composition of employment was domi-

nated by agriculture, which engaged 139,000 workers (plus 55,000 recorded under private plots), compared to less than 38,000 in industry. In the so-called non-material sphere, the education sector dominated employment.

Overall levels of employment in KKP declined significantly during the transition, by about 12 percent to 1994 relative to 1991. There was some recovery in 1995, to reach about 96 percent of the 1991 level (Klugman 1997a). This stands in contrast to overall national trends, which suggest that total employment expanded by almost 3 percent over the period 1991-1995 (Chapter 3).

The expansion of the working age population in KKP has continued at a rapid pace, growing by more than 12 percent between 1991 and 1995. Loss of job opportunities has meant that the number of working age people in KKP who are "not employed" has doubled over the period.[15] Hence, based on official labour statistics, the regional unemployment rate can be estimated to be around 13 percent in 1996. While this figure cannot directly be equated to unemployment (see Chapter 2), it is indicative of recent trends.

Changes in the structure of wages by branch suggest a mixed story on adjustment (Klugman 1997a). The relative wage has declined in agriculture as well as other sectors of public employment (state administration, health and education). Relative gains have been recorded for finance and credit, housing and communal services, transport and to a lesser extent construction. It seems that several sectors, including transport, construction and industry, have not seen a wage adjustment consistent with the decline in sectoral employment.

[15] While the category of non-employed includes women on maternity leave and women "with many children", the absolute number of individuals in these groups has remained fairly stable in size over time (they accounted for about 51 percent of the total "not employed in the economy" in 1995).

Fergana

The densely populated Fergana Valley is "shared" by three Central Asian neighbours: Uzbekistan, Kazakhstan and Kyrgyzstan. It was the scene of substantial ethnic tensions in the late 1980s, which have apparently subsided (or been repressed) since then.[16] Fergana has traditionally been a labour surplus region (Marnie 1992), with relatively low household incomes (Coudouel *et al.* 1997; Coudouel 1998).

Industry plays an important role in the oblast's economy. Indeed the proportionate contribution of Fergana to national industrial output (close to 30 percent) is similar to that of Tashkent city and oblast. However, by way of contrast to Tashkent, levels of industrial output have been quite depressed between 1994 and 1997. Figure 5.2 shows stagnant and negative growth in 1994-1995, with only limited subsequent recovery in industrial output. As noted above, industry accounts for about one-fifth of formal employment in Fergana, and agriculture engages about one-third of workers in the official economy. In addition, private plot production is especially important, which was traditionally seen as being symptomatic of the tendency toward labour surplus in the region.

Existing evidence about regional differentiation in Uzbekistan leads one to expect the following regional effects: (i) residence in Tashkent would have a large and positive effect on earnings. This has traditionally been the case, and has likely strengthened during the transition. However one would not expect the effect to be as large as the differences in average earnings suggest, once differences in the level of education and the sectoral composition of employment are controlled for; (ii) KKP would be expected to be the worst off, based on widely held beliefs about the impact of the Aral Sea disaster on

[16]There were serious outbreaks of killing and looting, in conflicts that were frequently delineated in ethnic terms, for example, Uzbeks versus Kyrgyz, over claims to land and water in the Fergana Valley in 1990 (Schoeberlein-Engel, 1995). In 1989 there was an outbreak of violence against the Meskhetian Turks (one of the groups relocated to Central Asia by Stalin) which took the form of murders, assaults and property damage.

living standards and economic opportunities in the region; (iii) in both Fergana and KKP, the pre-existing labour surplus alongside continuing labour force growth during the transition should have exerted downward influence on wages, especially for new entrants.

5.4 The Basic Model

Earlier chapters have set the economic, structural and institutional context within which wage determination has taken place during, and since, the Soviet period. The objective of PART II of the thesis is to understand the individual determinants of wages in transition. This section embarks upon that task by applying a basic human capital model to the present data set. The initial results suggest that there are a number of reasons to be cautious about the usefulness of the conventional approach to modelling earnings, applied in its simplest form, even though this approach has been widely applied in other studies of transition economies. Hence a building-block type approach is employed in PART II, whereby the results of successive chapters are utilised in constructing a preferred model of earnings.

The basic Mincer-type model that was introduced in the preceding chapter is estimated for labour earnings, where the dependent variable is the net monthly wage from main place of work. In this estimation and henceforth, the restricted sample (excluding the self employed) is used. The only independent variables included at this initial stage are experience and experience squared, and the education dummies. Following convention, a 'potential experience' variable was constructed based on age in years minus years of education minus seven (age at school entry) (see Chapter 4.2, equation 4.6).

Table 5.7 presents the results for the basic regression on log earnings for the pooled sample. This model is necessarily misspecified, since even a sex dummy is missing. It is nonetheless a useful first step. While the coefficients generally take the expected sign, there are some unexpected aspects. For the

education variables, which are defined relative to elementary (four grades) or less of schooling, the coefficients generally rise with the level of education. However, at several levels, completion is associated with lower returns than some (incomplete) education at the same level.

Controlling for experience, Table 5.7 shows that while complete high school education appears to be "worth" more than incomplete high school, incomplete vocational appears to generate greater returns than completed vocational training, and the same is true of the *teknikums*. This result is puzzling, certainly from a signalling perspective (see Chapter 4.2), but also in terms of the human capital/ productivity view of returns to education. This point is revisited in Chapter 8, where the possible existence of sheepskin effects is explored.

Table 5.7: Basic Mincer model with education dummies, pooled sample

	Coefficient	t-statistic
pexp	.013	3.17
$pexp^2/100$	−.013	−1.40
hgh	.396	2.60
dhgh	.412	2.71
incvoc	.732	3.81
voc	.661	4.23
inccol	.829	3.99
col	.694	4.43
incuni	.943	5.04
uni	.984	6.43
constant	5.51	36.17
Adjusted R^2	0.114	
N	1708	

A new variable which captured years of schooling was used to replace the education dummies. The information on the highest level of education was transformed into continuous years of schooling, by imputing certain values to each stage of education.[17] This procedure undoubtedly introduces measurement error, especially in the light of the non-linearities in the returns to education reported in the previous table, and therefore the results should be treated with caution. It is nonetheless an interesting exercise, which facilitates a simple comparison of results from the basic human capital model with studies from Eastern Europe and elsewhere in the world which have employed a continuous schooling variable. The results are presented in Table 5.8.

Table 5.8: Basic Mincer model, pooled sample

	Coefficient	t-statistic
pexp	.012	2.90
$pexp^2/100$	−.005	−0.61
yrsch	.077	13.13
constant	5.16	61.40
Adjusted R^2	.100	
N	1708	

Controlling for experience, the return to an additional year of education is about 7.7 percent for the pooled sample. These results for Uzbekistan in 1995 are of similar orders of magnitude found in the studies of other transition economies reviewed in the preceding chapter. For example, Flanagan (1998) reports returns to years of schooling for both sexes in the Czech Republic in 1996 of 5.7 percent; Rutkowski (1996) found that an additional year of schooling increased wages by 7.4 percent in Poland in 1993.

[17] Specifically, the following values were assigned to the respective levels of schooling in consultation with local experts: none (0); incomplete primary (3); complete primary (4); incomplete middle secondary(6); incomplete secondary (9); full secondary (11), incomplete vocational (9); complete vocational (11); incomplete teknikum (10); complete teknikum (12); incomplete higher (14); and complete higher (16).

There are, however, problems with this basic model. For example, there may well be correlations between education and other variables that are omitted or mis-specified. Interpretation is thus deferred until a more adequate functional form is developed in the following chapters.

The overall explanatory power of the basic Mincer-type approach revealed by the coefficient of determination (adjusted R^2) is low, at around 0.10. The reasons to expect a decline in the explanatory value of the observed characteristics during transition have already been noted and illustrated in the previous chapter. The size of the adjusted R^2 is low relative to established Western market economies where the adjusted R^2 in earnings regressions range up to 0.20-0.25. (This figure is nonetheless higher than what Newell and Reilly (1996) found for Russia: adjusted R^2 for males of 0.049 and for females of 0.034.) Such poor fits could be traced to various factors, that are not mutually exclusive. The functional form is likely to be wrong, for example, some of the variables could have been mismeasured, and/ or factors other than experience or education could play a more important role in the determination of earnings. Each of these possibilities is explored in the chapters that follow.

Before proceeding, it is useful to look at the gender effects. An indication of the importance of gender is provided in Table 5.9. This suggests that, holding the human capital variables constant, a substantial premium is associated with being male. This effect, which is of the order of 25 percent, is highly significant. It also significantly increases the explanatory power of the earnings regression.

Basic Results by Gender

The next step is to separate men and women. There are a number of reasons for this distinction, the foremost being the constructed "potential experience" term, which likely overstates women's actual experience in the labour

Table 5.9: Basic Mincer model with sex dummy

	Coefficient	t-statistic
pexp	.009	1.81
$pexp^2/100$	-.003	-0.028
yrsch	.070	12.39
male	.245	7.40
constant	5.18	64.02
Adjusted R^2	.1196	
N	1649	

market.[18] Most obviously, women take time off to have and raise children. In Uzbekistan the total fertility rate, which is a synthetic measure of the number of children a woman would have if she passed through her child bearing years at the current age-specific fertility rates, was about 3.8 in 1994 (Klugman and Schieber, 1997, Table 3). This demographic picture, coupled with long-established maternity leave provisions (see Chapter 2 above), suggests that the work history of many women tended to be discontinuous.

In fact running separate OLS regressions for men and women on the basic model reveals quite different orders of magnitude on the coefficients for potential experience, each level of schooling, and in the overall explanatory value of the model (Table 5.10). The returns to potential experience are much higher for men – the coefficient on the experience variable is over three times that for women. On the other hand, the higher coefficient of determination for women suggests that the conventional human capital factors play a somewhat larger role in explaining their wages, relative to men.

The results by gender show large differences in the returns to experience. Of course one cannot state definitively that this is the case in the absence of direct measures of "true" experience. However this is clearly suggestive of mis-specification – in particular, that experience is mis-specified when the

[18] A number of international studies are restricted to men, for this reason (e.g. Vella and Gregory 1992).

Table 5.10: Basic Mincer model, by sex

	Men		Women	
	Coefficient	t-statistic	Coefficient	t-statistic
pexp	.020	3.20	.006	1.67
$pexp^2/100$	-.028	-2.07	.003	.023
hgh	.385	1.92	.411	1.80
dhgh	.385	1.91	.470	2.09
incvoc	.690	2.68	.794	2.86
voc	.568	2.73	.817	3.55
inccol	.693	2.59	1.008	3.15
col	.560	2.68	.888	3.85
incuni	1.062	4.12	.885	3.35
uni	.879	4.34	1.135	5.00
constant	5.62	28.12	5.32	23.38
Adjusted R^2	.092		.169	
N	977		731	

simple Mincerian proxy is used.

The Mincerian measure of experience comprises "true" experience plus some unknown element of error. The size and therefore implications of the error in measurement of experience would tend to differ among individuals. The extent of error would tend to be inversely related with the individual's level of education, for example. University-educated women, for example, would be expected to have higher levels of labour force participation (closer to the assumption of continuous attachment underlying the Mincerian measure of potential experience). The impact of mismeasurement of female experience on the experience coefficient, and on other coefficient estimates, is set out more formally in the next chapter (section 2). Chapter 6 also derives and imputes an alternative measure of female experience. It is therefore appropriate to defer interpretation of results until after experience is properly specified.

5.5 Conclusions

This chapter introduced the data set upon which the empirical analysis in PART II of the thesis is founded. The elaboration of the independent variables to be used in the earnings regression equations indicated likely areas of importance in the extended model – in particular, the regional and ethnic variables. Initial results about the returns to education and experience in Uzbekistan were presented. The chapter also raised several issues that will be analysed in more depth in the chapters that follow, some of which are unique to economies in transition, such as arrears, and others with more general methodological relevance to the study of earnings. The main findings of the chapter can be summarised as follows.

The descriptive statistics showed that the sample of workers is, on average, fairly well-educated and young. There are a number of characteristics that are peculiar to economies in transition – in particular, pervasive non-payment of wages due. Unexpected aspects included the findings that rates of labour force participation among working-age women are far from universal, and a very high incidence of maternity leave.

Evidence based on official data and field work suggested that the regional differences in the level of earnings and structure of the labour markets are significant, and that regional dummies will be significant in models of earnings outcomes. Likewise, evidence about ethnicity indicates that non-Slavic groups will have relatively lower rates of pay. However the studies to date have not quantified these effects on earnings with controls for education, experience and other factors expected to affect earnings.

The basic Mincerian human capital model was applied to the pooled sample, with the initial results suggesting that the return to an additional year of schooling was roughly comparable to that found for other transition economies. But the chapter also demonstrated that there are a number of reasons to be cautious about the usefulness of the conventional approach applied in its simplest form.

First, the use of a continuous years of schooling variable introduces an undesirable degree of mismeasurement. The question of appropriate specification of the education dummies is examined below. The possibility of sheepskin effects – that is, returns to completion of a particular level of education over and above any increases in productivity associated with additional schooling – is addressed in Chapter 8.

Second, the male wage premium, coupled with the much higher returns to education for women and the much lower returns to "Mincerian" experience suggest that pooling all individuals is likely to lead to results that are misleading. Henceforth, then, results are presented separately by gender. The very low returns to experience for women are open to alternative explanations, including gender discrimination, low rates of on-the-job training, the relevance of other determinants of earnings, and/or mismeasurement of the experience term. For these reasons, it was argued that interpretation of the results should be deferred until Chapter 8, once a more satisfactory model of earnings has been developed.

The results of the basic model do provide some guidance as to next steps. All estimations are carried out separately by sex. In later extensions to the "basic" model, regional and ethnic dummies are included in the estimations. The next chapter investigates whether women really are being rewarded so much less for additional years of experience, or whether there is a measurement problem. It explores ways to adjust the measure of experience for women, to take account of intermittent labour force participation, and derives an improved measure that more closely reflects actual experience.

5.A Appendix. Earnings by Raion: the Case of KKP

Available data suggests significant *intra-oblast* variation in the level of average earnings. Table 5A.1 shows average nominal earnings, on a raion basis, for employees for 1990 and 1995, and in agriculture for 1995. Employee salaries tended to exceed agricultural earnings (the only exception is Chimbai). The overall gap in 1995 (871 versus 612 sum) was of the order of 30 percent. At the same time, however, not all rural raions are worse off.

The relative importance of agricultural earnings versus the employee salaries is shown in columns four and five. It is notable that even in the rural raions of KKP, agricultural earnings do not generally predominate sources of labour income.

Klugman (1997a) constructed composite labour earnings for each raion as a weighted average of both wages of workers and employees, and agricultural income, weighted according to the relative numbers of workers and employees versus those receiving agricultural income, in each raion.

Trends in this variable show that the dispersion in wages among raions has generally increased since 1990. Hence workers in Kungrad (town and raion), Tashaus and Nukus, already above average, have moved further ahead. Raions that appear to have slipped further behind already below average positions include Chimbai (town and raion), Berin and Veruni. A number of raions also appear to have slipped in relative position on the earnings scale, such as Keglin and Tahtakup.

The index of composite earnings tends to suggest greater levels of inequality of earnings among oblasts than a measure confined to the wages of workers and employees. This is to be expected, since as noted above, agricultural earnings are significantly lower on average. Hence the urban centres draw further ahead relative to most rural raions.

Table 5A.1: Labour earnings by raion, KKP

	Average employee salary		Av. ag wage	Non ag./ total
	1990	1995	1995	employment (%)
*towns**				100
Nukus	1.02	1.14		100
Tashaus	1.05	1.26		100
Turkul	0.98	0.97		100
Chimbai	0.90	0.83		100
Veruni	0.92	0.82		100
Kungrad	1.21	1.42		100
Hojel	0.86	0.87		100
Muynak	0.92	0.91		100
Rural raions				
Amuydaryan	0.90	0.79	0.11	48
Ollikkalink	1.01	0.88	1.14	42
Tahtakup	1.08	0.92	1.08	86
Karusyak	0.99	0.95	0.92	97
Kegilin	1.05	0.84	1.32	65
Bozat	0.83	0.90		100
Nukus	1.01	0.88	1.19	49
Kangul	1.04	1.00	1.40	61
Shuman	1.02	1.01	1.24	41
Hodjel	0.96	1.07	0.99	26
Turtkul	1.04	0.80	1.20	30
Berin	0.88	0.78	0.97	39
Chimbai	1.00	0.83	1.22	62
Kungrad	1.15	1.54	1.42	42
Muynak	0.96	0.93	1.12	69
Oblast Average	1.00	1.00	1.00	

NOTE: Several raions bear the same name as towns.
SOURCE: author calculations based on official data. See Klugman 1997a.

Chapter 6

Measurement of Female Experience

6.1 Introduction

One of the major insights of human capital theory is the observation that individuals can increase their productivity not only through investments in formal education but also by learning work skills while they are on the job. This may occur through formal training programmes sponsored by their employer, and/or on an informal day-to-day basis through instruction of colleagues, task repetition, and so on. Human capital theory thus suggests that if women's attachment to the workforce is weaker than men's, due to competing family responsibilities, they will acquire less of this valuable on-the-job training, not only because of fewer years spent in employment *per se* but also because the expectation of lower labour force participation reduces training investments.[1]

The results of the basic model presented in the previous chapter suggested that women's returns to potential experience are less than a third of men's. However this measure of experience assumes continuous time in the labour force after leaving school. Many of the recent empirical studies of women's

[1] Blau and Ferber, 1992, p. 162.

earnings, especially studies concerned with gender discrimination, acknowledge that the Mincerian proxy for labour market experience is an inaccurate measure of actual accumulated experience for women.[2]

However none of the studies of wages in transition, known to the author, have directly addressed ways to resolve this problem. This has usually been justified by reference to assumed high rates of labour force participation during the Soviet period (e.g. Newell and Reilly 1996), an assumption that can be shown to be highly questionable, especially in the Central Asian context.

In the present data set, as is typical of most empirical studies of wages, information on actual time in employment is lacking. This gives rise to a general problem, which is not novel, and in the present context can be described as follows. In the former Soviet Union, women were expected to undertake the bulk of child-rearing responsibilities. Maternity leave rights were established shortly after the revolution, in the 1922 Labour Code (see McAuley 1981 for details).

Since 1956, women were allowed, on full pay, eight weeks leave prior to birth and eight weeks post-partum. They were also entitled to take unpaid leave up to the child's third birthday. While subsidised child care was extensive, access was far from universal, especially in rural areas (see Klugman *et al* 1997; UNICEF 1998). Hence, as shown in Chapter 5, the share of working-aged women on maternity leave is high.

Women who are not working, even if formally attached to their jobs through maternity leave, may accumulate less human capital that is recognised or valued by employers. The importance of this is that it would tend to cause earnings functions that utilise age or Mincerian experience as a proxy for experience to bias downward experience coefficients for women than is the case for men.[3] The application of the conventional Mincer model to female

[2]See Kidd and Shannon (1997), and references cited therein.

[3]This need not be the case, however, if for example women were more productive in the on-the-job training that was undertaken.

earnings in Chapter 5 indicated surprisingly low returns to experience in absolute terms, and relative to men. Those results suggested that, for example, at five years of experience an additional year of experience increased women's pay by only 0.6 percent, whereas for men the estimated increase would be more than three times higher, or 2 percent.

The above result could reflect either: (i) women of age X have worked fewer years than men of the same age; and/or (ii) women are accorded lower returns to experience. If the first explanation holds, this implies mismeasurement if a model of earnings utilises age, or a Mincerian term, for experience. To resolve this problem, one needs to construct a more appropriate proxy for actual labour market experience. This has important implications for, *inter alia*, the evaluation of unexplained differences in earnings by sex, as shown in Chapter 8.

This chapter is structured as follows. The next section establishes levels and trends in female labour force participation, demonstrating the likelihood of discontinuous work force attachment for this sex. Drawing on the methodology that has been used in several published studies that have suggested ways to impute a more satisfactory measure of female experience, this task is undertaken in Section 6.3. The effect of alternative measures of experience on the estimated returns to experience is demonstrated in Section 6.4. The final section concludes.

6.2 Female Participation and Employment

The lengths of individuals' work experiences depends on the extent to which they have been employed in the labour market. If female labour force participation rates are high, then the Mincerian measure of potential labour force experience, based on the assumption of continuous work after school-leaving age, will tend to closely approximate the underlying reality.

This section investigates evidence about levels and trends in female labour

force participation in Uzbekistan over the past four decades or so, thereby providing the context and motivation for the imputation of female experience that follows. Definitional difficulties are reviewed before the analysis goes on to critically examine the belief that female rates of labour force participation in the formerly planned economies have been high, at least by Western standards.[4] If labour force participation and employment rates were high, then the assumption of continuous work force attachment since leaving school is not contentious. However, the best available evidence suggests that less than two in three working aged women in Central Asia were employed in the labour force.

Definitional Issues

A critical prior issue, that was alluded to in PART II, lies in the conceptual differences related to labour force participation.[5] It matters that there was no Soviet concept of labour force participation in the sense used in the West. The notion of "Balance of Labour Resources" was used to guide central planning (and remains current in official statistics) (see Chapter 2). Within total labour resources, the "Economically Active Population" comprises those who are employed, while the category "Not Economically Active" includes students plus those "Not Employed in the Economy". The latter, which includes such groups as women on maternity leave, is not equivalent to unemployment, since it does not take into account whether or not the individuals are actively seeking work

The widely used International Labor Organisation (ILO) concept of labour force participation refers to individuals who are in paid work, plus those who are unemployed and actively looking for work or retraining. The closest approximation to the ILO concept in Soviet sources is the ratio of the number

[4]See, eg., Milanovic (1998), p. 20; World Bank (1996a), Chapter 4; Blau and Ferber (1992), Chapter 10.

[5]See Klugman and Scott (1997) for a review of these difficulties in the context of the former Soviet republic of Kazakhstan.

of women employed to the number of women aged 16-54 years, which we can call an employment rate.[6] While 55 is the normal age at which rights to a State pension accrue, many women continue to work beyond that time (in part because individuals are allowed to receive both pension and wage, and accumulate additional work history for the purposes of pension entitlement). The presence of working women aged 55 and over in the numerator tends to raise the employment rate.

Soviet statistical practices thus helped reinforce the notion that employment and labour force participation rates were high in the former Soviet Union. It is likely however that the "true" employment rates were somewhat lower. The differences in reporting practices also make comparisons between the Soviet and Western situations with respect to rates of labour force participation and employment somewhat difficult.

Levels of Employment and Participation

Definitional problems notwithstanding, it is widely thought that Soviet women were employed in the labour market to a far greater extent than their western counterparts, and that steep increases in employment rates preceded the rises in participation rates experienced in the West after the 1970s (see, e.g. World Bank 1996a). McAuley (1981) documents the increase in the absolute number of Soviet women in "gainful employment', from less than five million in the late 1920s to over 50 million by 1975. Marxist ideology and the labour demands of industrialisation efforts combined in the right, and implicitly the obligation, of women to find paid employment, as set out in the 1936 Constitution.[7]

[6] In fact the employment rate is of greater interest for present purposes, since time spent actually working and gaining on-the-job training is what matters for the effect of experience on earnings.

[7] In the USSR, over and above ideological pressures, various measures that enabled women to work, in particular the expansion of child care places and the extension of maternity leaves and concessions that permitted women to combine work and domestic responsibilities (see Chapter 8), within an overall incomes regime which effectively meant

Table 6.1 shows that overall rates of participation were already high by 1960, at levels that only Sweden had reached even by 1990.[8] Yet female labour force participation rates in Central Asia diverged from the Soviet averages, in terms of both levels and trends. The measured rates scarcely rose after 1965 according to the figures reported by McAuley (1981). The differences can be attributed to the labour "surplus" which characterised the region, in contrast to the shortages that characterised much of the European parts of the Union, as well as to higher fertility rates.[9] Trends over time are important for the analysis that follows because the imputation procedure requires the construction of a record of past experience for current participants.

Chapter 2 has already reviewed evidence suggesting that the rates of "non-employment" of working-aged adults in Soviet Uzbekistan were up to 14 percent, among whom nine out of ten were women. The picture that emerged from representative survey data for 1995 shows that the share of women on maternity leave was extraordinarily high, since the leave entitlement is up to three years.[10] The female employment rate in the sample is of the order of 46 percent.[11]

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that a family with children needed to have two earners in order to have a decent income (Klugman and Braithwaite, 1998).

[8] As noted above, the rates for the Western countries are defined as the total female labour force divided by the female population aged 15-64 years (OECD, 1991, p. 461), whereas the Soviet figures show the ratio of average annual employment to the female population age 16-54 years (McAuley, 1982, Table 3.2).

[9] The total fertility rate in 1980 was 4.81 in Uzbekistan, compared to 1.87 in Russia, 1.95 in Ukraine and 2.0 in Lithuania (UNICEF, 1998, Table 2.4).

[10] This is consistent with other recent evidence for Uzbekistan. Expert Centre (1998) report that nearly one-third of women employed in industry in Fergana oblast were on maternity leave in 1997.

[11] There have been widespread concerns about declining labour force participation for women during the transition (see, e.g., World Bank, 1996a, p. 72-73). While it is no easy matter to establish trends since the Soviet period, there are a number of reasons to expect changes to have occurred during the transition. However the overall expected effect of the various influences - declining real wages, reduced access to childcare, falling fertility rates and changing ideological pressures - is indeterminate (Klugman *et al*, 1997). Untangling trends in labour force participation, especially the impact of diminished childcare access, is a subject beyond the scope of this chapter that nonetheless warrants further research.

Table 6.1: Female participation and employment rates, selected countries, 1970-1990

	1960	1970	1980	1990
OECD				
UK		55.5	61.7	68.4
France		49.5	55.6	57.7
Sweden		62.1	75.8	83.5
Ireland		34.6	35.2	37.5
USA		50.6	61.3	69.6
Australia		46.1	52.5	61.9
Former Soviet Union		1970	1980	1990
USSR	62.7	81.6	83.1	
Russia	66.7	85.1	86.9	78.0
Central Asia*	60.1	66.5	65.4	71.1

Sources: McAuley (1981) for FSU, except 1990, ILO (1992). OECD (1991) for OECD countries.
Notes: Soviet figures show employment/female population, 16-54 years. * excluding Kazakhstan.

The Effect of Mismeasurement of Experience

The review of the evidence has shown that employment rates for women in Uzbekistan has been much less than 100 percent. Hence the assumption of continuous employment since leaving school is likely to over-estimate the amount of "true" work experience.

It is relevant to ask: what is the effect of mismeasurement of experience? This has (at least) two dimensions: an effect on the coefficient for experience, and possible effects on other coefficients in the model. It is useful to set out the conceptual basis for each of these.

If potential experience exceeds "true" experience, then the coefficient estimated for experience will be too low (relative to the male coefficients on experience, and also relative to the coefficient on true experience).

More formally, this can be shown as follows. Assume a model of earnings

$$w = \alpha T_P + \beta S$$

where w is the wage, T_P is the measure of potential experience and S is the number of years of schooling. Assume that there is some relationship between potential and "true" or actual experience (T_A), depicted by

$$T_P = \delta T_A$$

Since the number of years of potential experience is greater than years of actual experience, $\delta > 1$. Hence the coefficient estimates on true experience can be estimated in an earnings regression as

$$w = \alpha \delta T_A + \beta S$$

Because $\delta > 1$, it follows that the coefficient on potential experience (α) is biased downwards.

Mismeasurement of one dependent variable (experience) will also affect the other coefficients in the model. This is a standard econometric result.[12] The effect of mismeasurement of experience on the other estimated coefficients in the model can be illustrated more formally for the case of schooling. Recall the model

$$w = \alpha T_P + \beta S \tag{6.1}$$

defined as before. Assume that actual experience, T_A, is known. In this case, equation 6.1 can be rewritten as

$$w = \alpha T_A + \gamma (T_P - T_A) + \beta S$$

The importance of this is that if true experience is less than potential experience ($T_A < T_P$), then $\gamma < 0$. Assume, further for the purposes of this illustration, that there is an inverse correlation between number of years of

[12] See, for example, Greene 1994, pp. 279-284.

education and the size of the difference ($T_A < T_P$). This would tend to occur if, for example, university educated women are less likely to have time out of the labour force.

The effect of the mismeasurement of experience on the education coefficient (β), depends on the relationship between γ on the one hand, and the size of the error ($T_P - T_A$) and X on the other. Under the present assumptions, both γ and the relationship between the size of the error and number of years of schooling is negative, so that the overall effect on the schooling coefficient is likely to be positive.

The above case is only illustrative of the possible effects, since the "true" effect is not known in the absence of direct information on actual experience. For Australia, for example, Rummery (1992, p. 361) suggests that errors associated with measurement of the experience term may bias the coefficients on the other variables in the earnings equation model either upwards (as appeared to be the case for males), or downwards (as was the case for females).

It seems that the belief that rates of female employment were high in the Soviet period is ill-founded, at least for the case of Uzbekistan. The evidence suggests that their time in employment were likely to be interrupted by childbirth and the associated leaves, and that this would have affected the length of the true experience. The most important implication of this for the present analysis is that overstatement of "true" experience would tend to reduce the estimated returns to female experience, relative to the "true" returns (and also relative to men). A standard econometric result is that the errors associated with one term in an OLS model are expected to carry though to the other coefficient estimates.[13] The analysis therefore suggests that any modelling of wages based on the assumption of continuous employment since leaving school (for example, Newell and Reilly, forthcoming) is open to criticism. In the next section, this issue is considered empirically.

[13] Unless the variables were completely uncorrelated.

6.3 Imputing Experience for Women

This section undertakes a procedure, similar to that which has been utilised in other countries, to impute a measure of labour market experience for women that takes into account the role of intermittent work attachment. The method utilises the observed characteristics of women in the sample who are presently participating, in order to derive work histories for each individual.

Before proceeding to elaborate this procedure in detail, the next subsection reviews the factors that might be expected to affect the participation decision and uses the micro-data to construct a profile of female participants in the Uzbek labour market. Such a profile has never been previously published. Section 6.3.3 presents and implements the model, which is based on logit estimates. Finally in this section, attention is drawn to the assumptions underlying this procedure, and potential interpretative problems are raised.

6.3.1 Factors Affecting the Participation Decision

A number of studies have modelled the decision of the individual to allocate time between the market and home production.[14] Studies in Western countries have tended to find fairly common patterns by age, level of education, marital status and number of children, especially in countries with lower rates of participation (OECD 1988). Studies of the Soviet period obviously face serious data constraints, however, and those that have been undertaken typically analyse European Russia (Ofer and Vinokur 1992; Katz 1994).

One exception that casts light on Soviet Uzbekistan is Berliner's (1989) study of Soviet female urban labour participation. His analysis was not based on individual micro-data, however, but instead on regional-level information for 168 oblasts, which included Uzbekistan. The regional-level variables subject to investigation included fertility, ethnicity/religion, education and

[14]See Blau and Ferber (1992) Chapter 4, and references cited therein.

wages. The main findings were that:

(a) taking into account that fertility and participation decisions will be made jointly, participation had a strong negative effect on fertility, but not the converse. The general declines in fertility were particularly pronounced in Central Asia; for example, between 1970 and 1980 the Soviet fertility rate declined by about 4 percent compared to a fall of 13 percent in Uzbekistan (Kingkade 1987; Table 6.4).

(b) Higher male wages (as proxied by education) had a negative effect on female participation.

(c) While Muslim and Slavic fertility levels seem to differ substantially, participation rates did not vary once fertility, education and other factors were controlled for.

A more recent study of neighbouring Kazakhstan casts further light on the participation decision in the Central Asian context (Klugman *et al.* 1997). Although the focus of this study was on the impact of childcare on household welfare, the effects were expected to flow through changes in the labour force participation of women with pre-school aged children. Based on maximum likelihood estimation, the significant factors affecting the probability of participation were the age of the youngest child (higher the age, the more likely is the mother to participate); education of the mother (the more educated, the more likely they were to participate); household income[15] (which had a negative impact); and, living in a town, but not the oblast capital (which had a positive impact).[16]

Who is participating in the labour market in Uzbekistan in 1995? A useful initial step in the investigation of participation patterns in Uzbekistan is to construct a profile of participants in the EESU sample. Table 6.2 presents simple cross-tabulations of female labour force participation rates by age group, level of education, marital status and number of children.

[15] Excluding the women's own wage.

[16] See Klugman *et al,* (1997), Table 10.2.

The first issue concerns age. The age profile of participants is of most interest because it provides insights into life cycle effects. In Western countries, three broad age patterns have been identified (OECD 1988). The first displays a single peak in the early twenties, followed by (permanent) withdrawal after marriage and childbirth. Ireland fits this experience, for example. Another pattern, now seen in the UK, has two peaks around a valley about 30 years of age given the presence of young children. A third pattern, which has been found in Sweden, does not show any marked differences over time after women enter the labour force, and participation rates rise to a plateau that persists until retirement age. However this latter group of countries also tend to have significant opportunities for part-time employment.

What pattern might be expected to prevail in Uzbekistan? On the one hand, the availability of childcare, maternity benefits and leave in Uzbekistan suggest that the third pattern would tend to prevail. On the other hand, the large average family size and the very limited scope for part-time employment in the former Soviet system suggests that some women might be discouraged from participating at all. Official statistics are silent on the question of part-time work in the USSR – at least in sectors other than agriculture.[17] There was very little formal part-time employment, although the organisation of work in agriculture did involve seasonal fluctuations in the intensity of work. The only available evidence, for Russia, suggests that part-time employment in the state sector represented less than 0.5 percent of state sector employment in the 1970s (McAuley 1981, p. 28). In this sense the pattern of female employment in the former Soviet Union is quite different to that in most industrial market economies.[18]

Table 6.2 indicates that female labour force participation rates do not decline around the child-bearing years. Rather, their participation rates con-

[17]McAuley (1982, p. 27) argues that this in itself should be taken as evidence that the phenomenon is unimportant.

[18]In the US in 1990, 27 percent of women (and 12 percent of men) worked less than 35 hours per week (Blau and Ferber, 1992, p. 184).

Table 6.2: Labour force participation rates for selected characteristics, Uzbekistan, 1995

Characteristic	Participation Rate (per cent)
Marital status:	
married	52.7
Education:	
completed secondary	56.3
completed vocational	60.7
completed college	63.4
incomplete university	37.7
completed university	67.0
Ethnicity:	
Uzbek	51.0
Slavic	68.0
Karakalpak	52.8
Kazakh	45.8
Age:	
18-25 years	41.6
26-30 years	53.3
31-35 years	62.9
36-40 years	72.7
40-44 years	78.1
45-49 years	73.1
50-54 years	40.9
SOURCE: Author estimates based on EESU	

tinue to rise and peak in the 40-44 year age group. This pattern is somewhat surprising given the co-existence of large shares of women on maternity leave in the sample. It is, however, consistent with the age patterns of the ratio of the employed to the working age population estimated by Isamiddinova (1997, pp.13-15), which are based on extrapolations from the 1989 census.

This can be explained, at least partly, by the age patterns of the individuals on maternity leave. The average age of women who are working is about 36.5 years, compared to only 27 years for women on maternity leave. Almost

three in four women on maternity leave (72 per cent) are under the age of 30 years. In this light it is not surprising that rates of labour force participation are some 10 percentage points higher for women aged 31-35 than those aged 26-30 years (and higher again for both of the next two five-year age cohorts). The labour force participation rate of women in the 26-30 year age group is nonetheless higher than the youngest working age group, given the greater involvement in full-time education of the latter.

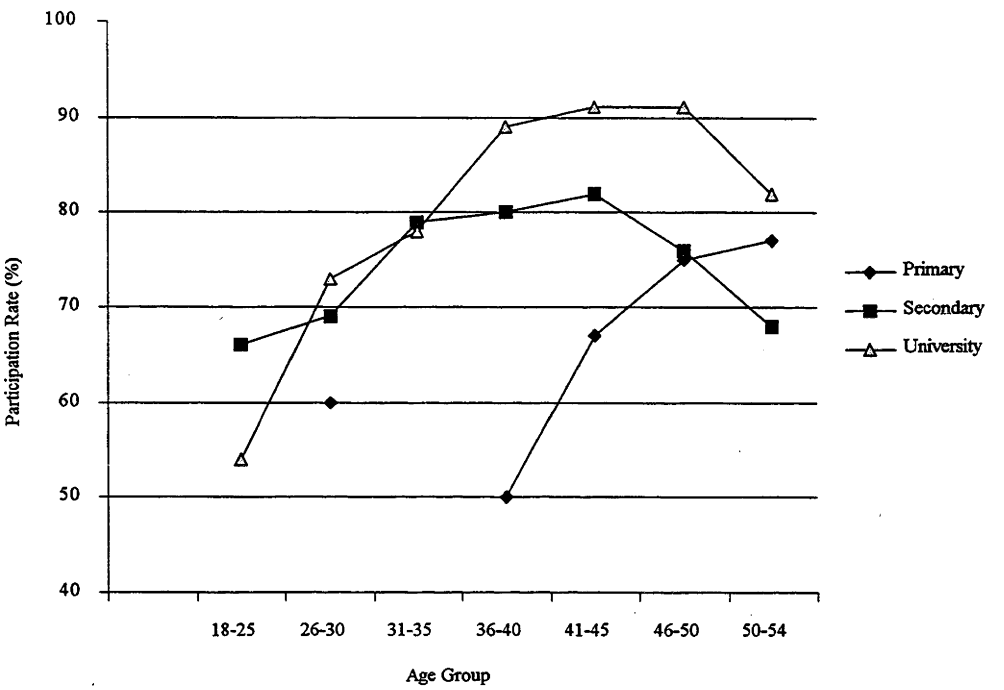
Second, education patterns are of interest. The education patterns shown in Table 6.2 mirror the age profile, in so far as the eldest cohorts tend to have both lower educational attainments and lower participation rates. Hence, for example, the rate of labour force participation for the small number with elementary education or less (N=264) is less than 10 percent. There is a broad association between completion of education at various levels, and rates of labour force participation – the table shows the example of university education, where rates of participation for those who had completed are 67 percent, almost double that for those who dropped out.[19] This suggests that those who drop out of education move into domestic responsibilities. The overall pattern of participation rates by education level is depicted graphically in Figure 6.1.

The majority of married women participate in the labour force (Table 6.2). Not shown in the Table is the relationship between the rate of participation and the number of children. In Western countries, there tends to be a negative correlation.[20] This can be observed for the present sample, for whom data are available on young children: among women with no pre-school aged children, two-thirds participated in the labour market, among women with one pre-school aged child, 53 percent participated, with the share dropping to 36 percent for those with three young children.

[19]This pattern is confirmed with the negative coefficients found in the model of the probability of participation that is estimated below.

[20]As in Ireland, for example, see Callan and Farrell 1991; for the US, see Blau and Ferber 1992, table 4.4

Figure 6.1: Female participation rates by age, 1995



This section has pointed to the factors expected to affect the probability of female participation in the labour force, and presented evidence about the correlates of participation in the present sample. The reason this matters for the current exercise is that it provides essential background for the logistic model of the participation decision and imputation procedure that is undertaken in the next section.

6.3.2 The Model

Ideally, of course, to capture experience for the purpose of earnings functions, one would obtain direct measures of work experience, as did Ofer and Vinokur

(1992), for example, in their analysis of the labour market experience of Soviet Jewish emigrês. In the absence of direct information, however, an approach is to impute female experience based on the observed characteristics of the sample (Zabzala and Arrufat 1985). This would lead to more accurate wage estimates of the role of experience.

In other words, the results from logit estimates of female participation are useful because these can be utilised to predict experience for each woman in the sample. In the rare cases where actual labour force experience has been available for the same sample (e.g. for Australia, as reported in Kidd and Shannon 1997), this adjustment leads to estimates that come much closer to approximating "true" experience than Mincerian experience (and age).[21]

The basis of these approaches is to predict the probability of female employment for each individual, backward through time, in order to derive a measure of accumulated experience. Using the single cross-section for June 1995, a logit model on the probability of employment can then be estimated. The probability of employment E_{it}^{*} of individual i in period $t-j$ is derived from a model specified as:

$$E_{it}^{*} = Z_{it}\alpha + A_i + \varepsilon_i \tag{6.2}$$

where $E_{it}^{*} > 0$ if i is working; $E_{it}^{*} \leqslant 0$ if i has no job; Z_{it} are the time-invariant variables that affect individual i's participation decision; A_i is the individual's age in years; and ε_i is a residual error term.

The independent variables are limited to the information for which there is complete information on the sample. Hence the term Z represents several variables that can be assumed to remain constant over time–viz. level of education, ethnicity, region of residence, and never having been married.

The inclusion of region in the above is justifiable since Soviet citizens' choice of residence was restricted by residence permits, known as the *propiska*,

[21] For the full sample, actual experience average 10.8 years, whereas the Mincerian proxy was 21 years. The imputed experience estimate based on the reduced form model (similar to that implementade here) was 11.6 years (Kidd and Shannon 1997, Table 3).

a system which prevailed in Uzbekistan at least up through the mid-1990s. While individuals were allowed to change jobs, inter-regional mobility in the USSR was thereby restrained (Commander and Yemtsov 1997). We specify a flexible form by using levels of education (complete and incomplete), five-year age cohorts and a series of interaction terms. The only time-varying variable for which we have complete information is the individual's age.

Some of the Western studies that have undertaken this imputation procedure have included the predicted log wage for the current period under the assumption that the individual worked in the labour market. For example, Kidd and Shannon (1997) predict the individual's wage from a reduced form wage equation that includes age, age squared and four education dummies as regressors. However, when the log wage is included in the logit model, complications follow: for example, adjustments are needed to allow for real wage changes over time, and it is necessary to exclude at least one of the wage equation regressors from the vector Z.

Kidd and Shannon (1997) show that the implied wage coefficient can vary substantially with the identification restriction imposed. They conclude that there are "substantial difficulties associated with allowing for real wage growth in the derivation of imputed labour market experience" (p. 140). It is arguable that these problems would be significantly compounded in a transition context, particularly given the large shifts in real wage levels that have occurred in Uzbekistan (see Chapter 3). A critical point is that Kidd and Shannon (1997, p. 142) also show that, at least for the case of Australia, ignoring real wage effects has little impact on experience imputation, and that the reduced form model with no adjustment for real wage growth performs much better in an econometric diagnostic sense. The preferred approach taken now, therefore, is to restrict the independent variables to those for which we have complete data since labour force entry, which excludes the real wage from the model.

Results

The model presented in equation 6.2 is estimated in STATA as a logistic regression on the sample of 2789 women of working age. An age cut-off is used rather than dropping women who had actually retired, since the latter might well introduce bias into the analysis.[22] The age cut-off is 55 years, the normal age of pension eligibility. This excluded 572 women from the sample.[23]

Three alternative specifications of the logistic regression model were estimated. Model 1 is a basic model, Model 2 includes a range of regional and ethnic terms interacted with schooling. Model 3, which includes an interaction term between marriage and years of schooling, is the preferred model, since the additional interaction terms allowed the relationship between the observed variables and the likelihood of being in employment to be more fully captured by the model.[24] The significant results are presented in terms of marginal effects in Table 6.3, and the co-efficients and Z-values of the model are in the appendix (Table 6A.1).

The marginal effects in Table 6.3 were calculated relative to a base case, viz. unmarried, educated to primary level or less, aged under 25 years and

[22]The exclusion of women of retirement age is standard international practice in modelling participation decisions (Callan and Farrell 1991), since modelling of the retirement decision raises different considerations (such as pension entitlements) to that of participation.

[23]A smaller number of women (77, or 3.5 percent of the sample) reported themselves as "not working for health reasons". These individuals were retained, since health and disability from an employment perspective is largely qualititative and a question of degree.

[24]Theory does not provide any firm guide as to the appropriate functional form of the model, so that we need to justify on empirical grounds. A summary schooling term is used instead of education dummies for the interaction terms. To test the validity of the restriction, this involves the ratio

$$\lambda = \frac{\max L(\theta)^R}{\max L(\theta)^U}$$

(Maddala 1988, p. 84). The Likelihood Ratio test consists of using -2log$_e\lambda$ as a $\varkappa^2$ with degrees of freedom k, where k is the number of restrictions (in this case, 25). In this case, $\lambda = 1$, which is well below the critical table value of 11.5.

living in Tashkent. Specifically, the marginal effect of variable a is obtained via matrix multiplication:

$$\frac{\exp(X_a^*\beta)}{1+\exp(X *_a \beta_a)} - \frac{\exp(X_{BASE}\beta)}{1+\exp(X_{BASE}\beta)}$$

where β is vector of logit coefficients obtained from Table 6A.1, X_{BASE} is the base case of characteristics as defined in the text. The calculation of the marginal effects for the interaction terms is somewhat more complicated, requiring that a different base case be used in each case, consistent with the nature of the interaction.[25]

The results can be highlighted as follows. First, marital status is significant. The negative effect of being married, of the order of one-third, is largest in Model 3. Marital status reflects in part the availability and level of alternative sources of income. It may also proxy the presence of children. Hence the finding that women who are married are generally less likely to work outside the home is a common finding in the international literature (Blau and Ferber 1992, p. 90).

Second, education generally has a positive effect on the likelihood of employment. This is clear in Model 1, where there is a positive relationship between the level of education and the likelihood of employment. This is consistent with the international literature (Blau and Ferber 1992, p. 94), and may be explained in terms of women who plan to spend a relatively higher proportion of their time in paid employment to be also more likely to invest more in education. The net impact of education is also positive in Model 3, once the large positive interaction effects between schooling and region, ethnicity and marriage are taken into account. The largest impact occurs in the case of marriage, of the order of 65 per cent.

[25] For example, the base case for Fergana*schooling has Fergana region (cf. Tashkent for the general base case) and complete secondary schooling (the school category equivalent to the mean number of years of school for the Fergana sample). In the $X*$ case, the value for schooling is entered as the value of the mean number of years of school (10.7), plus the standard deviation (2.5).

Table 6.3: Logit model of female employment: marginal effects

Variable	Model 1	Model 2	Model 3
married	-.060	-.117	-.334
Education (relative to primary or less)			
incomplete secondary	-.065		
complete vocational			-.247
complete college	.174		
incomplete university		-.259	-.284
complete university	.163		-.211
Ethnicity (relative to Uzbek)			
Slavic		-.354	
Age (relative to 16-25 years)			
Aged 26-30	.253	.084	.062
Aged 31-35	.340	.178	.152
Aged 36-40	.479	.331	.304
Aged 40-44	.551	.411	.387
Aged 45-49	.522	.390	.368
Aged 50-54	.225	.079	.068
Region (relative to Tashkent)			
Karakalpakalstan		-.354	-.372
Fergana	.043	-.354	
Interaction terms			
Fergana and schooling		.483	.384
KKP and schooling		.514	.375
Slavic and schooling		.198	.218
Married and schooling			.651
N		2789	

Age is significant and, relative to the youngest omitted group (16-25 years), positive in each of the models. The pattern of effects is consistent with what was observed in the cross-tabulations. The size of the effects is reduced somewhat by the inclusion of the interaction terms that were discussed above.

After estimating the preferred logit model, the sample was expanded by creating additional observations for each women for each year from the survey year back to the year when she left school. On this expanded sample, the probability of employment was predicted for each observation based on the individual's vector of (unchanged) characteristics, and age in that year. The predicted probabilities, from school-leaving year up through to the year of the survey (1995) are then summed for each individual to yield a "corrected" measure of labour market experience (Zabzala and Arrufat 1985; Kidd and Shannon 1997). The expanded sample was then collapsed back to the original number of observations.

6.3.3 Limitations

In implementing this approach, potential drawbacks need to be borne in mind. The most important relate to the assumption of time-invariance and to the constraints imposed by the data, in particular, the lack of complete fertility information. These deserve some elaboration.

It is assumed that there are no changes over time in unmeasured factors affecting the probability of female participation, that the variables chosen do not vary over time, and that there are no group or cohort effects. In other words, differences in the propensity to work of a 30 year old woman today and a 30 year old woman twenty years ago are assumed to be attributable to differences in the values of the explanatory variables in the vector Z. Depending on the particular economic and institutional context, such an assumption may be problematic.

An obvious example would be where female labour force participation

rates have been rising, a common phenomenon in Western countries, at least since 1970 (see Table 6.1). In Uzbekistan, by way of contrast, employment rates have been quite stable in recent decades. Section 6.2 presented evidence that labour force participation rates of working age women in Uzbekistan rose from 60 to 65 percent between 1960 and 1980. (In Russia, the rates rose from about 67 to 87 percent over the same period.)

One potential problem arises from part-time, as opposed to full-time, employment, which would be worth less in terms of labour market experience. It is assumed here that the individuals were working full-time. The assumption of full-time rather than part-time employment over the work history is justified in the former Soviet context. In 1992, only 1.2 percent of women worked part-time (Katz 1994). However to the extent that any falls in female participation and employment during the transition have taken the form of selective withdrawal from the labour market of certain types of women, this could be problematic since the estimates are based on the characteristics of those participating in 1995.

Another problem arises because the lack of complete fertility data for the sample.[26] Age can only provide an imperfect proxy for the presence of children since fertility rates have tended to fall in recent decades: an Uzbek woman could expect to have four children in the 1990s, which is two less than in the early to mid 1970s. This is shown in Table 6.4. The total fertility rate is a measure of fertility which represents the theoretical number of births to a woman during child-bearing years using the given year's birth rate as a constant (UNICEF 1998, p. 126).

Since they are dependent on the length of the interruption to employment associated with each birth, the decline in fertility rates suggests that women in older cohorts have fewer years of actual employment experience than women who entered the labour force after the mid 1980s. Because only

[26]There is full information on pre-school aged children (under seven years) for individual women, but no specific information on either the number or age of any other offspring for women in the sample at the individual level.

Table 6.4: Fertility trends in Uzbekistan, 1958-1993

Year	Total Fertility Rate
1958-59	4.92
1965-66	5.53
1969-70	5.67
1975-76	5.67
1978-79	5.09
1985	4.68
1989	4.02
1993	3.80

SOURCE: Goskomstat 1988/1990
UNICEF Transmonee Project Database
NOTE: See text for definition.

the existence of children presently aged under seven years is known for individual women in the sample, it would be wrong to make inferences from mothers with young children to the whole sample of women because of these cohort-type effects. This unavoidable degree of imprecision in the measurement of work force attachment is offset, to some extent, by the inclusion of the status of "never married" in the logit model.

The rate of single motherhood in Uzbekistan is not high: only 4 percent of births in 1989 were to unmarried mothers, compared to 14 percent for Russia, for example.[27] Thus being single might be taken as a proxy for the absence of children, and might also be interpreted as providing some insight into work force (as opposed to family) attachment.[28]

A final problem is that this imputation procedure likely gives rise to additional "noise", because of selection effects. The procedure entails the loss of some information about the likelihood of an individual who is participating in the labour force at time t. Selection effects mean that an individual who

[27] UNICEF, 1998, Table 2.2.

[28] The coefficient on single status in a logit participation model is positive and significant. Married status has a large negative impact on the likelihood of being employed.

is in the labour force at time t is more likely (than an average member of the population) to have been participating at time $t-1$. The present procedure uses predictions derived from the average logit coefficients and thus imposes an average participation relationship for all women. This means that their probability of participating in the previous period is based on their observed characteristics, even if it neglects the fact that they are in fact participating at the later date.

6.4 The Effect of Imputation

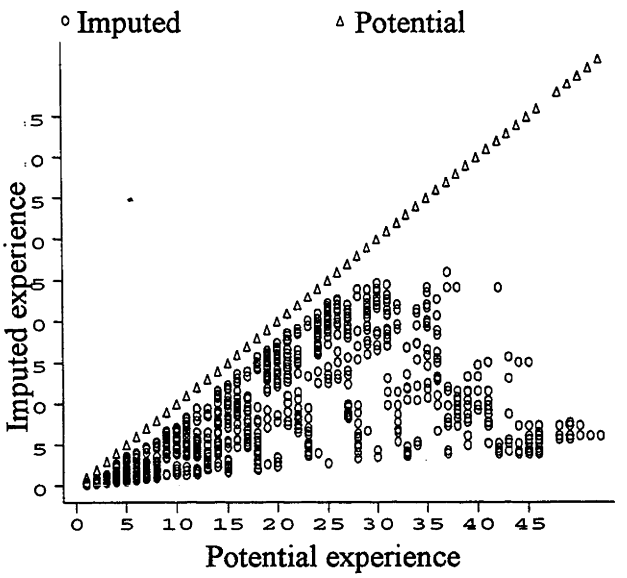
This section sets out the results of the imputation procedure. First, the results are graphically illustrated, and then the effect of imputation is shown for individuals with various selected characteristics. Second, the effects of imputed experience on the estimated returns to experience are presented.

6.4.1 Results

What is the effect of the imputation procedure? The results of the individual-based correction are shown graphically in Figure 6.2. It is not a simple proportionate adjustment, since the extent of correction depends on the individual's observable characteristics. Each dot represents the imputed amount of experience for an individual woman. The 45 degree line in Figure 6.2 represents Mincerian experience and, as must be true, all the imputed experience estimates lie below that line.

Table 6.5 illustrates the average effect of 'correcting' experience for groups with selected economic and demographic characteristics. The extent of correction varies significantly across groups, as shown by the ratio of imputed experience to age given in the final column. For women in the sample with children under seven years of age, for example, the imputation reduces their measured experience by 60 percent, about twice that of those women with-

Figure 6.2: Imputed versus potential experience



out children.[29] By region, women in Tashkent appear to have less continuous work records than those outside the capital, which is consistent with the relatively higher measures of experience derived for workers in agriculture, and those with only secondary education.

6.4.2 Returns to Experience

The impact of alternative approaches to the measurement of experience can be examined by looking at the results from a basic OLS earnings regression using alternative measures of experience. Three versions of the basic model, with "experience" and its quadratic and years of school as regressors are

[29]This result is not unexpected, of course, although reassuring given that information about the presence of children is not actually included in the logit model.

Table 6.5: Comparison of age and imputed experience for selected characteristics

	Age (years)		Imputed experience (years)		Imputed/ Age
	Average	Std. Dev.	Average	Std.Dev.	
Total	35.0	9.8	8.9	6.9	0.70
Education level					
Secondary	33.8	9.1	9.4	7.2	0.79
University	38.7	9.0	9.8	5.9	0.66
Employment					
Agriculture	33.6	9.2	9.0	7.3	0.79
State Enterprise	35.6	10.0	9.0	6.8	0.68
Private	33.7	10.4	8.3	7.4	0.71
Region					
Tashkent	37.9	10.3	9.7	6.7	0.65
Fergana	33.7	9.4	9.2	7.1	0.76
Karakalpakalstan	33.5	9.2	7.8	6.9	0.75
Demographic					
Married	36.2	8.9	9.8	6.9	0.78
Not Married	31.5	11.3	6.7	6.7	0.59
Children	35.7	16.4	7.5	6.5	0.40
No children	37.8	10.4	10.8	7.1	0.68
Ethnicity					
Uzbek	33.7	9.4	8.6	6.9	0.73
Slavic	40.0	10.9	10.9	6.8	0.62

estimated on the female sample. Model A uses *age in years* as the measure of experience; model B, *Mincerian* experience (as in Chapter 5); and Model C utilises the *imputed* experience that was derived in the preceding section. The results are presented in Table 6.6

As expected, the imputed experience term affects the returns to experience. The measure of imputed experience suggests that women, on average, have far fewer years in employment, which in turn significantly increases the estimated returns to each year of experience. Age as a proxy for experience suggests that additional years on average bring less than a 0.5 percent increase in wages. The use of Mincerian "potential" experience leads to a similarly low coefficient (though in both cases the term is very insignificant). Average years of imputed experience are less than a quarter of the average age, and the associated returns to experience are about four times as high under the imputed approach. It is noted that experience in each of the model is associated with low t-statistics; this has to do partly with functional form, an issue addressed in the next chapter.

Table 6.6: Alternative experience measures: summary OLS results

	Model A		Model B		Model C	
"Experience"	.0085	(0.585)	.0054	(0.765)	.0196	(1.59)
"Experience" squared/100	.0026	(0.133)	.0132	(0.741)	-.0550	(-1.02)
Years of education	.0745	(9.74)	.0861	(10.83)	.0748	(9.77)
Constant	4.95	(19.42)	5.00	(45.70)	5.18	(52.75)
Adjusted R^2	.148		.148		0.134	
N	707		707		691	

NOTE: t-statistic in parentheses.
See text for derivation of the imputed measure.

The reported coefficients from the OLS regression do not directly show the effect of experience at various ages. To do this, a further simple calculation is required, multiplying the respective coefficients by the relevant number of years of experience and its square. This shows the effect of alternative

measures of experience on the measured contribution of experience, over a range of years in the experience profile. The results of this exercise are presented in Figure 6.3 and Table 6.7.

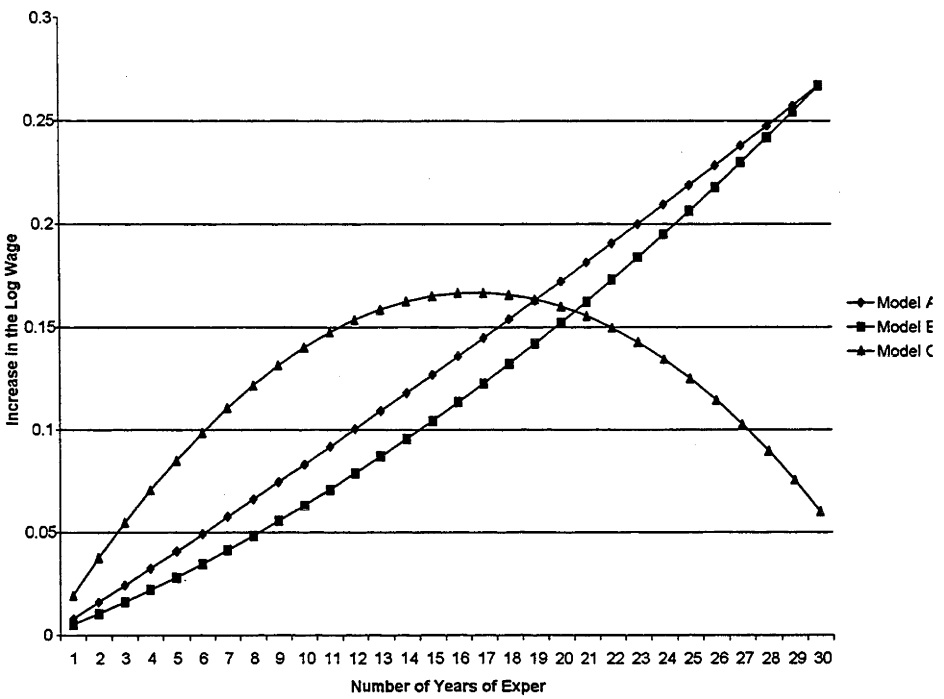
Figure 6.3 shows that the imputed experience measure forms an experience-earnings profile of familiar shape, whereas the other measures are, unusually, convex in form. This means that using the imputed measure, there is more rapid growth of earnings in the first decade or so of work experience.[30] For example, Model C suggests that at two years of experience, a woman has 4 percent higher wages than a new entrant, whereas Model A suggests a difference of only 1.6 percent and for Model B, the difference is only 1 percent. At six years, the effect of experience relative to a new entrant is about 10 percent according to Model C, but less than half that amount for Models A and B. For Model C (the imputed measure), the effect of experience peaks after around 17 years in the labour force. A woman with 17 years of experience, holding education constant, would have about 16.7 percent higher earnings than a woman with no experience.

The actual figures underlying the graph are presented for selected years in Table 6.7. The effect of the measure of experience on the estimated increase in earnings due to experience clearly varies over the range of working ages. As depicted in the graph, the imputed measure suggests that there is more rapid growth of earnings in the first decade or so of work experience. At the mean number of years of experience, the estimated increase in earnings due to an additional year of experience under Model A is only 57 percent of that estimated using the imputed experience variable in Model C. Up to about 20 years of experience, both the Mincerian and age proxies for experience show a smaller increment in earnings due to experience.

As noted at the outset of this chapter, the value of experience from a human capital perspective derives from the associated training that takes

[30] The literature review in the next chapter suggests that this more rapid initial growth is consistent with the "stylised facts" of the experience-earnings profile found in international studies.

Figure 6.3: Alternative experience-earnings profiles



place on-the-job or through more formal mechanisms. The idea is that employers value experience because of its productivity-enhancing effect. The results presented in this section could be taken to suggest that the use of age or Mincerian experience as a proxy for actual time in employment leads to mismeasurement. If this is the case, then the use of such proxies would tend to bias the estimated returns to female experience in a model of earnings.

6.5 Conclusions

The typical pattern of female labour force attachment in Uzbekistan is much more intermittent than suggested by age, or by the Mincerian proxy for

Table 6.7: Increase in earnings associated with experience (percent)

Years	Measure of Experience					
of experience	Model A	Model B	Model C	A/B	B/C	A/C
5	4.1	2.8	8.5	1.44	0.33	0.48
9 (mean)	7.4	5.5	13.1	1.34	0.42	0.57
15	12.7	10.4	16.5	1.22	0.63	0.77
20	17.2	15.2	16.0	1.15	0.87	1.00
25	21.9	20.6	12.5	1.06	1.65	1.75

NOTE: Model A uses age as a proxy, Model B, Mincerian potential experience and C is the imputed measure (see text for derivation).

experience. In other words, the rate of investment in human capital on the job per year of age is lower for women than for men. In the former Soviet Union, as elsewhere, this is generally due to the greater family responsibilities being borne by women.

This chapter presented and applied an imputation method, showing how measures of experience can be adjusted to better reflect actual work force attachment of individuals in the sample. The imputation method was shown to be simple, and the data requirements relatively undemanding, although there are caveats related to the underlying assumptions.

The use of age or Mincerian proxies for female experience will always tend to bias the coefficients on experience downward. In the absence of time series effects, the suggested imputation method would, *on average*, provide a true measure of experience. The coefficient estimates for imputed experience are about three times larger than that on Mincerian experience. But note that even if the imputation leads to measures that are correct, on average, it does *not* follow that the resulting imputation will be correct for every individual. For individuals, the measure is inevitably "noisy" because one is relying on logit coefficients and observable characteristics to derive a probability of labour force participation over time. This is based on the observable correlates of participation in the current cohort of participants. It may well

be that there are differing unobservable characteristics of the group presently participating that are not taken into account. Ideally of course, one would compare the results with information about actual experience, but that is not possible in the present case. This calls for caution in interpretation.

One might expect that the estimated extent of unexplained gender wage differences is sensitive to the measurement of female experience. Chapter 8 applies the imputed measure to illustrate its importance for analyses of gender discrimination in the labour market. It will demonstrate that the use of age in human capital functions for women in the former Soviet republic of Uzbekistan, and by implication, in the Russian Federation and elsewhere, will tend to overestimate the extent of unexplained wage variation in the labour market.

The effects of alternative measures of experience were illustrated in this chapter using the conventional use of experience and its quadratic. Yet there is a growing body of international evidence that suggests that this is not the appropriate functional form. Therefore before going on to develop an extended model of earnings determination in Uzbekistan, the functional form related to the specification of experience is addressed in the next chapter.

6.A Appendix

Table 6A.1: Logit model of female participation decision

	Model 1	Model 2	Model 3
Variable	Coeff. (Z)	Coeff. (Z)	Coeff. (Z)
married	-.377 (3.0)	-.583 (-4.8)	-1.66 (5.1)
Education (relative to primary or less)			
incomplete secondary	-.415 (-2.8)	-.229 (-1.5)	-.178 (1.6)
complete vocational	-.242 (-.62)	-.637 (-1.6)	-.733 (-1.9)
complete college	.824 (5.1)	.315 (1.8)	.167 (.94)
incomplete university	-.194 (-.71)	-1.04 (-3.6)	-1.12 (-3.9)
complete university	.773 (4.9)	-.061 (-.31)	-.437 (-1.9)
Slavic (relative to Uzbek)	.227 (1.5)	-1.19 (-2.3)	-.727 (-1.3)
Aged 26-30 (relative to <26)	1.14 (8.1)	.962 (6.7)	.948 (6.7)
Aged 31-35	1.49 (10.2)	1.34 (9.2)	1.31 (8.9)
Aged 36-40	2.10 (12.5)	1.99 (11.9)	1.95 (11.6)
Aged 41-45	2.48 (12.0)	2.39 (11.4)	2.36 (11.2)
Aged 46-50	2.32 (9.28)	2.28 (9.0)	2.26 (8.9)
Aged 51-55	1.03 (4.35)	.943 (3.9)	.97 (4.0)
KKP (relative to Tashkent)	-.09 (-.06)	-1.32 (-3.4)	-.928 (-2.2)
Fergana	.230 (1.84)	-1.33 (-4.0)	-.678 (-1.7)
Constant	-1.21 (-7.14)	-.60 (-3.5)	-.521 (-3.1)
Fergana and schooling		.150 (5.0)	.088 (2.5)
KKP and schooling		.112 (3.3)	.077 (2.1)
Slavic and schooling		.122 (2.9)	.078 (1.8)
Married and schooling			.104 (3.6)
N		2789	
Log Likelihood	-1559.72	-1567.5	-1560.72
Prob > chi^2	0.0000	0.0000	0.0000
Pseudo R^2	0.1583	0.1613	0.1649

Chapter 7

Functional Form and Experience

7.1 Introduction

This chapter investigates alternative specifications of the earnings model with respect to experience, or the "experience-earnings profile". In empirical applications of human capital theory, years of experience are taken to represent post-school enhancements to individual productivity, usually associated with on-the-job training. The observed correlation between experience and earnings is consistent with alternative explanations, however, as discussed in Chapter 4.

The measurement and specification of experience raises a number of conceptual and econometric issues. The measurement problems that arise especially for women were addressed in Chapter 6. Here the focus is on one aspect of functional form: should we include a quadratic or higher order polynomial term on experience? The preferred option has substantial effects on the predicted effect of experience on wage outcomes.

The specification of the earnings function with a quadratic term on experience has been the most widely adopted form in the regression analysis of

determinants of individual wages. That is, recalling the review in Chapter 4,

$$w_i = \alpha + bS_i + cT_i + dT_i^2 + u_i \tag{7.1}$$

where w_i represents the natural logarithm of labour earnings for individual i, S_i represents years of schooling for individual i, T_i represents years of work experience for individual i, and u_i is an error term (see Chapter 4.2). For example, all the empirical studies of earnings determination in transition economies reviewed in Chapter 4 used a quadratic term on experience. But the wider international literature has increasingly recognised that this may not be the most appropriate specification. Alternative specifications for experience have been demonstrated to dominate the quadratic model in a number of contexts, including the USA (Murphy and Welch 1990) and Australia (Borland and Suen 1994). There is a range of reasons why this might be so, not least because the quadratic form forces a simple non-linear relationship with a single turning point. This chapter explores the extent to which these issues matter in the transition context of Uzbekistan.

Alternative polynomial specifications of experience have substantial implications for the estimated effect of experience on earnings in Uzbekistan. This heightens the importance of an investigation into the preferred functional form. One might also expect that alternative specifications of experience have repercussions for the estimated coefficients on other variables, as discussed in the previous chapter. In fact, however, this is not the case for schooling (as shown in the regression results for each of the models presented in the appendix to this chapter, the coefficients on education are similar in each case, for women and men).[1]

The analysis of age or experience profiles based on a single snapshot encounters the potential difficulty of confounding true age effects with cohort and business cycle effects. Cohort effects can arise because, for example, of differences in economic conditions at the time of labor force entry. The

[1]The effect of alternative experience specifications on the coefficients of other variables in the model is presented in an appendix to Chapter 8.

changes that have occurred over time are also sometimes known as 'vintage effects'.

Potential cohort effects are unfortunately inevitable with cross-sectional analysis. At the same time, however, at least for the United States, Murphy and Welch argue that "the specification bias induced by ignoring changes in the age-earnings profile from year-to-year is actually smaller than the bias generated by the quadratic specification" (Murphy and Welch 1990, p. 203). In the present case, possible vintage effects could arise from demographic changes over time as well as from the macro-economic and structural changes associated with the demise of central planning. Hence an investigation of the appropriate functional form is still well worth undertaking, bearing the possibility of vintage-type effects in mind.

This chapter is structured as follows. In the next section, the theoretical rationale for alternative polynomial specifications is set out. Section 7.3 subjects the alternative approaches to some conventional diagnostic tests. In Section 7.4 non-parametric methods are introduced, outlining the underlying theory before presenting the results and possible interpretations. Section 7.5 provides a graphical comparison of non-parametric and polynomial results before the final section concludes.

7.2 Polynomial Specifications

7.2.1 Theory

Given the basic human capital model, the question arises, what is the appropriate form of the life-cycle investment ratio? Borland and Suen (1994) note that human capital theory does not provide specific guidance here, beyond the implication that at some point in an individual's working life, investment in human capital should begin to decline.

Ben-Porath (1967) analysed the optimal distribution of human capital

investment over the life cycle.[2] Rational allocation of time for human capital investment suggests that most of the investment in human capital would be undertaken at younger ages, for several reasons: the payoff period is longer, postponement reduces the value of present gains and also because later investments could involve higher opportunity costs (Mincer 1997, p. S28). The idea is that, at the individual level, depreciation eventually outstrips declining new investment in human capital. This implies that the experience-wage profile will slope upwards, and then downwards.[3]

At the same time, there are reasons to believe that ,and/or circumstances where, the simple experience-earnings story might not hold. First, on the supply side, the existence of uncertainty due to structural change might lead rational individuals to delay investments in human capital given irreversibility. Chapter 3 documented the significant declines in vocational, college and university enrolments, both full-time and part-time, that have occurred during the transition. This could be related to increased uncertainty about the value of such training and qualifications under the new market conditions.

Second, on the supply side at the firm level, the output declines that have accompanied the transition might be expected to reduce the provision of training by firms, which could apply to both general and specific training. Large declines in output relative to firm capacity imply significant reductions in work activity at the plant level, and corresponding reductions in learning-by-doing.

On the other hand, if the transition from a command economy is associated with more rapid technical change, highly educated workers might be expected to have a comparative advantage in the adoption and implementation of new technologies (Bartel and Lichtenberg 1987), which would in turn be reflected in their experience-earnings profiles. These possibilities are elab-

[2] By way of contrast, Becker (1975) focussed on the optimal distribution of total accumulation across persons (Mincer, 1997, p. S27).

[3] Given technical progress and economic growth, actual declines in earnings increments over time would normally seem to be unlikely.

orated below in the interpretation of the empirical results for Uzbekistan. It is sufficient to note at this stage that in such circumstances, the profiles of earnings and experience may be more complex than the simple path depicted by a quadratic model.

The conventional way that economists have conceptualised paths of individual training in a human capital framework can be set out as follows. An individual i from schooling group s has net earnings (Y), and R is the rate of return to her post-school investment. In period t, k_{it}^s is the fraction of time spent by the individual in human capital investment activity in that period. This is also referred to as the "individual human capital investment ratio."

Earnings capacity E depends on the amount of, and rate of return to, post-school investment and level of schooling. Mincer (1974) suggested that the individual human capital investment ratio might be a declining function of $T = t - s - 1$, the number of years since leaving school (not counting the current year, year t). He considered two possible specifications. One assumption saw human capital investment declining on a linear path, in which case

$$k_i^s = a^s - b^s T_i$$

where the respective $a^s, b^s > 0$, and are parameters for schooling group s.[4]

If the rate of return on post-school investment is constant and the investment ratio has a linear inverse relation with experience, then it can be shown that the net earnings function is:

$$\ln Y_i^s = \ln E^s + \ln(1 - k_i^s) + r\left(a^s - \frac{b^s}{2}\right)T_i - \left(\frac{rb^s}{2}\right)T_i^2.$$

This is the familiar earnings function that is quadratic in years of post-school investment.

[4]Alternatively, human capital investment was assumed to follow an exponentially declining path as experience increased:

$$k_{iT}^s = c^s e^{(-d^s T)}$$

where again, $c^s, d^s > 0$ are parameters for schooling group s.

If, on the other hand, the investment ratio declines at an increasing rate according to the quadratic equation

$$k_i^s = a^s - b^s T_i - g^s T_i^2,$$

then the net earnings function would be:

$$\ln Y_i^s = \ln E^s + \ln(1 - k_i^s) + r\left(a^s - \frac{b^s}{2} - \frac{g^s}{6}\right) T_i - \frac{r}{2}(b^s + g^s)T_i^2 - r\frac{g^s}{3}T_i^3$$

which involves a cubic in years of post-school investment in human capital. Similarly, if the investment ratio is assumed to include a cubic term, then the associated earnings function has a quartic function on the years of post-school investment.

It should be recalled that critics of the human capital explanation of the observed correlation between experience and earnings have argued that it has not been proven that the productivity-enhancing effects of post school investment actually cause the higher earnings[5] (see Chapter 4). It was noted that, thus far, the empirical relationship on the relationship between tenure and productivity is mixed, with some studies supporting the human capital explanation and others refuting it. The present data set does not permit such an inquiry.[6] In any case, however, these points are borne in mind in the analysis and interpretation below.

7.2.2 Method

The preceding section has shown that different assumptions about the form of the investment ratio imply different order polynomials in experience in the associated earnings function. This provided the context for investigation of

[5] See, e.g., Medoff and Abraham (1980).

[6] If there are returns to tenure, then the coefficients on experience (and possibly other regressors) will be biased (Chapman and Tan 1980). On the other hand it is possible that tenure is less important in the post-socialist context of Uzbekistan given (i) greater standardisation of firm technology in the planned economy and (ii) the importance of agriculture in the economy.

more flexible forms in the specification of experience in the earnings model. It has already been noted that theory does not provide much guidance with respect to the specification of experience in the earnings function. However the issue of functional form is important even if one is not committed to a "training-only" interpretation of the experience-earnings profile, wherein all changes in the slope of the profile can be traced back to patterns of on-the-job training. In the analysis that follows, the following equations are estimated for each schooling group:

$$\ln Y_i = \alpha + \beta_1 T_i + \beta_2 T_i^2 + \gamma X_i + \varepsilon_i \tag{7.2}$$

$$\ln Y_i = \alpha + \beta_1 T_i + \beta_2 T_i^2 + \beta_3 T_i^3 + \gamma X_i + \varepsilon_i \tag{7.3}$$

$$\ln Y_i = \alpha + \beta_1 T_i + \beta_2 T_i^2 + \beta_3 T_i^3 + \beta_4 T_i^4 + \gamma X_i + \varepsilon_i \tag{7.4}$$

which are referred to as the quadratic, cubic and quartic models respectively, where T_i equals years of experience of the ith individual and X_i is a vector of exogenous characteristics (see Chapter 5).

How should different education groups be treated in this evaluation? In theory, different levels of schooling might be expected to be associated with different paths of on-the-job training. Empirically, a positive correlation between the level of schooling and job training has been observed in a number of Western studies.[7] The expectation that changes in the economy have affected relative labour demand for workers with different levels of education (Katz and Murphy 1992) is another reason to separate the sample thus.[8] In their investigations of experience-earnings profiles, Borland and Suen (1994) and Pagan and Ullah (forthcoming) both carry out their estimations separately for each schooling group in order to avoid schooling and experience interaction effects being confounded in the measured returns to experience.

[7] See Lillard and Tan (1986); Mincer (1988).

[8] In the US, for example, changes in relative labour demand over the past 25 years have been seen to have favoured the relative labour demand for more educated workers (Katz and Murphy, 1992, p. 36).

One way to test whether the same procedure should be adopted in this study is to introduce terms which interact experience and different levels of schooling, and test whether these terms are jointly significant. This provides a test of whether the returns to experience vary by schooling group. To do this, interaction terms for each level of education and the quadratic, cubic and quartic orders of experience are constructed, and the models are estimated separately by sex.

The results clearly reject the separation of women by schooling group, since the interaction terms were jointly insignificant in the quadratic, cubic and quartic cases. For men, by way of contrast, the interaction terms were jointly significant at the 5 percent levels, or less.[9] Hence in the analysis that follows, the sample of women is pooled, while men are separated by level of education.

The final point on methodology is to recall how experience is measured for males and females in the sample, and also the nature of the schooling groups. For males, experience is calculated according to the Mincerian convention - that is, age minus years of school minus age of school entry. For women, Chapter 6 derived and imputed a corrected measure of experience that takes into account the likelihood of interruptions to the work career. Table 7A.1 in the appendix presents the regression results for both specifications for women, indicating the increase in returns to "experience" associated with the imputed measure. Table 7A.2 shows the breakdown of the male and female samples for experience groupings and, for women, for selected education categories.

[9]The joint significance of the interaction terms (different polynomials on experience and levels of education) were as follows:
(i) for the quadratic, prob.>F=0.0263;
(ii) the cubic form, prob.>F=0.0110; and
(iii) quartic form: prob.>F=0.0340.

7.2.3 Testing Polynomial Specifications

In this section, the adequacy of alternative models is tested. The approach adopted is to compare fully estimated alternative models - specifically, the quadratic, cubic and quartic models.[10] If the initial model is "correct", then adding additional regressor variables should not improve econometric performance.

A range of methods is used to evaluate the appropriate functional form of the earnings model with respect to experience, namely:

1) $F-$ and t-test of significance levels on the coefficients;

2) Adjusted R-squared; and

3) Reset test, which tests for omitted variables in regression specification.

In all the analysis that follows in this chapter, the earnings functions are specified including only the experience terms as regressors.

$F-$ and t-tests of significance

The three alternative models are run for each sub-sample, including only the orders of experience as regressors, and the associated F statistics and t-ratios are calculated. The results are presented in Table 7.1. The focus is on the F-statistics, which present a useful overall measure of statistical significance.

The first point to note is that experience plays a statistically significant explanatory role for the pooled samples of both men and women under each of the functional forms. For men with secondary education, each model performs similarly well with respect to an F-test. For the vocational and university groups, the cubic dominates the alternative specifications. The quadratic appears to perform particularly poorly for the university group, and is only just within the 10 percent level of significance for the vocational group.

[10] A Gompertz function is an alternative, but given its poor predictive performance (in the Australian case), Borland and Suen (1994, p. 54) recommend against the adoption of this type of function as a standard estimation methodology.

The t-test results are difficult to interpret because the patterns are less clear (see Will 1998). Within particular models, some terms are significant and others are not. For men, none of the specifications perform very well, with the exception of the quadratic model for the secondary group and the pooled sample. Among the vocational and university groups the cubic specification appears to have the highest t-statistics. The quartic appears to perform badly in terms of levels of significance. For women, referring to the pooled sample, the t-test criterion suggests that the cubic form dominates the quadratic, and also the quartic form.

Explanatory power

The *adjusted* R-squared results are presented in Table 7.2. Each of the models, which include only experience on the right hand side, has fairly weak explanatory power. The adjusted R squared for the cubic and quartic specifications for women dominate the quadratic. For men, none of the forms shows clear superiority in terms of explanatory power, though the quartic is a more consistent performer across the different education groups.

Ramsey RESET Test

This test, based on Ramsey (1969), tests for non-linear relationships between the dependent variable and omitted variables. The RESET test is potentially useful in the present case given the suspicion that the "initial model has under-represented the curvature of the function it intends to estimate" (Beggs 1988, p. 93). RESET2 in the STATA programme, involves adding the squared, cubed and quartic predictions of the model to the regression, and applying an F-test to the coefficients of the added variables. The significance of the coefficients is indicative of some kind of specification error such as incorrect functional form (Griffiths *et al.* 1994, p. 344).

Using powers of the fitted values of the wage, the hypothesis is that the model has no omitted variables. The reset test results for the pooled sample

Table 7.1: Comparison of t and F statistics using different polynomials, by sex

	Women			Men		
	Quadratic	Cubic	Quartic	Quadratic	Cubic	Quartic
All groups						
experience	2.91	3.06	2.44	3.97	2.72	0.28
quadratic	-2.33	-2.39	-1.68	-3.22	-1.65	0.51
cubic		2.01	1.27		0.90	-0.76
quartic			-1.01			0.82
Prob>F	0.003	0.001	0.002	0.000	0.000	0.000
Secondary educated						
experience				3.30	1.50	0.11
quadratic				-2.37	-0.53	0.77
cubic					0.13	0.95
quartic						0.98
Prob>F				0.000	0.000	0.000
Vocational training						
experience				0.94	1.79	1.68
quadratic				-.39	-1.59	-1.35
cubic					1.55	1.12
quartic						-0.92
Prob>F				0.099	0.072	0.098
University						
experience				1.00	-1.54	-1.07
quadratic				-1.26	1.86	0.88
cubic					-2.09	-0.64
quartic						0.40
Prob>F				0.297	0.081	0.14

NOTE: For women, pooled sample: see text.

Table 7.2: Explanatory power of alternative specifications (per cent)

	Men			Women		
	Quadratic	Cubic	Quartic	Quadratic	Cubic	Quartic
All groups	1.88	1.79	1.86	1.37	1.80	1.81
Secondary	4.19	3.96	3.95			
Vocational	0.95	1.45	1.39			
University	0.20	0.16	1.22			

Table 7.3: Ramsey RESET test results

	men	women
Pooled		
quadratic		0.5449
cubic		0.6387
quartic		0.2597
Secondary		
quadratic	0.7653	
cubic	0.5752	
quartic	0.5650	
University		
quadratic	0.7653	
cubic	0.4449	
quartic	0.5997	

of women, and for men separated by level of education are presented in Table 7.3. The coefficients are very low in each case. The F-probabilities suggest that this hypothesis cannot be rejected at the 10 percent level for any of the specifications. The insignificance of the coefficients in each of the models (quadratic, cubic and quartic) indicates incorrect functional form or omitted variables. (This result is not unexpected since the only regressor in the model is experience.)

Interpretation

The results help in the choice of functional forms. Two main points emerge:

First, there is uncertainty about the preferred specification. In particular, it is not clear that the quadratic model is the preferred specification, since it performed poorly in several respects, including the t-tests of significance for most schooling groups and the coefficient of determination.

Second, none of the specifications performed consistently well. In several cases the cubic model appeared to provide a superior specification. However the results were not clear cut.

Indeed it is difficult to establish formally the joint significance of a group of tests. The sample sizes do not allow out-of-sample prediction tests (as were undertaken by Borland and Suen 1994).[11] This motivates the use of alternative methods to point to the preferred functional form for experience. In the next section non-parametric analysis is used to help establish the preferred model.

7.3 Non-Parametric Regression Analysis

Each of the polynomial specifications still involves strong parametric assumptions, and it has been shown that none of these specifications perform particularly well in terms of conventional diagnostic tests. An alternative, non-parametric, approach to the estimation of the experience-earnings profile is therefore a useful way of letting the data suggest the appropriate form of model.

There is a rapidly expanding literature on non-parametric methods in econometrics, most recently and notably Pagan and Ullah (forthcoming). Blundell and Duncan (1997) is a valuable recent survey of kernel regression in empirical microeconomics.

[11] For example, Borland and Suen's sample included 1049 males with university degrees, whereas the present sample has less than 400.

> "The main strength of non-parametric over parametric regression is the fact that it assumes no functional form, allowing the data to choose not only the parameter estimates, but the shape of the curve itself" (Deaton 1997 p. 193).

As Pagan and Ullah (forthcoming, p. 12) note, studies of the wage paid to an individual is one area where some variables might be restricted to have a linear impact while allowing a much smaller number to have a non-linear impact. That is, whereas the impact on earnings of demographic characteristics, for example, might be assumed to be linear, the relationship between experience and earnings may be non-linear.

The application of non-parametric analysis of experience-earnings profiles is a technical innovation in the context of economies in transition, which brings the major benefit of flexibility. The approach obviates the need to pre-specify the precise analytic functional relationship between earnings and experience, which is a clear advantage given the dearth of knowledge about the role of latter in Uzbekistan.

It nonetheless carries certain disadvantages. First, and most obviously, non-parametric analysis lacks the familiar summary of the model as a small number of estimated parameters (Beggs and Chapman 1988). Second, there is no easy access to the usual test statistics including confidence intervals. Third, the observed non-parametric relationships are sensitive to choices about the "bandwidth", as explained below.

This section is structured as follows. First the theory underlying non-parametric analysis is reviewed; second, the specific method utilised in this chapter is set out; and thirdly, the results of non-parametric analysis are presented graphically.

7.3.1 Theory

The basis for the non-parametric approach recalls the definition of a regression as a conditional expectation. The data are assumed to derive from

some multi-nomial density function that is estimated using so-called "kernel" techniques, which essentially provide weighting rules in establishing the contribution of each data point. For example, given data on the log-wage $\ln Y_i$ and experience T_i, a density function $f(\ln Y, T)$ is estimated, from which the data are assumed to derive. Writing $f_c(\ln Y|T)$ as the conditional probability density function, the "regression" of the log-wage on experience is

$$E(\ln Y|T) = \int_{\ln Y} \ln Y \times f_c(\ln Y|T) d(\ln Y) = \frac{\int_{\ln Y} \ln Y \times f(\ln Y|T) d(\ln Y)}{\int_{\ln Y} f(\ln Y|T) d(\ln Y)}$$

or, using the data directly,

$$E(\ln Y|T) = \frac{[\sum_{i=1}^{n} \ln Y_i \times k_i(T)]}{\sum_{i=1}^{n} k_i(T)}$$

where $k_i(T)$ is a weighting or kernel function used to estimate the density function $f(.,.)$. In most applications, the kernel function takes the form

$$k_i(T) = k\left(\frac{T - T_i}{h}\right),$$

where h is the "band-width", and points further away from T receive less weight. Various forms of the function $k(.)$ have been used in the literature, including the rectangular kernel, the quadratic kernel, and the Gaussian kernel (see Deaton,1997, p. 173).

Thus the essential idea with non-parametric density analysis is to estimate the density $f(x)$ from the part of the sample that is "near" to x. The bandwidth is the interval or band under consideration, which controls how much smoothing occurs. There are trade-offs involved in the choice of bandwidth, since the bandwidth controls the trade-off between bias and variance (Deaton 1997, p. 174). The smaller the sample size, the wider the bandwidth needed to include sufficient number of observations, although the resulting smooth estimate risks bias from bringing in data that come from a different part of the distribution. Conversely, a small bandwidth helps allow detection of genuine underlying features in the data, but runs the risk of unnecessary variability.

There are formal theories about the trade-off between bias and variance (Silverman 1986, p. 38-40), but these are beyond the scope of our present needs. According to Deaton (1997, p. 175), an adequate procedure is to consider alternative bandwidths by plotting the associated estimates, and judge by eye whether there is under- or over-smoothing. He suggests a preference for undersmoothing, in that the eye can better ignore spurious variability than discern features that have been subsumed by oversmoothing.

The construction of a histogram is one way to look at the distribution of the data, but this has disadvantages associated with the arbitrariness in the choice of the number of 'bins' and their width (Deaton 1997, p. 171). These practical choices can change the shape of the histogram so that the empirical distribution is apparently different. There are also conceptual problems involved in reliance on a histogram - which is a tool for representing a discrete distribution - to represent the density of a variable that is inherently continuous (length of experience) (*ibid.*). Non-parametric techniques allow direct inspection of the data but do not share all the drawbacks associated with histograms.

7.3.2 Locally-Weighted Regression

A final variant of the non-parametric estimation technique, which is employed in this chapter, combines the density estimation approach above with familiar OLS regression techniques. The technique is referred to as a "locally weighted regression", or *LOWESS*.

LOWESS is a locally weighted scatterplot smoothing, which can be thought of as a series of linear regressions at different points appropriately "stitched together" (Deaton 1997, p. 193). The *LOWESS* technique uses a nearest neighbour definition of closeness rather than a kernel, thus normalising the number of data points used in each local regression, rather than the width of the band. Instead of estimating the expectation of the log-wage conditional on experience, T, by calculating a simple average of the values nearby,

the *LOWESS* approach estimates the conditional expectation by running a regression using only points close to T.

This estimation method was implemented using STATA. The basic idea is to create a new variable that, for each observation, contains the corresponding smoothed value. For $i = 1...N$, the smoothed value $\widehat{w}_i$ is obtained by running a regression of wages on experience using only a small amount of data in the vicinity of the point (w_i, x_i). In particular, *LOWESS* uses running-line least-squares smoothing, and Cleveland's (1979) tri-cube weighting function. The weighting formula used in the regression is such that the central point (w_i, x_i) receives the largest weight and points farther away (based on the distance $|x_j - x_i|$) receive less.[12]

The estimated regression is then used to predict the smoothed value $\hat{w}_i$ for w_i. The procedure is repeated to obtain the remaining smoothed values, so that a separate weighted regression function is estimated at every observation. Thus for women, a regression was run on each of the 691 observations with full information.

Non-parametric approaches to regression analysis have the advantage that the graphs tend to "follow the data," and more closely the smaller the bandwidth. In contrast, the polynomial specifications graphed in the final part of the preceding section were global, in the sense that characteristics of the data on, say, the extreme left of a scatterplot could affect fitted values on the extreme right.[13]

Following experimentation with alternative bandwidths, values of between 0.3-0.7 were chosen. This is less than the STATA default bandwidth of

[12] The weight placed on observation j, in a local regression around the point x_i, is

$$\omega_j = \left(1 - \left(\frac{|x_j - x_i|}{\Delta}\right)^3\right)^3$$

where $\Delta = \max(x_+ - x_i, x_i - x_-)$, and x_+/x_- is the highest/lowest value of x. See Cleveland (1979).

[13] Of course, this problem would arise with any functional form, polynomial or otherwise.

0.8. Bandwidths smaller than 0.3 naturally followed the data more closely, but appeared to involve 'unnecessary' variability. The chosen bandwidth means that between 30-70 percent of the data were used in smoothing each point.

7.3.3 Results

A general caution about interpretation is in order. It is not possible to draw conclusions about the statistical significance of the observed patterns. The non-parametric experience-earnings profiles may reveal which functional forms are clearly *in*appropriate, but the lack of confidence intervals means that caution is required in inferring that the observed pattern is necessarily the "true" form.

The results for women and men, disaggregated for the latter by levels of education, are presented in Figures 7.1-7.5 below. For the pooled sample of women, Figure 7.1 suggests that the experience-earnings profile rises through the first eight years or so, then there is an extended dip in the experience-earnings profile from around that time. The male sample is divided according to education level.[14] The results for males with secondary education are presented in Figure 7.2. There are "dips" for recent cohorts (0-3 years) and again at around 20-25 years.

Can these patterns be observed with respect to other levels of education? Figure 7.3 shows a quite unusual pattern for males with university education. Recent university graduates, as well as graduates with around 20 years experience, have dips in the experience-earnings profile. This finding for university graduates is perhaps surprising, and an explanation is offered in the next section.

The final groups to be examined are men with post-secondary training from PTUs and colleges. The results of non-parametric regression for men

[14]Recall that, each of the groups include a (small) share who did not gain the certification at the relevant level (see Appendix 5.1).

Figure 7.1: All females

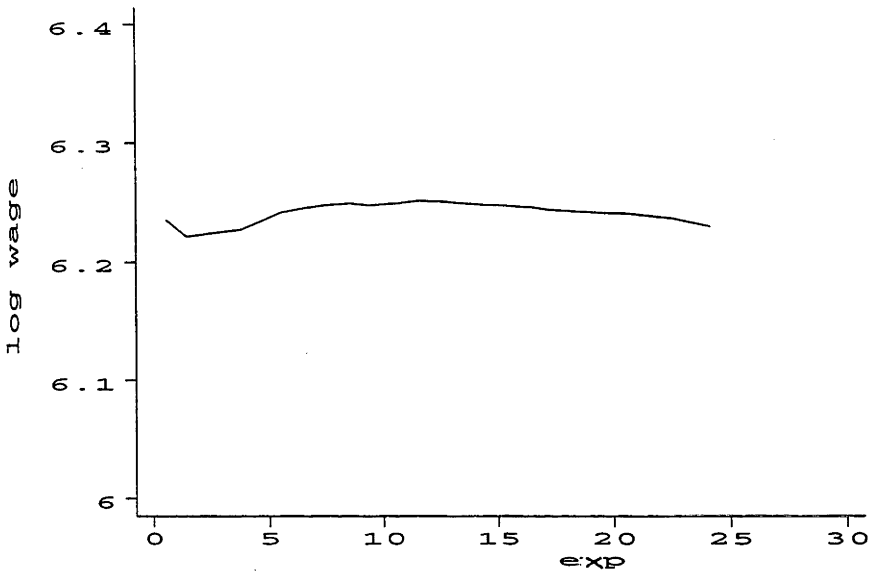


Figure 7.2: Secondary males

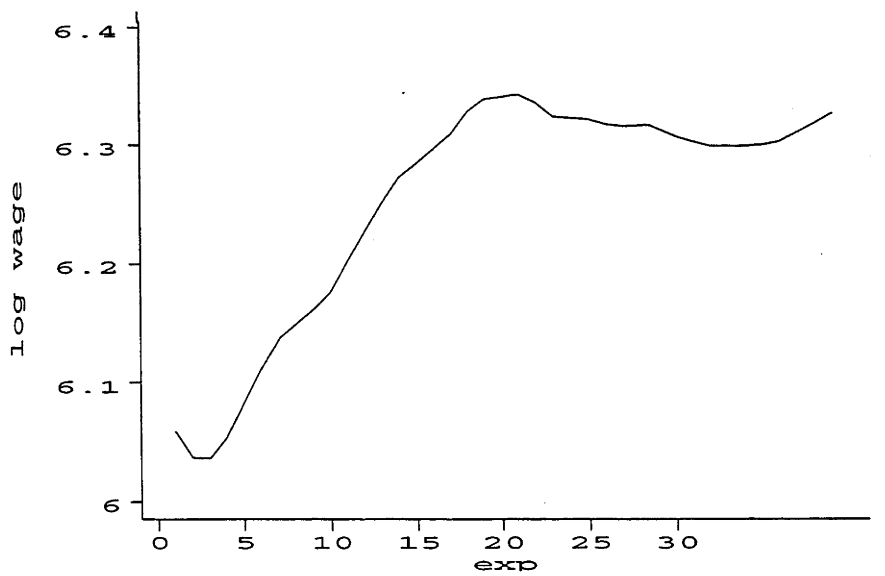


Figure 7.3: University males

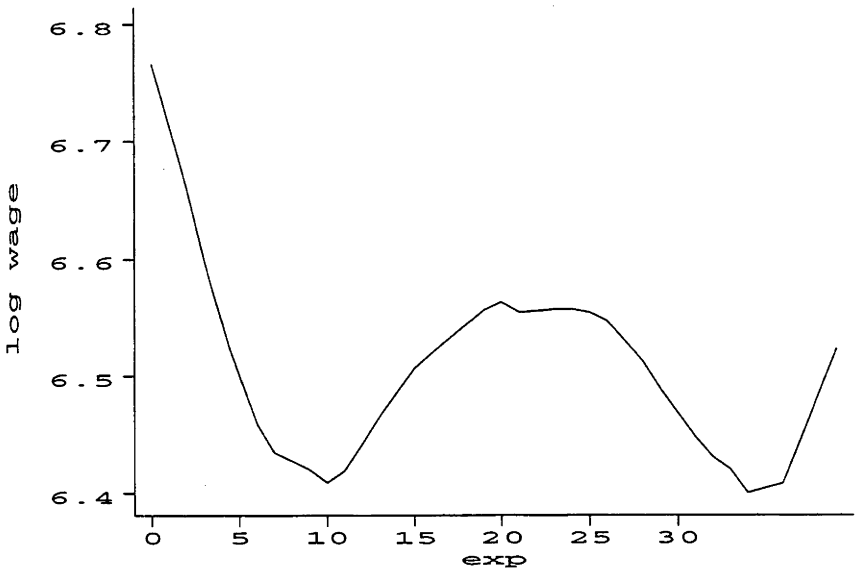


Figure 7.4: Vocational males

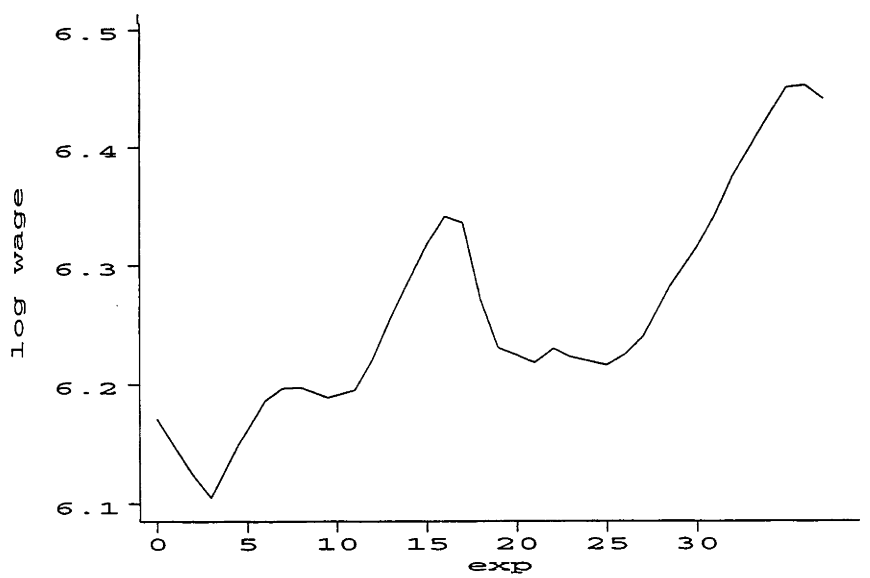
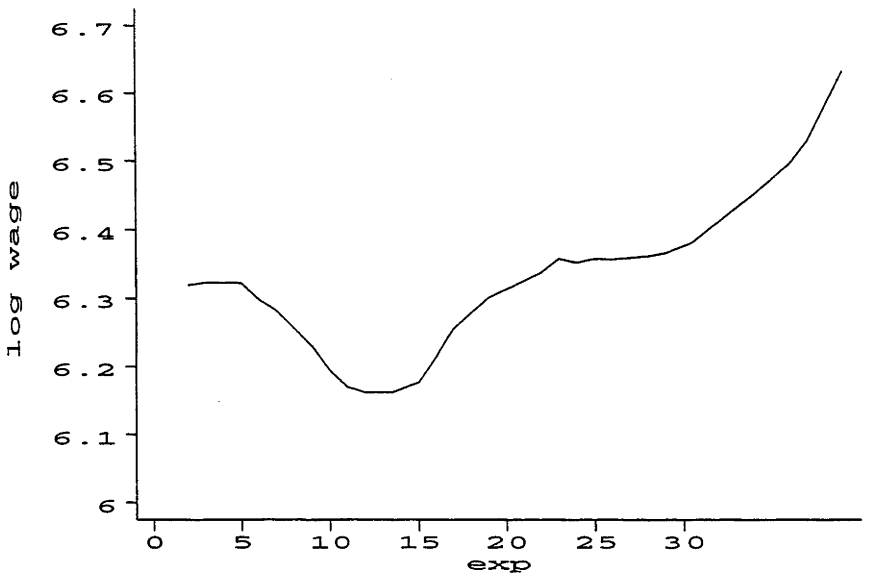


Figure 7.5: College males



with PTU (vocational) education are presented in Figure 7.4. The profile does not follow the familiar quadratic shape: there is uneven initial growth up to around 17 years in the workforce.

The results for college educated men, presented in Figure 7.5, echo the U-shaped pattern seen for university educated men. Figure 7.5 shows that recent college graduates secure higher earnings, and a convex pattern emerging again after 20 years in the workforce. The next section offers some interpretations of these results.

7.3.4 Interpretation

The profiles suggest that dips occur in the underlying earnings data at certain ranges of experience for both women, and men of different education groups. While these patterns might initially seem surprising in the context of a literature which has traditionally relied upon quadratic functional forms

for experience, the results are not unprecedented (see, e.g. Pagan and Ullah, forthcoming, pp. 151-152). Given that the data is limited to a single cross-section, definitive statements about the underlying experience-earnings profiles cannot be made. It is nonetheless useful to introduce three conceptually distinct influences on the experience-earnings profile – specifically, the actual relationship between experience and earnings, year and cohorts effects– each of which deserve some elaboration.

First, the observed cross-section patterns could actually reflect the underlying *experience-earnings* relationship in Uzbekistan in 1995. It is conceivable that the economic transition has reduced the value of higher and college education, so that these workers face a declining path of earnings during their initial years in the labour force. This would lead to the unusual downward sloping experience-earnings profile that is observed in the cross-sectional data.

Second, the onset of transition might be expected to cause *year effects,* which can be thought of as a fixed effect for all age groups. Chapter 3 elaborated a series of major economic and structural changes in the economy that could cause year effects. One obvious example in the present case arises from the substantial slowdown in the economy, in that the annual rate of economic growth dropped from over 10 percent in 1988 to less than 4 percent in 1989, down to 1.6 percent in 1990, and became negative in 1991. The economy actually contracted in each of the following years through to 1995, by about 20 percent (see Klugman 1996, Table 7). One would expect this to have had an important influence on the level of wages, but the year effects on the experience-earnings profile cannot be isolated in the single cross-section of data.

Third, the existence of *cohort effects* could give rise to the patterns observed in the non-parametric results. Following Katz and Murphy (1992), cohorts are not defined solely on the basis of age: rather it is suggested that different demographic groups – by sex and level of education, as well as ex-

perience - might be considered as distinct labour inputs or cohorts. To the extent that these are imperfect substitutes, changes in the relative demand and supply for these different groups will affect their relative wages, and this could be reflected in the experience-earnings profiles. A change in education system that affected the supply or quality of different types of skills is an example of a cohort effect. Major cohort effects would be expected to follow from changes in the demand for, and supply of, different types of labour, and from institutional changes during the transition.

Pagan and Ullah (forthcoming, pp. 151-152), who also found patterns with dips for samples drawn from two quite different economies, Canada and China, attribute this to cohort effects in the cross-section sample "that represents earnings of people at a point of time who essentially belong to different generations. Thus the plot of earnings represents the overlap of earnings trajectories of different generations. Only if the socio-political environment of the economy has remained stable intergenerationally, can we assume these trajectories to be the same" (p. 153).

Clearly there are reasons to expect stronger vintage or cohort effects in a transition context. In the case of Uzbekistan, conditions have clearly altered over time. These changes have been socio-political and demographic, as well as economic in nature.

The interpretation of the non-parametric results is difficult because these three explanations may be confounded in practice, and impossible to disentangle in the cross-sectional data. However the difficulty in reconciling the observed patterns with traditional theory about the experience-earnings path leads to a focus on cohort effects as the main explanation. What would be the effect of transition on relative wages of different demographic groups? Any transition effects might be expected to show up most strongly for recent cohorts, whose wages can be most easily adjusted to reflect the new conditions. The transition (or cohort) effects that are expected to affect relative wages during the transition can be grouped into changes in (i) the demand

for labour; and (ii) the supply of labour; and (iii) the institutional framework that governs wage-setting decisions.

Demand for Labour

There are different effects emanating from the demand-side of the labour market, so that the net cohort effects are not *a priori* clear. The focus is on differences in labour demand among different cohorts, rather than aggregate changes (due to the drop in output, for example).

First, it might be expected that transition will increase the relative demand for better educated workers, since higher education allows individuals to better cope with change and disequilibria in the economy. According to Schultz (1975), education allows individuals to adjust more effectively to disequilibria and change in the economy. That individuals have been better equipped to deal with structural changes and take advantage of emerging opportunities was found by Chase (1997), for example, in a study of Czech earnings over time. This is consistent with empirical evidence that highly educated workers have a comparative advantage with respect to the adjustment to and implementation of new technologies (Bartel and Lichtenberg 1987). One might expect that these effects would be most pronounced for younger (more recently educated) workers. According to the "active labour market hypothesis" (Freeman 1975), changes in the labour market would be expected to show up most sharply for new entrants.

There have been some important structural changes in the economy, as described in Chapter 3. For example, the share of services in final output has risen significantly over the transition – from about 7 percent up to 25 percent of GDP. Employment in the social sectors and general administration, sectors traditionally dominated by women, has been relatively buoyant. Ideally some measures of the pace of technical change would be used to inform on the nature of the structural changes taking place in the Uzbek economy: this could cast some light on the interrelationships between technological change,

labour market experience, formal training and wages.

Econometric studies have used proxies like growth in multi-factor productivity (Chapman and Tan 1992) and the age of plant and equipment (Bartel and Lichtenberg 1987). Unfortunately similar measures are not available for the present case. There is nonetheless evidence, from aggregate data on gross domestic investment, that rates of investment have been quite robust throughout the transition. The investment share in GDP has ranged between 25 and 33 percent (in 1991 and 1995 respectively), which is above the regional averages reported by the World Bank for 1991 for the OECD (21 percent) and Latin America (19 percent).[15]

Older workers might find that the skills acquired on-the-job during the period of central planning are less valuable as the structure of the economy adjusts to market conditions. Studies from other European countries in transition based on panel data and/or on series of cross-sections have been interpreted as confirming this suspicion (Svenjar, forthcoming). However the changes in returns to training may be confounded with cohort effects.[16] Flanagan (1998) reports that returns to (potential) experience for both men and women in the Czech Republic approximately halved over the decade to 1996. Similarly, Krueger and Pischke (1995), who estimated human capital functions for East Germany before and during the transition, found that the already flat experience-earnings profiles became even flatter.

Supply of Labour

There have been some major changes on the supply-side of the labour market. Aggregate labour force growth has continued at rapid rates, corresponding to past rates of population growth. This may have been offset, to some extent, by declines in the labour force participation rate, though it is very difficult to establish trends over time (see Chapters 3 and 6). The focus here is on

[15] World Bank (1993b) Table 9.

[16] Chapter 4 reviewed studies investigating pre and post transition periods which had found such effects.

changes in the relative supply of different cohort types.

There have been clear declines in the supply of new graduates from different types of higher education institutions, given the falls in enrolment rates during the transition. Tertiary enrolments, as a share of the 16-22 year old age group, dropped by over 40 per cent between 1989 and 1996. Similar trends are evident for vocational and technical enrolments over the period (see Chapter 3; UNICEF 1998, Annex Tables 7.4-7.6). There have also been declines in secondary enrolment rates, of the order of 25 per cent, leading to fewer individuals completing that level of education. Cuts in supply of different types of skilled labour could be expected to lead to increases in the wages thereof.

Another major change on the supply-side of the labour market could be expected with the demise of on-the-job training. In the face of large and sustained declines in output, firm-based provision of formal training would tend to decline. This trend has been observed in Russia, for example (World Bank 1996a). Chapter 3 has documented substantial declines in evening and correspondence enrolments in vocational training, that were formerly an important element of adult education.

The effect of formal post-school training (general or specific) on earnings might be expected to be greater when individuals are employed in industries that are experiencing rapid rates of technological change (Chapman and Tan 1992). To the extent that large-scale changes in the nature of work have been associated with marketisation of the economy, reduced amounts of training due to, for example, current constraints in access to capital to finance such investment, would tend to flatten the experience earnings profile.

Even on-the-job training in the form of learning-by-doing could have been stifled during the transition. In the wake of the breakdown of pre-existing trading arrangements, some firms effectively ceased production due to problems in, for example, securing essential inputs. Soviet Uzbekistan was part of a highly interdependent system of supply and distribution, so that the

collapse of the All-Union market in the early 1990s dramatically affected the region (Abazov 1997, p. 435). Recall that a significant share of the present sample had not been fully paid in the previous month – one might suspect that at least some of these individuals were not effectively working either. The associated failure of individuals to learn-by-doing would tend to flatten the experience-earnings profile.

Changes in the Institutional Framework

There have been a series of changes to the institutional framework that governs wage-setting. Chapter 3 presented evidence that the distribution of earnings has widened during the transition. While a minimum wage is still legally in place, its role has been diminished through lagged and partial indexation in the midst of high inflation (see Chapter 3). At the top end of the earnings distribution, an upward shift in the profile of highly-educated workers might be expected. The liberalisation of the inherited framework that had limited wage relativities could be more relevant to establishing the pay of new entrants, rather than older workers.[17]

In the light of this framework of demand, supply-side and institutional factors, explanations are provided separately by sex, with an emphasis on the observed cohort effects.

Women

The imputation of "actual" labour force experience for women potentially complicates interpretation of the experience-earnings profiles. Take, for example, two women with ten years of experience. The fact that they have the same number of years of experience does not imply that they are the same age, or that they entered the workforce at the same time. Therefore the graphs cannot be directly interpreted in terms of chronological time, when

[17]It is of course likely that the effects of liberalisation go both ways – that is, reducing wages at the bottom of the distribution as well as increasing wages at the top.

considering prevailing economic conditions as part of the explanations for the profiles. And, as with men, the analysis is constrained by the cross-sectional nature of the data. It is nonetheless possible to offer some alternative explanations.

Figure 7.1 suggested that the experience-earnings profile for women is fairly flat. To the extent that changes can be observed, there appears to be a dip in the experience-earnings profile from around ten years, with no evident recovery over time. Both a relatively flat experience-earnings profile and a downward tendency after about ten years can be explained in terms of similar factors. The decline in the experience-earnings profile begins at the time which, for many women, would coincide with the most intensive period of child-bearing and child-rearing activities. The majority of women are likely to either have been taking maternity leave or returning from leave around this time. (Recall that the Soviet and now Uzbek maternity leave provisions are quite lengthy – up to three years – and that the average number of children for women in this cohort is about three.) Even though the corrected measure of female experience has sought to take intermittent labour force participation into account, it is possible that women's earnings may still be effectively penalised during the period of child-bearing and thereafter.

There are a number of Western studies that have examined the effect of intermittent labour force participation on the female experience-earnings profile (see, e.g., Goldin and Polachek 1987; Rummery 1992). Figure 7.6 illustrates some possible scenarios. The typical male experience-earnings profile is depicted by O_1G. An individual with intermittent labour force participation is likely to have a different profile, however. Goldin and Polachek (1987) identified $OABC$ as the profile of an individual with commitments outside the labour force, in particular, family responsibilities. There is an initial period earnings growth for new female entrants, followed by the period of withdrawal from work $(h_0 - h_1)$ associated with child-birth when earnings are zero (hence the dashed lines). Then she re-enters the labour market at

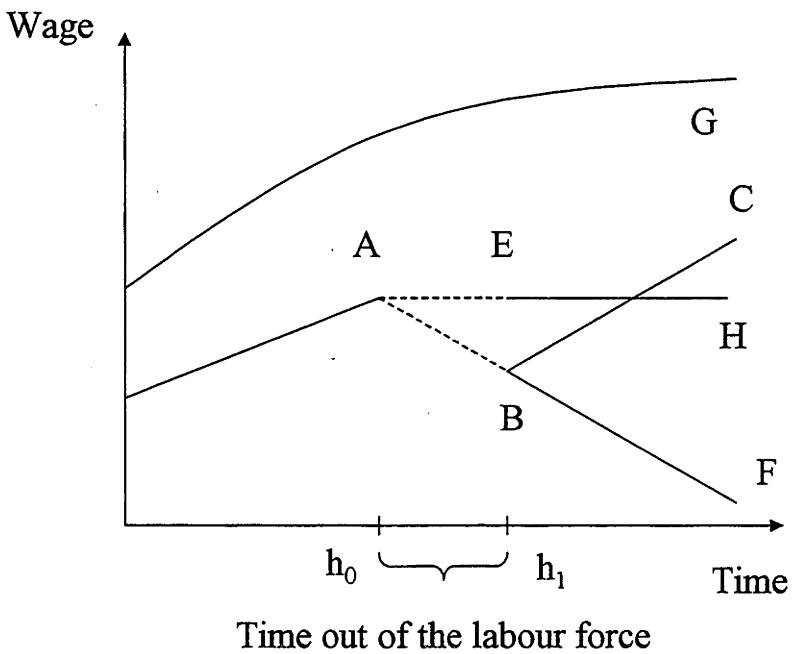
a lower rate of pay. That is, women re-enter the labour market at a wage lower than the wage at which withdrawal occurred, but then earnings growth resumes at that time (see also Rummery 1992, p. 354).

A drop in the wage at which women re-enter the workforce after maternity leave might be attributed to skill depreciation or the atrophy of human capital. The former effect could well be exacerbated in a context of changes in the technological nature and/or organisation of work that are associated with transition to a market economy, if existing skills become redundant. Apart from the human capital explanations, it is possible that women experience a loss of seniority due to time out of the labour force, which would adversely affect their earnings profile regardless of individual productivity (Medoff and Abraham 1980). The same factors could well explain the relative flatness of the experience-earnings profile for women: relatively lower rates of investments in on-the-job training by women and/or promotion to more senior positions would tend to flatten the profile.

The profile $OABC$ in Figure 7.6 shows that women's earnings suffer from the depreciation of their human capital that occurs around the period of child-bearing and rearing, but then the earnings profile returns to the earlier growth path after re-entry. It is also conceivable, however, that women's earnings never recover after child-bearing, due to lack of subsequent on-the-job training. Lack of job training for mothers might be traced to the demand side (due to greater domestic responsibilities and therefore less time to, for example, attend evening courses), and/or to the supply side (unwillingness of employers to finance training for employees with less than full attachment to work). It is also possible that there are smaller investments in on-the-job training for women in anticipation of lower labour force participation.

In the Uzbek data, the pattern is closer to that depicted by $OABF$ in Figure 7.6. The continuing depreciation or, at best, flatness of the experience-earnings profile can be traced to several factors. First, the legal guarantees which formally prevent employers from reducing women's pay on their return

Figure 7.6: Possible effects of career breaks on female earnings profiles



to work after childbirth are evidently ineffective. Hence in terms of Figure 7.6, a woman's earnings should have been secured at A, the level that had been attained when leave was taken, so she can return at E. This may not happen in practice. Second, as noted above, the lack of earnings growth after their return from maternity leave may be associated with employer reluctance to invest in training of employees' who are perceived to have lower work attachment, and also affect the demand for education, given women's greater domestic responsibilities.

Men

I now turn to interpret the results for men. The possibility of cohort effects is the most fruitful avenue of investigation, bearing in mind that these effects

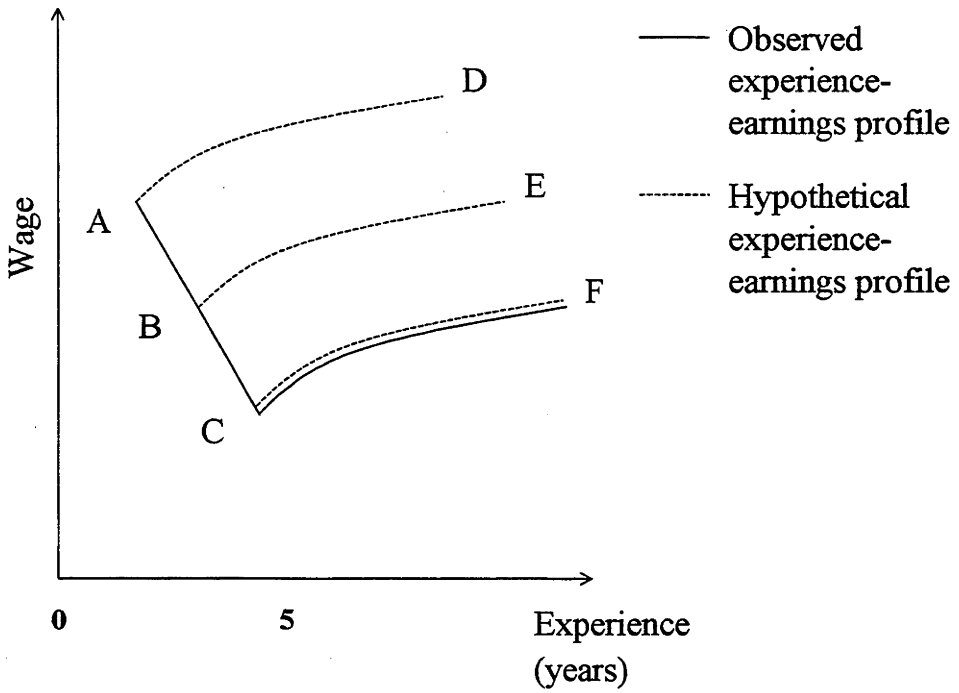
could be confounded with year and other factors. Recall that cohorts are defined here in terms of education and gender, as well as by age. In particular, it is useful to distinguish between men with post-secondary training from those without.

Initial inspection of the non-parametric results indicate a declining profile of earnings for male university and college graduates, through to about seven years. Since the use of Mincerian experience for males allows this to be mapped chronologically, this coincides with the period of economic change since 1988. However this pattern must be considered in absolute as well as relative terms. Recent cohorts of graduates are actually *better off*. This leads to the unusual observed pattern in the cross-section data, which does not conform to traditional shape of the experience-earnings profile. The unusual U-shaped pattern could indicate that new cohorts are located on earnings profiles that have become successively higher since the late 1980s – although of course that this is the case cannot be proven since the present data is a single cross-section. This is shown graphically in Figure 7.7. New graduates move on to successively higher experience-earnings profiles.

In addition to the conventional "Schultz story", there are important institutional factors operating in transition. Liberalisation of the economy and the labour market, and the associated widening of wage relativities, would be expected to advantage more capable individuals. This might well coincide with university qualifications. Even though there is evidence that higher education institutions in Uzbekistan are plagued by problems that range from outdated methods of instruction to lack of resources for maintenance and teaching aids (Salehi-Esfahani and Thornton 1997), university entry is still highly competitive and generally remains the goal of the most able secondary graduates in Uzbekistan. Thus the results are consistent with the expected shifts in the earnings structure associated with marketisation of the economy.

The results are also consistent with the drop in supply of university graduates as a result of the substantial falls in enrolment that have occurred

Figure 7.7: Possible effect of transition on male earnings profiles



during the transition. Reduced supply of recently trained graduates could be lead to the price being bid up. Therefore either the demand or supply side could shift up the profile for younger workers.

There is fall in the experience-earnings profile for university educated males, after a peak at around 20 years of experience (and after 40 years for college graduates), which does not have an easy explanation in terms of prevailing economic and demographic conditions. One could, of course, characterise this as the conventional depreciation of human capital after an observed peak in experience-earnings profiles.

For men with college training, there is a pattern for the recent past echoing that for university graduates. The declining profile up through at least about 12 years of experience suggests that more recent cohorts have been

on successively higher earnings profiles. For university-educated males, the profile begins the more conventional quadratic shape after that time, with a peak at around 40 years.

The cohort effects that characterise the earnings profiles of recent college graduates are somewhat unexpected, in that post-secondary training under the old Soviet system was notoriously narrow (Heynemann 1997a). The specialised nature of the training might have been expected to hamper the ability of individuals to adjust to new job tasks. Chapter 3 presented evidence of significant declines in enrolment in various types of vocational training institutions. The smaller numbers of graduates with college training, like those with university education, have nonetheless benefitted from the transition and could have shifted onto higher age-earnings profiles.

By way of contrast, the pattern for males with vocational education does not show any dramatic earnings advantage for recent entrants similar to that observed for university and college graduates. This can be attributed to the profile of skills associated with vocational (PTU) education, and is consistent with other studies of earnings in transition (for example, Flanagan 1998). PTUs provide only basic training associated with manual jobs and do not necessarily require intellectual ability and general knowledge or skills. The duration of vocational training is short (typically one, and rarely two, year(s)), whereas the duration of college courses is typically three or four years, providing basic training in the specific field as well as more general, academic orientation. Colleges (*teknikums*) and universities both provide better, more general background training and qualifications so that the individual is likely to be more flexible and also more amenable to any retraining and adjustment. Recall the colleges train individuals for mid-ranking white collar jobs. Examples of the types of professions included are accountants and auditors, teachers and nurses.

Finally, the non-parametric results suggest that the experience-earnings profile for males with secondary education is much closer to the conventional

quadratic specification. There is some rise in the profile through to about 20 years, after which time it becomes at best flat. In contrast to the university and college-educated groups, recent male entrants with secondary education have not gained from the economic changes associated with the transition.

7.4 Graphical Comparisons

In this section, experience-earnings profiles are graphed using predicted log wages. The objective is to graph alternative functional forms, and compare to what was revealed by the non-parametric analysis above. An OLS wage model is estimated with only experience as a regressor, then the wage is predicted. This is carried out for each model (quadratic, cubic and quartic), by demographic group. For men, in order to simplify, and to highlight the experience effects, the sample is again divided by education group. Only the male groups with above secondary education are included, since the previous section found that the underlying patterns in the data for the secondary group were quite similar to the quadratic shape (Figure 7.2). For women, results are presented for the pooled sample. These visual impressions provide insight into the extent of distortion associated with alternative models.

Figure 7.8 shows university educated men (22 percent of the male sample), for two alternative polynomial specifications, quadratic and quartic, in comparison to the non-parametric results. The quadratic profile is in fact fairly flat. The cubic and quartic forms come much closer to portraying what the non-parametric results reveal: that the earnings profiles of the recent cohort has been significantly advantaged by the transition. The cubic also appears to better to reflect the declining pattern of earnings later in the career, whereas the quartic shows renewed growth that is not evident in the non-parametric results.

For men with vocational education, the cubic and quartic forms capture the dips in the profile that are portrayed by the non-parametric results (Fig-

ure 7.9).The quadratic form has virtually no curvature, whereas the data show a peak after about ten years in the workforce.

Figure 7.10 depicts the experience-earnings profiles of college-educated men. The quadratic form has been forced into an unusual convex shape by the higher earnings of recent graduates. But even then, the impression is misleading because the patterns in later working life are ignored. The cubic form appears to better reflect the trends among recent entrants as well as the slowdown in earnings growth later in the careers of college-educated males that is shown in the non-parametric specification.

Finally, comparisons for the pooled sample of women are presented in Figure 7.11. The quartic comes closest to showing the initially flat earnings profile. At the same time, the quadratic does not appear to be too misleading. This is because the overall profile for women has so little variation overall.

Using a single cross-section, some important facts about the data revealed by the non-parametric specification would have been missed if only the quadratic specification had been employed. It is necessary to be cautious about the non-parametric patterns, given the uncertainty about the statistical significance of the observed patterns. The results nonetheless suggest that higher order polynomials, in particular the cubic specification, will better "fit the data".

Figure 7.8: Predicted earnings profiles: university males

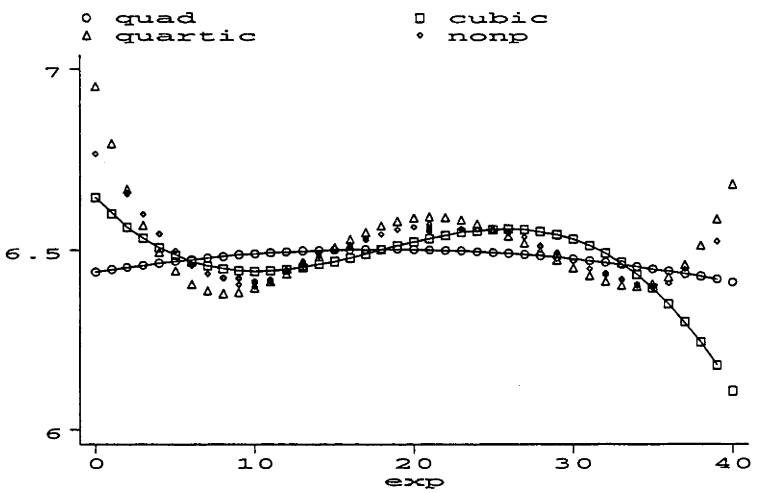


Figure 7.9: Predicted earnings profiles: vocational males

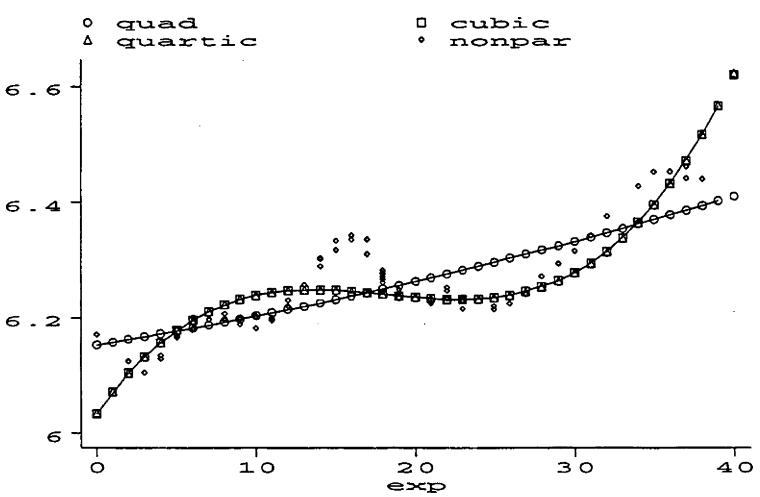


Figure 7.10: Predicted earnings profiles: college males

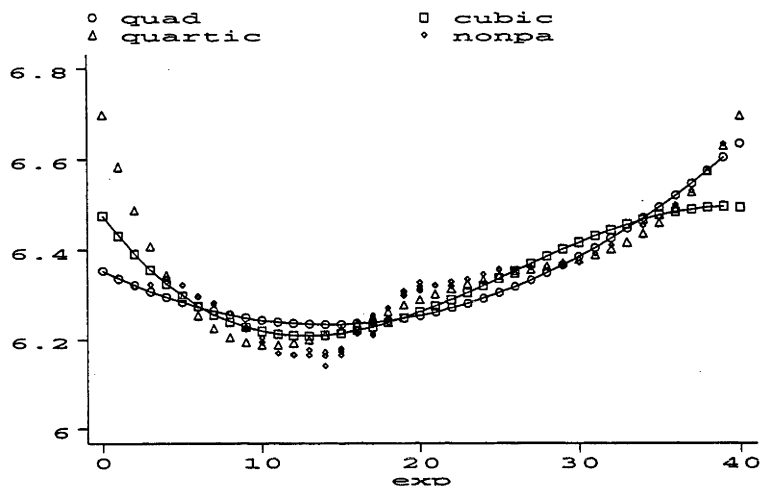
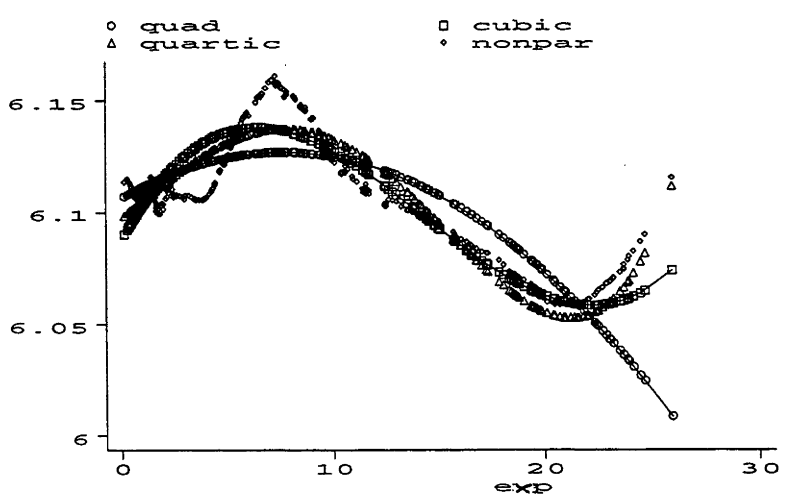


Figure 7.11: Predicted earnings profiles: all females



7.5 Conclusions

This investigation of functional form with respect to experience leads to several conclusions relating to methodology, the preferred functional form with respect to experience in Uzbekistan and, more generally, about the cohort effects associated with structural change and economic transition.

First, the chapter has drawn attention to the difficulties in interpreting experience-earnings profiles in cross-sectional analysis. It was suggested that a strict human capital interpretation that would wholly attribute the patterns to on-the-job training and productivity may not be warranted. The international studies that were reviewed in Chapter 4 indicate that a number of other factors could come into play, including the pace of structural and technological change, tenure at the firm and the relative importance of firm specific and general experience. More generally, especially in the transition context of large-scale economic changes, one would expect year and cohort effects to be important. Although data limitations prevent fuller empirical exploration, these points are borne in mind in the interpretation of the results.

Second, the chapter has demonstrated the value of non-parametric analysis, which was utilised alongside more conventional testing techniques. The latter did suggest that the quadratic model performed badly, though without indicating a clear preference among the alternatives. Local regression techniques, implemented in STATA, provided tools with which to tackle the problem of functional form. This was valuable in indicating the preferred model when the results of the conventional tests were not unambiguous. The question – which of the alternative functional forms better reflects the underlying reality – was addressed using the non-parametric results.

Third, the chapter showed that the quadratic model does pose a serious risk of mis-specification in the present context. The main problem with a quadratic model, particularly in the case of cross-sectional data, is that it may lead one to miss important cohort effects. Hence one might be mislead

into concluding that there was a standard shaped experience-earnings profile when non-parametric inspection of the data indicates that there is not. Wage models using a quadratic specification of experience tend to perform badly in Uzbekistan for some demographic groups. The quadratic form is apparently too simple to pick up the unusual patterns of experience and earnings observed in transition for recent cohorts, especially of university and college educated males.

The higher order polynomial specifications of experience, on the other hand, appeared to provide a more adequate description of the experience-earnings profile for different education groups. Of course one cannot draw definitive conclusions about the true experience earnings profile, since this is not contained in a single cross-section. The results of the non-parametric analysis revealed that the patterns observed using the cubic and quartic specifications reflect the underlying data and not just the functional form. In particular, the cubic model appears to provide the best alternative polynomial specification for experience in Uzbekistan in the mid 1990s.

Fourth, the cohort effects in Uzbekistan might well be expected to characterise other transition economies which have experienced similar types of structural changes. In this sense, the myriad of studies of earnings in transition (reviewed in Chapter 4), that have proceeded on the basis of a quadratic on experience, could suffer from model mis-specification. This is a more serious problem for studies that are based on a single cross-section – earlier studies based on the analysis of data collected over time (e.g. Flanagan 1998; Chase 1997) have picked up cohort effects, even using a quadratic model. Although the results of the non-parametric analysis cannot be regarded as definitive, the results are illuminating and suggestive. One important implication is that a quadratic specification of experience will underestimate the slope of the experience-earnings profile in the early stages of working life. And in theory, such mis-specification will have repercussions for the other coefficient estimates.

Finally, and perhaps most interesting in terms of broader changes in the labour market during the transition, the non-parametric approach enabled the examination and interpretation of the patterns underlying the data. It was unclear *a priori* whether recent cohorts would be adversely affected, or relatively advantaged, by economic transition. The results indicate that recent cohorts of youth, especially those with higher levels of education, have significantly benefitted. Even in depressed macroeconomic conditions, liberalisation of the economy has evidently created substantial new earnings opportunities – and recent cohorts (and well-educated men, in particular), seem to be well-placed to take advantage of such opportunities.

Finally, from a policy perspective, the significant declines in tertiary enrolments in recent years are a possible cause for concern. This trend could have important distributive effects given evidence that up-front cost recovery has diminished access to education among children from lower income households.

7.A Appendix

Table 7A.1: Regression results with alternative specifications

	Women			Men		
Model	Quadratic	Cubic	Quartic	Quadratic	Cubic	Quartic
Potential Experience						
exp	.054 (.77)	2.4 (1.5)	.5 (.2)	1.69 (2.3)	4.67 (2.5)	1.30 (-.4)
$exp^2/100$	.011 (.74)	-.1 (-1.1)	.01 (.3)	-.01 (-1.0)	-.01 (-1.9)	..01 (.37)
$exp^3/100$		.02 (1.3)	-.01 (-.5)		.002 (1.7)	-.01 (-.7)
$exp^4/100$			.00(.00			.000 (1.0)
education	8.61 (10.8)	8.75 (10.9)	8.8 (10.9)	5.98 (7.7)	6.23 (7.8)	6.26 (7.8)
$\overline{R}^2$	.148	.149	.146	.070	.071	.074
Imputed Experience						
exp	1.96 (1.6)	8.23 (3.2)	12.2 (2.2)			
exp^2	-.05 (-1.0)	-0.07 (2.9)	-1.5 (-1.5)			
exp^3		.002 (2.7)	.06 (1.0)			
exp^4			.000 (-.7)			
education	7.47 (9.8)	7.63 (10.0)	7.58 (9.9)			
$\overline{R}^2$	.132	.141	.140			

Table 7A.2: Sample by education and gender

number of years of experience	men	women		
	pooled	higher	secondary	higher
less than 10	789	130	546	179
10-20	638	114	154	117
21-30	352	81	62	12
31-40	214	51	85	14
more than 41	80	–	–	–
total		376	847	322

NOTES : For a description of system of schooling see Chapter 2. For women, the table combines the final two age categories - the imputed experience measure, together with retirement at age 55, means that few women fall into the older categories.

Chapter 8

Extensions and Applications

8.1 Introduction

This chapter develops extensions to the basic Mincer model presented in Chapter 5. The basic model was shown to be inadequate, or at least potentially problematic, in several respects. Since the analysis undertaken in Chapters 6 and 7 has addressed concerns about the measurement and specification of experience, the model can now be taken forward to gain insights from its application to a range of interesting labour market questions from the role of signalling to unexplained gender wage differences.

The chapter develops or applies the human capital model in four areas. The first task is to estimate an extended model of earnings. The selection of controls for earnings follows suggestions from the analysis in Chapters 2 and 3 about which individual characteristics would be expected to affect earnings. The resulting extended model is applied in later sections of the chapter.

Second, some apparent peculiarities in the returns to education are investigated. This possibility was introduced in Chapter 4, in the context of so-called sheepskin effects. In this chapter, tests are applied to ascertain whether or not individual diplomas are being relied upon as a signal by employers, which would lead to earnings premiums for graduates over and above the true productivity enhancing effects of education.

Third, the human capital earnings profiles for the net and contract wage are compared. As defined in Chapter 5, the net wage is the amount actually received in the previous month, and has thus far been utilised as the dependent variable in the earnings functions. The contract wage is the net wage plus that amount which was not paid by the employer for the previous month. What difference does the choice of dependent variable make to the estimation of returns to human capital? This inquiry answers some obvious questions that arise in the light of the significant impact of arrears on net earnings in the results presented in Section 8.2.

The fourth task is an application of the imputed experience variable, demonstrating the importance of correct measurement of female experience to the estimated extent of so-called "discrimination" (or unexplained gender wage variation). The analysis casts some doubt on the usefulness of the conventional approach to decomposition of the gender wage gap. This is the final application of the human capital model in this thesis, with the next chapter investigating the arrears question in greater depth.

8.2 The Effect of Additional Controls

There is a range of variables, in addition to experience and education, that would be expected to affect earnings outcomes in Uzbekistan. Chapter 5 reviewed evidence suggesting that regional dimensions are important, given the substantial differences in local economic structures and conditions. Sociological evidence about the role of ethnicity indicated that Slavic groups were traditionally favoured in terms of labour market earnings.

In this section, the effect of additional controls is examined separately by sex, and in two stages, with the second including a range of interaction terms. The variables were defined and described in Chapter 5.[1] The dependent variable is the log of the net wage received.

[1]Means of all the variables were given in Table 5.1.

8.2.1 Men

The results of an extended model of earnings for men are presented in Table 8.1. An initial point to note is that the inclusion of these controls raises the explanatory power (adjusted R^2) of the regression significantly, from .17 in the basic model, to about .35.

Table 8.1 has several results of interest. Most striking are the effects of the arrears and region dummies on log earnings. Recall from Chapter 5 that the arrears dummy simply captures whether or not the individual experienced wage arrears in the previous month, while net earnings is the amount received. The potential problem of joint endogeneity between the net wage and the fact of arrears is therefore not an important issue.[2]

The fact that the individual reported non-payment of wages in the preceding month is found to have a significant negative effect on the net wage: all else being equal, the presence of arrears, relative to not having arrears, was associated with a negative impact on net earnings of the order of one-third. The possibility of systemic distributive effects in the pattern of arrears is examined in the next chapter.

The signs on the regional dummies for living outside of Tashkent confirm and quantify the significance of the patterns described in Chapter 5, holding human capital, sectoral and other observed characteristics constant. Living in Fergana has a significant and negative impact of the order of one-third. The magnitude of the negative effect associated with residence in KKP is large, but nonetheless only about half that for Fergana.

These findings are not surprising either for the densely populated Fergana Valley where surplus labour was a problem even during the Soviet period (see Chapter 2), nor for KKP, given what has been referred to as "the Aral Sea crisis" in the region(see, e.g., World Bank 1993). However the ranking and scale of the differences between the two oblasts is somewhat unexpected

[2]By way of contrast, there is some joint endogeneity between the contract wage and the amount of arrears, since the latter is used to derive the amount of the former.

Table 8.1: Extended model of wage determination: men

	Coefficient	t-statistic
Experience		
exp	0.922	3.24
$exp^2/100$	-.0.200	-2.32
$exp^3/100$	0.001	1.57
Education (relative to primary or less)		
high	0.196	1.26
college	0.278	1.71
vocational	0.272	1.68
university	0.491	3.11
arrears	-.344	-6.20
Ethnicity (relative to Uzbek)		
Slavic	0.169	2.54
Karakalpak	-0.184	-1.89
Kazak	-0.099	-1.06
Central Asian	0.144	1.46
other	0.128	1.49
Sector (relative to kolkhoz)		
State	0.535	8.13
Private	0.716	7.81
military	1.19	9.49
Region (relative to Tashkent)		
Fergana	-0.324	-6.51
KKP	-0.161	-2.06
Constant	4.58	14.08
N	925	
$\overline{R}^2$	0.3495	

if one expected the levels of earnings and household income poverty to be inversely correlated: it is KKP which has been portrayed by international agencies such as the World Bank as the poorest region of Uzbekistan. These regional results would hold even allowing for the fact that the wage data is in nominal terms. While there is a positive correlation between levels of income and prices at the regional level, differences in regional price levels do not change the income ranking of the regions under consideration (Coudouel 1998).

Part of the negative effect associated with residence in KKP is captured by the ethnicity term (*Karakalpak*). If these two terms are added (*Karakalpakstan* and *Karakalpak*), then the overall negative effect is of the order of 34 percent. However this cumulative impact would only be relevant for the 30 percent of the KKP sample of employees who are Karakalpak.

The sociological evidence reviewed in Chapter 5 suggested that Russians and other Slavic groups have traditionally occupied better-paying positions in the economy. Table 8.1 confirms the persistence of this pattern during the transition and, for the first time, quantifies its significance for earnings using representative microdata.

Holding other observed characteristics constant, earnings for individuals of Slavic ethnicity are about 17 percent higher than for Uzbeks. This finding of earnings advantage is perhaps surprising in the light of their large-scale out-migration from the republic since independence (see Chapter 3), but can be explained as follows. First, the fact of outmigration could have created a selectivity problem: the Slavs who have chosen to stay may indeed be those who do have better-paying jobs, while poorly paid Slavs have tended to emigrate. Second, it is possible that the earnings premium for Slavs is a proxy for skills (not captured by the levels of formal education) traditionally held by Slavs that have become relatively more scarce due to outmigration. Third, the outmigration might be more a reflection of insecurity about their *future* livelihood and/or prospects: Smith (1995) found that Slavs were much more

pessimistic about their likely position in 2000 than were Uzbeks. The ethnicity dummies for the other ethnic groups are not statistically significantly different from each other and from the omitted category (Uzbek).

Higher earnings are associated with all sectors relative to the agricultural *kolkhoz*. Workers in agriculture have traditionally been relatively low paid, and the aggregate picture of wage relativities that was presented in Chapter 3 suggested continuation of this pattern during the transition. This is true even with the inclusion of a dummy variable capturing receipt of benefits-in-kind from the workplace. The continuing controls on agricultural producers, in particular, compulsory procurement of most cotton and grain output at prices fixed by the state, has undoubtedly affected the profitability of the sector. At the same time, aggregate evidence suggests that agriculture has tended to absorb surplus labour, which would be expected to dampen earnings in the sector during the transition period of slow economic growth.

Interestingly privatised firms that have emerged with marketisation of the economy are associated with earnings that are about 72 percent higher than for *kolkhozes*. This appears to be markedly above the large effect registered for state employment, of about 54 percent, although the difference is not statistically significant.[3] Whether or not privatisation is an effective way to hold down labour costs is therefore somewhat unclear. International agencies advising the Government, in particular the World Bank and IMF, have often tended to assume that the divestment of state ownership is a critical part of wage restraint (se, e.g., Nellis 1991). This assumption appears not to be borne out by the data. Finally, the coefficient on military employment is also significant, and highest, although the size of this group is small (see Table 5.2).

The inclusion of additional controls has a large impact on the size of the returns to education for men. In the extended model, the coefficients asso-

[3]The difference between the coefficients (0.18) is outweighed by the standard error (approximately 0.36).

ciated with each level of education are lower than those reported in Chapter 5.

Table 8A.1 in the appendix presents the extended model using a quadratic rather than a cubic specification of experience. This is of interest because earlier studies of earnings in transition have proceeded on the basis of a quadratic for experience. As expected, the quadratic model shows very much lower coefficients on experience – the coefficients on experience are .922 and .049 for the cubic and quadratic models respectively. This translates into large differences in the contribution of experience to earnings at the mean number of years of experience. At 17 years of experience, the total effect of experience is approximately 86 percent (relative to an individual with no experience), whereas in the quadratic model the overall effect associated with experience is negative. However the changes in the other coefficients of the model are insignificant.

To get a better sense of the interplay of the variables of interest, a fully interacted model was estimated. All the variables that had significant coefficients in Table 8.1 were interacted with each other. That is, arrears and the ethnic, sector and region variables; the ethnic and sector and region variables; and the sector and region variables against each other.[4] The results of the fully interacted model are presented in Table 8A.4 in the appendix. In the interests of clarity, the model presented in the text (Table 8.2) limited the interaction terms to those which were significant.

Table 8.2 shows that the interaction effects related to arrears which are significant and in many cases quite large. None of the other interaction effects proved to be significant, however. The arrears dummy itself has a large negative effect (-63 percent), and there are further effects when arrears are interacted with other observed characteristics. These interactions can be described as follows. Living in Fergana and having arrears has an

[4]In light of the preceding results, the ethnic groupings were simplified as follows: Slavic and other non-Uzbeks, which are compared to the omitted group (Uzbek).

Table 8.2: Extended model with interaction terms: men

	Coefficient	t-statistic
Experience		
exp	0.944	3.33
$exp^2/100$	-0.200	-2.48
$exp^3/100$	0.001	1.78
Education (relative to less than primary)		
high	.103	0.65
college	.160	0.95
vocational	.168	1.01
university	.385	2.32
arrears	-.627	-2.26
Ethnicity (relative to Uzbek)		
Slavic	.158	2.40
non-Uzbek	.092	1.45
Sector (relative to kolkhoz)		
State	.383	4.83
Private	.596	5.76
military	1.08	7.51
Region (relative to Tashkent)		
Fergana	-.296	-5.55
KKP	-.324	-4.15
Interaction terms		
nonUzbek*arrears	-.213	-1.72
state*arrears	.309	2.19
Fergana*arrears	-.438	-2.69
Constant	4.82	14.57
N	925	
Adjusted R^2	0.3633	

additional negative effect over and above the large negative effects of the regional dummy alone (-44 percent) and arrears *per se*, with Tashkent being the omitted region. (The effect for Karakalpakstan is also negative, but not significant.) Being non-Uzbek as opposed to Slavic, or Uzbek (the omitted group), and having arrears is also associated with a sizeable negative effect on earnings. On the other hand, and somewhat surprisingly, there is a large positive effect for state sector workers with arrears. Why this should be the case is unclear. The arrears phenomenon is thus not only novel, but it presents a number of puzzles that deserve detailed investigation. Chapter 9 is devoted to this task, while the final section of this chapter considers differences in the human capital determinants of earnings depending on whether net or contract wages are the dependent variable.

8.2.2 Women

The results for the extended model for women are presented in Table 8.3. Many of the patterns are similar to those found for men, in terms of which coefficients are significant, and their respective signs. In these cases, the interpretations offered for men therefore largely hold again here.

In several cases, however, the orders of magnitude differ between men and women. For example the returns to university degrees, relative to education of elementary or less, are about one-third higher for women. This is not unusual in an international context. The wide ranging survey of rates of return to education in 56 countries that was reviewed in Chapter 4 (Psacharapoulos 1985), found that in developing countries the estimates for women generally exceeds that for men.[5] Rates of return to education in US have often been higher for women than for men (Carnoy and Marenbach 1975; Gwartney and Long 1978).

Various reasons have been advanced to explain the phenomenon of higher

[5]Education coefficients are often referred to as "rates of return", although this is not strictly correct since the opportunity cost of investment (wages foregone) is not measured.

Table 8.3: Extended model: women

	Coefficient	t-statistic
Experience		
exp	0.064	2.55
$exp^2/100$	-0.589	-2.21
$exp^3/100$	0.016	2.13
Education (relative to primary or less)		
high	0.246	1.15
college	0.465	2.09
vocational	0.459	2.11
university	0.670	3.00
arrears	-.415	-7.43
Ethnicity (relative to Uzbek)		
Slavic	0.085	1.35
non-Uzbek	0.085	1.48
Sector (relative to kolkhoz)		
State	0.456	6.01
Private	0.547	4.87
Military	0.774	2.97
non-wage benefits	-0.177	-.28
Region (relative to Tashkent)		
Fergana	-0.239	-4.26
KKP	-0.249	-3.76
Constant	5.321	22.17
N	685	
$\overline{R}^2$	.435	

returns for women, including mismeasurement of the experience variable (Blinder 1973) and differences in the demand for, and supply of, educated men and women (Sloan 1985). In the present case, the possibility of mismeasurement should have been alleviated: discontinuity in labour force attachment have been at least partly corrected for in Chapter 6, thereby diminishing the risk of overestimation of the schooling coefficient.

On the supply side, a higher share of men have higher educational qualifications (see Table 8A.7 in the appendix, and Chapter 5). This may lead to selection effects due to omitted ability bias: since a smaller proportion of women have tertiary degrees they are likely to have higher on average unobserved ability than women without degrees (assuming that unobserved ability is correlated with educational attainment).[6]

The negative impact of arrears is larger for women (cf. Table 8.1 for men). All else equal, the presence of arrears is associated with a reduction in the net wage of over 41 percent, compared to women without arrears. Like men, women in non-farm sectors earn more than those on *kolkhozes*, but the earnings advantages associated with private sector employment are not as large (55 percent higher for women, versus 72 percent for men).

Table 8A.2 in the appendix presents the extended model using a quadratic rather than a cubic specification of experience. As for men, this comparison is of interest because previous studies of earnings in transition have employed a quadratic model of experience. As expected, the quadratic model shows much lower coefficients on experience. The education coefficients are smaller at every level in the quadratic model relative to the cubic model. However

[6] Blackburn and Neumark (1992, p. 525) point out that the human capital model of earnings predicts that those workers who choose more schooling will tend to have higher levels of ability. See Chapter 4 for a review of omitted ability bias.

all the differences in the coefficients of the two models are insignificant.[7]

The next step is to add a range of interaction variables. A fully interacted model was estimated; the results are presented in Table 8A.5 in the appendix. Since the interacted variables of significance were limited to those related to arrears and sector of employment, the model was re-estimated using only the significant variables (Table 8.4).[8] In this model, the effect of the arrears dummy *per se* is positive but insignificant, although all the significant interaction effects are negative. However being non-Uzbek and having arrears has a large negative effect, and the negative impact of the interaction of residence in Fergana and having arrears is even larger (-78 percent). There is also a negative interaction between the summary education variable (years of schooling) and arrears, that is significant at the 10 percent level, suggesting that the better educated are worse affected by arrears.

Examining the interaction terms for sector of employment, state sector and Fergana had a significant and strongly positive effect; in Karakalpakstan the positive effect of state employment was not significant. The effect of private sector employment interacted with Fergana region was actually negative in this model, at least at the 10 percent level.

Table 8A.3 in the appendix presents the extended model with interaction terms using a quadratic rather than a cubic specification of experience. As before, the quadratic model shows much lower coefficients on experience. However all the differences in the coefficients of the two models are insignificant.

The overall picture of women compared to men suggests that the effect of transition has been mixed. On the one hand, several of the trends associ-

[7]The significance of the differences were tested using a standard t-test

$$\frac{\beta_1 - \beta_2}{\sqrt{SE_1 + SE_2}}$$

where β_1 and β_2 refer to the coefficients, and $SE_1$and SE_2 to the standard errors on those coefficients, in the cubic and quadratic models respectively.

[8]As noted above, the fully interacted model also runs the risk of multi-collinearity.

ated with transition (including arrears in wage payment and growing private sector opportunities) have either been more adverse, or less advantageous, for women in Uzbekistan. This has been reflected in the coefficients on these characteristics in the extended model. Chapter 5 has illustrated that women are more concentrated in the state sector and less likely to be working in private firms. Those women who do work in the private sector have less to gain than men – and private employment is actually associated with negative wage effects in Fergana. On the other hand, the returns to women's educational attainments are at least as high as men's. Still the net effect is that women earn on average less than men, a gap that is investigated in depth in Section 8.4 below.

Table 8.4: Extended model with interaction terms: women

	Coefficient	t-statistic
Experience		
exp	.042	1.76
exp2/100	-.391	-1.55
exp3/100	.011	1.51
Education (relative to elementary or less)		
high	.263	1.38
college	.449	2.26
vocational	.431	2.19
university	.702	3.46
arrears	.325	1.23
Ethnicity (relative to Uzbek)		
Slavic	.234	1.08
Other non-Uzbek	.184	3.08
Sector (relative to kolkhoz)		
State	-.094	-0.47
Private	.243	1.24
military	.343	1.16
Region (relative to Tashkent)		
Fergana	-.655	-3.01
KKP	-.615	-3.20
Interaction terms		
non-Uzbek*arrears	-.479	-3.46
Fergana*arrears	-.777	-4.38
State*Fergana	.575	2.60
Private*Fergana	-.456	-1.62
Yrsch*arrears	-.029	-1.83
Constant	5.84	20.18
N	685	
$\overline{R}^2$	.435	

8.3 Education and Sheepskin Effects

One area of ongoing debate in labour economics is between those who subscribe to the productivity-augmenting role of education that is associated with human capital theory, and those who prefer a signalling interpretation of the observed correlation between education and earnings (see Chapter 4). One way to disentangle the data on education and earnings is to test for the existence of so-called "sheepskin effects". If education was valued by employers for its effect in enhancing productivity, one would not expect the award of a degree or diploma after, say, three years of tertiary education to have a dramatic effect on earnings relative to the effect of two years of university. This is known as a sheepskin or diploma effect, which was introduced in Chapter 4. The sheepskin hypothesis predicts that "wages will rise faster with extra years of education when the extra year also confers a certificate" (Riley 1979).

A sheepskin effect is manifest where there is a statistically significant difference associated with completion of a level of education, over and above the returns to some (incomplete) education at that level. In the case of a continuous education variable, this would take the form of significant discontinuities in returns to education in the years normally associated with completion. In the present case of dummy variables, a more direct method can be applied to test whether completion *per se* brings additional returns that are statistically significant, as elaborated below.

This chapter empirically tests for the existence of sheepskin effects in Uzbekistan. To date, there have not been any published studies on this topic for transition economies even though, as suggested in Chapter 4, there are reasons to expect signalling to have been important in the former Soviet republics.

In the basic human capital model using education dummies that was estimated in Chapter 5, sharp discontinuities appeared to exist between the size of the coefficients for the various completed and incomplete levels of educa-

tion. The patterns also differed by sex. This is suggestive of the existence of sheepskin effects, a novel finding in the context of transition economies. However the interpretation of the returns to different levels of schooling was problematic when the rest of the regression was mis-specified. Now that Chapters 6 and 7 have developed a satisfactory specification of the basic model, it is appropriate to investigate the returns associated with completion.

Recall that Table 5.10 suggested that men who do not gain certification at various levels of education are receiving *higher* wages than those who do complete. This pattern for men is a bit puzzling at first sight, but could be consistent with the existence of ability bias for men. (The problem of omitted variables was introduced in Chapter 4.) Although omitted ability bias is often thought to skew returns to education in an upward direction (when the more able stay on at school), equally, there are circumstances where individuals leave formal education to take up more lucrative activities elsewhere.

Such opportunities might be greater for men. One obvious example is where physically able males drop out of education to take up manual work. The structure of Soviet wage differentials was such that semi-skilled blue collar work was relatively well compensated (Chapter 2).

Discontinuities in the returns to education were also apparent for women. But by way of contrast to men, women in the sample received greater rewards if they completed each of the levels of education (with the exception of college). These results could be interpreted as showing the existence of a 'sheepskin effect', whereby female workers are being rewarded for obtaining the certification, over and above any productivity effect.

This section examines patterns in the returns to different levels of education in detail. First, the international debate about sheepskin effects is reviewed. Second, the existence of sheepskin effects in Uzbekistan is tested separately for men and women.

8.3.1 The Sheepskin Hypothesis: Evidence and Caveats

This section reviews published studies in the international literature about the existence of sheepskin effects. It then goes on to provide some caveats to be borne in mind in the interpretation of the test results, even where sheepskin effects appear to exist.

International Evidence

There are no published analyses of the existence of sheepskin effects in the transition economies, with much of the empirical analysis of the sheepskin effect coming from the United States. Jaeger and Page (1996), Belman and Heywood (1991) and Hungerford and Solon (1987) each found evidence of sheepskin effects in the returns to education in the US, with significantly larger returns to diploma years than to other years of education.

Available evidence from developing countries is mixed (see Patrinos 1996 and Shabbir 1991 for recent reviews). In Latin America, Griffin and Cox Edwards (1993) and Patrinos (1996) have found non-linearities in returns to years of schooling for Brazil and Guatemala respectively, though not at every level of certification. For the Cote d'Ivoire, van der Gaag and Vijerberg (1989) found positive and significant coefficients when dichotomous dummy variables representing completed diplomas are included in the earnings function. Shabbir (1991) found substantial and statistically significant sheepskin effects for men at four levels of certification in Pakistan, although not at the primary and middle secondary levels. Mohan (1986) found that diploma effects were important for men, but not for women, in Columbia. Uzbekistan is somewhat unusual relative to the developing countries that have been studied in the literature on sheepskin effects (e.g. Brazil, Guatemala and Pakistan) given virtually universal literacy.[9]

There is some international evidence suggesting that women and minori-

[9]For example, the average number of years of schooling in Guatemala is only four (Patrinos, 1996), compared to 12 years in the present sample.

ties receive greater returns to signals of high productivity than males. For example, medical board certification increases the earnings of female doctors more than their male counterparts (Culler *et al.* 1987).

Belman and Heywood (1991) outline a signalling model predicting that minorities will receive greater returns to signals of higher productivity, because the signal is more closely correlated with productivity for minorities than for the majority group. This may occur because, for example, minorities have less resources with which to purchase inaccurately large signals (p. 721). The findings presented by Belman and Heywood (1991) suggest that white women, minority women and minority men receive higher returns for graduate school and white males do not (although they do not statistically test this hypothesis). They note that these results are consistent with explanations other than the screening function of education – in particular there may be different patterns of labour supply and demand, and women with higher degrees may be in relatively short supply.

On the other hand, Jaeger and Page (1996) using actual information on completion (as opposed to imputation based on number of years of education) find little evidence that the sheepskin effects of high school and college graduation in the US differ across race and sex groups. They conduct hypothesis tests for diploma effects across demographic groups and conclude that the apparent differences in returns across gender and race groups are generally not statistically significant.[10]

It is noted that the data sets used to test for sheepskin effects typically do not contain actual information on completion or non-completion – rather, this has to be inferred from information about the number of years spent in education.[11] Several of the studies of developing countries – including Patrinos (1996) and Shabbir (1991)– are similarly limited by the available data and assume degree completion based on the number of years of school.

[10]With the exception of occupational Associate's degrees for white women.

[11]Most of the US studies have been based on the Current Population Survey which, until recently, lacked information on degree attainment.

Caveats

The sheepskin hypothesis has wider importance as one of the testable predictions of signalling theory: it is often interpreted as evidence for the signalling, as opposed to the human capital, function of education. Yet the existence of sheepskin effects does not provide conclusive evidence against the productivity view of education for several, related, reasons.

First, notwithstanding the conventional specification using a 'years of schooling' variable in earnings function analysis, which implies the existence of linear returns to each extra year of education, human capital theory does not require that the returns to education be constant across each year of education. The courses and examinations that are undertaken in the final year of education (and the associated certification) may imply that the productivity-enhancing effect of the final year was higher than that of earlier years of education.

Second, an alternative interpretation of the existence of sheepskin effects due to Chiswick (1973), is that dropouts are disproportionately comprised of inefficient learners who leave school when they realise how little their productivity is being augmented by education. Hence the diploma effects on earnings exist because this self-selection means that graduates *are* more productive, and not due to any signalling function. A third related point is that omitted ability variables may correlate with completion (Hungerford and Solon 1987).[12] For example, those sitting the final examinations may well be more motivated than those who drop out; hence gaining the qualification signals individual motivation and preparedness to complete a task. While the latter traits cannot generally be directly observed, obtaining a degree may be considered to be a proxy that is correlated with productivity in the workforce.

Finally, as noted in Chapter 2, the value of tertiary education may lie

[12] See Chapter 4 for a discussion of the problem of omitted variables including unobserved ability.

in the personal connections developed at university that lead to better-paid jobs. The importance of social networks for labour market outcomes has long been recognised by labour economists – although the focus is typically on the role of employee referrals in the hiring process.[13] Montgomery (1991), and O'Regan and Quigley (1993), conclude from reviews of the US literature that approximately 50 percent of all workers currently employed found their jobs through friends and relatives. If social networks are an important avenue to better paying jobs in Uzbekistan, graduation may simply be a proxy for the amount of time spent developing such relationships at school and university.

8.3.2 Testing for Sheepskin Effects in Uzbekistan

The peculiarities apparent in the returns to complete and incomplete education do not necessarily imply the existence of sheepskin effects. The numbers of individuals in the sample whose highest level of formal education is "incomplete" is relatively small - for example only 2 percent report incomplete *teknikum* compared to about 10 percent who completed (Table 5.2).[14] Are the differences in earnings between those who completed and those who did not statistically significant? The survey information was used to construct a set of discrete dummy (or binary) variables with a value of one if the individual is in a given category and zero otherwise.

To test the significance of the differences between completion versus non-completion at various levels of education, these dummies are amended so the incomplete category at each level also includes completion. For example, for the university level, there are already two dummy variables: *inchigh* and *high*. The variable *inchigh* was amended so that $inchigh = 1$ where $high = 1$. The regression was rerun including the amended *inchigh* and *high*, after carrying out the same procedure for each level of education. The basic model was run with these combined education dummies, plus the separate dummies for

[13] See Saloner (1985) and Montgomery (1991), and references therein.

[14] The numbers of observations are corresondingly small – 26 individuals in the restricted sample fall into the incomplete teknikum category.

completion only, to test whether the latter category was significant. In effect, the additional dummy for completion in this model shows the deviation from the average effect due to completion. There are other ways to test for the existence of sheepskin effects, including the construction of spline functions.[15]

The present data set avoids the problems investigated by Jaeger and Page (1996) that afflict many international studies. There is direct information on degree attainment, so that measurement error is not introduced by having to impute degree receipt from the usual number of years of education to complete that level.

The sheepskin test results are presented in Table 8.5, where the variables with asteriks represent the combined group of persons with complete and incomplete qualifications at the relevant level of education. This test, run separately by sex, shows that completion is not associated with statistically significant coefficients for men nor for women at any level of education.

8.3.3 Interpretation

These results have important implications for the appropriate specification of the education variables in the earnings functions, and provide insights about the relevance of human capital theory of earnings to Uzbekistan. However there is also cause for caution in interpretation, as highlighted below.

First, from the practical perspective of modelling the determinants of earnings, the results suggest that pooling individuals at each level of education, even if some did not obtain a certificate, is an appropriate way to clarify the empirical analysis. This confirms that the approach adopted in the previous section, which estimated an extended model of earnings, is the

[15]The spline function approach generalises the human capital log linear specification set out in Chapter 4 to allow for discontinuities at values of S which correspond to completion in addition to the continuous years of schooling variable (the so-called "dummies for degrees" approach, where sheepskin effects would be indicated by significant and positive coefficients on the dummy variables); see, for example, Shabbir (1991) pp. 6-9. This approach is often used in the case of a continuous education variable, but is not necessary in the present case.

Table 8.5: Sheepskin test results

	Men		Women	
	Coefficient	t-statistic	Coefficient	t-statistic
exp	.035	2.47	.079	2.83
$exp^2/100$	-.010	-1.57	-.761	-2.58
$exp^3/100$	0.00	1.12	.021	2.50
high*	.391	2.05	.448	2.08
high diploma	.010	.012	.077	0.94
vocational*	.666	2.68	.819	3.07
voc. diploma	-.118	-0.67	.034	0.19
college*	.678	2.60	1.04	3.42
col. diploma	-.121	-0.63	-.144	-0.61
university*	1.08	4.33	1.00	3.90
uni diploma	-.187	-1.08	.147	0.89
constant	5.52	26.65	5.18	23.97
$\overline{R}^2$	0.093		0.174	
N	979		708	

NOTE: * indicates pooled group, with complete and incomplete education at that level.

correct model. (For comparison, the results of the revised basic models for men and women are presented in Table 8A.6 in the appendix.)

Another broader implication follows the finding that sheepskin effects are not important in Uzbekistan for either men or women. These results are consistent with the human capital view of the importance of education. There are not significant gains to an individual in gaining the diploma, as opposed to the earlier years of study. The simplest interpretation is that productivity-enhancing skills are being imparted in each year spent in education, so that graduation *per se* makes no significant difference to earnings outcomes in later life.

There are caveats, however. The absence of sheepskin effects does not necessarily mean that the Soviet system of education is adequate for the needs of a market economy. The review of the Soviet system of education in

Chapter 2 suggested that the course structures and teaching methods reflects the preparedness of the individual to work in a disciplined fashion and in close-knit groups (study-collectives). This was arguably more important to Soviet-type employers than the content of tertiary courses. These worker traits, that were important in the planned economy, may have continued to influence individual earnings outcomes in the early years of the transition.

There are further reasons for caution in interpreting the results. It is possible that the value of education lies more in the acquisition of personal connections, as opposed to productivity-enhancing skills, as a route to better labour market outcomes. Such connections were especially important in a bureaucratic command economy (see Chapter 2), but also hold relevance in a market-based system (Saloner 1985; Montgomery 1991). Unfortunately these issues are impossible to untangle empirically with the present data set.

8.4 Arrears and Returns to Human Capital

Arrears are a pervasive phenomenon in Uzbekistan, as in other former Soviet countries. Section 8.2 demonstrated that the inclusion in an OLS earnings regression of a dummy variable representing the presence of arrears was negative and strongly significant. The coefficient on the arrears dummy in the OLS regression on log net wages was minus 42 percent for women (with a t-statistic of -7.1). The negative effect for men was almost as large – the coefficient was minus 34 percent with a t-statistic of -6.2). Recall that those estimations were based on the net wage for all workers, without distinguishing those individuals with arrears.

In this context, the analysis addresses two broad questions. First, are there differences in the returns to human capital between those workers who are affected by arrears and those who are not? Preliminary modeling is used to illustrate the ways in which such differences might arise, and the effect is quantified by running separate earnings regressions for the individuals with

and without arrears. Second, and relatedly, are the observed differences statistically significant? An F test is used for this purpose. This will reveal whether pooling of the samples, regardless whether the individuals have wage arrears, has been the appropriate approach to adopt in examining the returns to human capital during the transition.

These questions are important for Uzbekistan in and of themselves, but also have wider implications for studies of transition given the frequency of arrears elsewhere in the former Soviet Union. This section is limited to a consideration of arrears in the context of human capital earnings functions. A more extended discussion of ways to model arrears is presented in the next chapter.

Before proceeding, some definitions should be recalled (see Chapter 5.2). Net wage means the amount in soum actually received by the individual in the past month from the main place of work. Arrears is the amount reported as owing to the individual from the past month from the main place of work.[16] The contract wage is simply derived by adding the net wage to the amount of arrears owed.[17]

[16]Immediately after the question on sources of income received, the respondent is asked "Were you paid everything due to you in the last calender month? I will read again the various sources of income and you tell me please, if you are owed money for any of them. But remember that I am only interested in the last calender month, and not for any earlier period". Then the interviewer is instructed to read out each sources and write down the amount of soums owed: the first source is monthly wage at main place of work.

[17]One unfortunate complication that may affect the accuracy of this summation, and indeed all the estimates using the net wage, is that the amount received need not have been owed for that month. That is, the amount received may include payment of arrears owed from earlier periods. The income question simply asks: "Please tell me the net sum of money (after income tax) which you received in the last calender month from the following sources....monthly wage at main place of work". It is possible that the respondent reports all wage income received that month (including past amounts owed), rather than the monthly wage for that month. However as shown in Chapter 5.3, this seems to be unlikely.

8.4.1 Possible Effects of Arrears

Are there significant differences between the individuals who have been affected by arrears, and those who have not? By way of illustration of the possible effects, it is useful to think about how arrears could impact on returns to human capital. This can be conceived in the following simple terms.

Individuals invest in education, leave school and obtain jobs. There could be two different scenarios. Under the first, arrears are randomly distributed and amount to a proportion of the contracted wage (or a specific absolute amount). Under a second scenario, arrears are not randomly distributed. For example, individuals with higher levels of education or with higher wages are less affected or unaffected by arrears.

Figure 8.1 illustrates these alternative scenarios. In the upper panel, arrears are randomly distributed with respect to individual human capital characteristics. The effect of arrears is simply to reduce the levels of earnings received across the distribution, while the slope of the earnings profile (that is, the returns to human capital characteristics) remains unchanged.

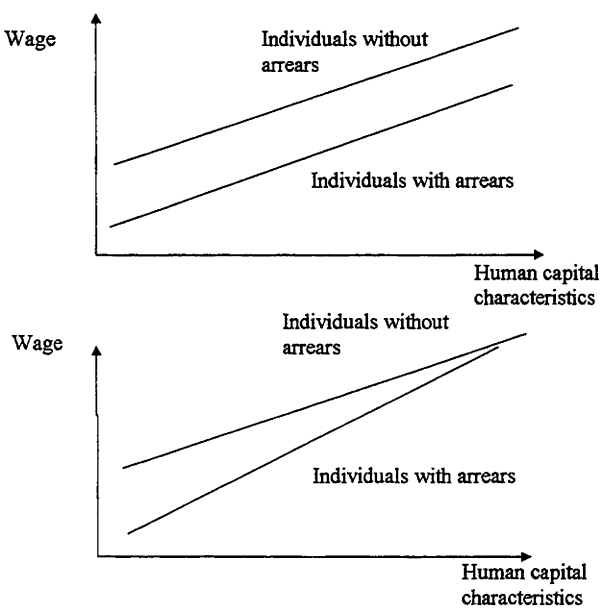
In the lower panel of Figure 8.1, individuals with lower levels of education are more affected by arrears. This results in falls in earnings at the bottom end of the education distribution. However this also has the effect of steepening the slope of the human capital-earnings profile for those individuals affected by arrears. In this case the returns to, say, education, would rise for individuals affected by arrears.

The question then arises, are the apparent differences in the co-efficients (slopes of the curves) on the human capital variables for individuals with and without arrears statistically significant? The focus here is on differences in the human capital variables.[18] Testing whether or not there exist significant differences between the groups is analogous to testing for structural change. This test is often labelled a Chow test, in reference to Chow (1960),[19] which

[18]The next chapter is devoted to exploring regional and other dimensions of arrears.

[19]See Greene 1994, pp. 211-212 for an elaboration and examples.

Figure 8.1: Possible effect of arrears on human capital returns



tests the hypothesis that some of the regression coefficients are different in the subsets of the data. This is a common application of the F test (Greene 1994, p. 211).

More formally, the test is as follows

$$F(K,N) = \frac{SSR_c - SSR_u/K}{SSR_u/N - K}$$

where SSR_c is the sum of squared residuals from the constrained (pooled) model and SSR_u is the sum of squared residuals from the unconstrained model (as defined below), K is equal to the number of parameters and N is the number of observations.

8.4.2 Results

The investigation is carried out separately by gender. The first step is to estimate earnings functions separately for the groups with and without arrears. The relevant wage (dependent variable) is the amount actually received in the previous month, net of arrears. The summary years of schooling variable is used to indicate what happens to returns to education.

Men are examined first. The results reported in Table 8.6 show much higher returns to education for male workers with arrears. This is because the wage cut incurred by arrears has the effect of steepening the slope on the wage-education curve, as depicted in the lower panel of the preceding figure. The same is true of the experience-earnings profile. At four years of experience, the estimated return to an additional year of experience is about 50 percent higher for the arrears group than for the non-arrears group (15 versus 10 percent). By ten years of experience, however, the difference between the two groups in the effect of an additional year of experience has narrowed considerably.

The next step, of course, is to test whether these apparent differences in the returns to education are statistically significant. This is done by way of an F test. The sum of squared errors for the constrained model is taken from

Table 8.6: Comparing returns to human capital: males with and without arrears

	With Arrears		Without Arrears	
	Coefficient	t-statistic	Coefficient	t-statistic
experience	.166	1.76	.085	2.71
experience^2/100	-.409	-1.37	-.176	-1.88
exp^3/100	.003	1.15	.001	1.26
years of school	.059	3.00	.034	5.38
constant	3.20	3.53	4.86	15.03
Adjusted R^2	0.132		0.089	
N	186		756	

the pooled sample. An unconstrained model is constructed by introducing interaction terms for the human capital variables. Additional interaction terms for each level of education and experience plus the presence of arrears - are included in the model for the pooled sample.[20]

The result of the application of this F test for male employees is

$$F(25, 934) = \frac{(360 - 352)/25}{352/909} = 0.826$$

The tabled critical value is 2.17 for one percent significance, so that the hypothesis that the human capital coefficient vectors are the same between the two samples (those with and those without arrears) cannot be rejected.

In other words, formal testing shows that despite the apparently large differences in returns to human capital between the arrears and non-arrears groups, the presence of arrears does not have a statistically significant impact on the returns to education and experience.

What is the impact of arrears on women's returns to human capital? This is examined as for men, and the first step is to split the sample and

[20] An alternative approach would be to include the interaction terms but not the arrears dummy. However this would mean that the coefficients of the model could be affected by the omitted variable (arrears) which has already been shown to be significant, and therefore possibly biased (see Hammermesh 1998). Hence the arrears dummy was included.

run the basic OLS wage regressions. Comparing returns to experience for women without arrears, to those with arrears, reveals results opposite to those found for men (Table 8.7). At 10 years of experience, this translates into contributions of experience (relative to someone without experience) of approximately 22 versus 6 percent for the arrears and non-arrears groups respectively. Women with arrears apparently get much higher returns to experience than those without arrears. For education, there is an opposite tendency: women without arrears have a coefficient on the years of schooling variables that is about one-fifth higher than that for women with arrears.

Table 8.7: Comparing returns to human capital: females with and without arrears

	With Arrears		Without Arrears	
	Coefficient	t-statistic	Coefficient	t-statistic
experience	.232	2.44	.061	2.41
experience^2	-.023	-2.385	-.006	-2.06
exp^3/100	.068	2.34	.015	1.90
years of school	.058	2.59	.072	10.21
constant	4.51	14.14	5.26	52.49
Adjusted R^2	.073		.166	
N	125		575	

Are these differences statistically significant? The same testing procedure as for men was adopted. An F or Chow-type test was used, with an unconstrained model for the pooled sample which includes interaction terms for arrears, and each level of education and years of (imputed) experience. The result of the application of this F test for female employees is

$$F(25,674) = \frac{(183 - 181)/25}{181/668} = 0.295$$

As noted above, the tabled critical value is 2.17 for one percent significance. Again, the hypothesis that the human capital coefficient vectors are the same between the two samples (those with and those without arrears) cannot be rejected.

The findings of this section can be summarised as follows. Given the widespread prevalence of arrears, a general question arose as to whether or not there are statistically significant differences in the returns to human capital between those who are affected by arrears and those who are not. Alternative scenarios were illustrated, and separate regressions suggested that the returns to experience were higher for both men and women who are affected by arrears. The picture with respect to education was less clear cut: for men, the returns were higher for the arrears group, whereas the opposite was found for women. In the case of both men and women, however, formal testing was used to show that the apparent differences in the returns to human capital between the arrears and non-arrears groups were not significant. It is therefore reasonable to maintain the extended model developed in Section 8.2 for the pooled samples of individuals, whether or not they are affected by arrears.

8.5 Experience and Gender Wage Differences

The crude gap between the average earnings of women and men in the sample is of the order of 25 percent. A gender difference in earnings of this order of magnitude is not unusual. Mincer (1985) reports an average gap of 25 percent for eleven industrial countries in 1980. Numerous international studies have investigated the gender wage gap, seeking to ascertain the extent of discrimination in the labour market (for reviews of the international literature see Gunderson 1989; Killingsworth 1990). The methodology typically involves a decomposition of the gap into explained and unexplained parts, following Blinder (1973) and Oaxaca (1973). The unexplained part is often referred to as "discrimination", although strictly speaking the most that we can say is that this part is unexplained by observed differences in the data.

Most of the studies published to date have focussed on western industrial countries. There are fewer studies of transition economies. The published

examples include Meng (1998) for China and Newell and Reilly (1996) for Russia.[21] Two earlier studies examined the case of Soviet Russia: Katz (1994) and Ofer and Vinokur (1992, Chapter 6).

This section applies the imputed female experience that was derived in Chapter 6 to test the sensitivity of the size of unexplained gender wage differentials to the measure of experience. In the next section, background on women's wages in Soviet Uzbekistan is provided, then Section 8.5.2 presents the widely used Blinder-Oaxaca method of wage decomposition. This method, and the more recent refinements of Cotton (1988) are then applied to the present data set. The concluding section highlights the methodological difficulties, and points to possible implications for policy.

8.5.1 Existing Evidence

The persistence of differences in average earnings throughout the Soviet period despite, on the one hand, formal pronouncements of sexual equality and, on the other, the lack of official wage data by sex, has been well documented. Information from sample surveys consistently revealed substantial earnings differentials between men and women, as reported in Table 8.8.

McAuley's 1981 book, 'Women's Work and Wages in the Soviet Union', cites earnings disparities, based on various small sample surveys in the European parts of the Soviet Union, of between 28-40 percent (Table 2.1, p. 21). Ofer and Vinokur's analysis of sex differentials in wages among Jewish emigres from the 1970s found a ratio of 0.68 for the basic wage, ranging up to 0.59 when all earnings are taken into account (1992, Table 7.1).Table 8.8 summarises the findings of various studies about the size of the gender wage gap in former Soviet countries.

Chapter 2 described how the rewards to labour in Uzbekistan were planned as part of the same structure that governed the entire Union. Not surprisingly

[21] Also Glinskaya and Mroz (1997, unpublished mimeo) examined the gender wage gap in Russia over the period 1992-1995.

Table 8.8: Estimates of the crude gender wage gap

Source	Country and Year	$\frac{\text{Female Wage}}{\text{Male Wage}}$(%)
McAuley (1981)	Russia, Lenigrad,1960-5	70
McAuley (1981)	Russia (urban) 1975	60
McAuley (1981)	Armenia, Yerevan 1963	65
Ofer and Vinokur (1992)	Russia (urban) 1979	77
Katz (1994)	Russia (Taganrog) 1989	66
Atkinson and Micklewright (1992)	USSR 1989	71
Newell and Reilly (1996)	Russian Federation 1992	74
Glinskaya and Mroz (1997)	Russian Federation 1995	71

then, the sizeable difference in average earnings between men and women in Uzbekistan is similar in magnitude to that found in Russia. Simply comparing mean earnings at main place of work by sex reveals that in Uzbekistan, in June 1995, men earned 768 sum whereas women earned only 570 sum, that is on average about one quarter less than did men. This is comparable to the gap of 26 percent estimated by Newell and Reilly (1996) for Russia for 1992, and slightly less than the Soviet-wide average gap of 29 percent reported Atkinson and Micklewright (1992) for 1989.

The most immediate explanation for the gaps reported in Table 8.8 is that women are simply being discriminated against by employers. Yet formal guarantees of equal pay were set out in Soviet law. Shortly after the October revolution the Party pledged commitment to alleviate sexual inequality (see McAuley 1981, pp. 5-6). The measures adopted included legal guarantees of equal rates of pay for equal work; and protection against "unsuitable" work (e.g. night work and overtime), as well as the expansion of education opportunities and the provision of subsidised child care.

The national Labour Code (dating from January 1995) contains formal protection for women that is very similar to the Soviet period. Discrimination on the basis of gender is expressly prohibited, and individuals who feel that they have been discriminated against in the sphere of work can apply to

the "people's court" (*narodnyi sud*) for redress (Article 6).[22] There are also additional guarantees for women viewed as potentially disadvantaged in the workplace, specifically including single parents, women with disabled children and women with many children under the age of 14. Enterprises with more than 100 employees (whether public or private) are obliged to allocate 4 percent of jobs to the last group. Pregnant women and women with children under the age of three years cannot be fired (Labour Code, Article 237).

While the likelihood of discrimination in rates of pay for the same job can be reduced by the legislative guarantees, social attitudes and norms, as well as segregation of the labour force, may still lead to lower wage outcomes for women. This has been the case in Western countries, where the enactment of equal pay legislation has narrowed but not eliminated gender wage differences (see, for example, Rummery 1992; Miller 1994; and Wooden 1998 on Australia).[23] There are different types of segregation: horizontal - where women and men are concentrated in different sectors - and vertical segregation - where women are concentrated in the job hierarchy in positions involving less skill and responsibility.[24] Measures of occupational segregation, like those presented for a range of countries by Blau and Ferber (1992, Table 10.2), are unfortunately not available for Uzbekistan.[25] Other evidence

[22] Article 6 reads as follows:

"All citizens have equal opportunities to acquire and practice employment rights. The setting of any limitations or preferences in the sphere of labour relations with regard to sex, age, nationality... and such circumstances unconnected with the work qualifications of the worker and his/her work performance is not permissable and is discriminatory" (see Marnie 1998, p.1).

[23] In Sweden, perhaps the most progressive industrial country in terms of egalitarian public policies between women and men in the family and in the workplace, the gender wage gap is still 10 percent (Sapsford and Tzannatos 1993, p. 235).

[24] There is empirical support for the argument that work in female-dominated occupations is undervalued relative to work undertaken in male occupations: see, for example, evidence for Australia in Miller (1994) who concluded that this amounted to about 40 percent of the gender wage gap.

[25] An index of segregation is computed using ILO data, equal to the percentage of one group that would have to change jobs in order for the occupational distribution of men and women to be the same. It ranges from 9.7 in China to 62.3 in Qatar. The measured

does nonetheless suggest substantial gender segregation in the former Soviet labour market and in transition Uzbekistan.

Based on the analysis of four decades of Soviet census data, McAuley (1981, Table 4.1) found that rising female labour force participation had been associated with an expansion of the sorts of jobs regarded as women's work, into which women were concentrated – in the USSR as a whole in 1970, 54 percent of manual, and 47 percent of non-manual female employees in the non-agricultural sector were engaged in industries where over 75 percent of the workforce was female. McAuley (1981) concluded that occupational segregation was the primary source of earnings disparities, and that segregation persisted because of the differences in the type of educational qualifications acquired, the difficulties in reconciling paid work and domestic responsibilities, and limitations on job choice imposed by protective legislation.

There is evidence that women have become increasingly concentrated into the worst paid (and traditionally female) parts of the Uzbek economy during the transition.[26] According to official employment statistics (quoted by Expert Centre 1998), the share of women working in the health sector rose from 15 to 19 percent between 1991 and 1996 and the share working in education rose from 20 to 30 percent; while the share working in industry fell from 26 to 19 percent. Health and education were traditionally favoured by women since the jobs offered the prospect of greater flexibility with respect to domestic responsibilities (McAuley 1981; Marnie 1998). Even in the female-dominated fields, however, women are under-represented at managerial levels. In Fergana oblast, for example, women represent 79 percent of those employed in the health sector, but only 16 percent of managers in the sector (Expert Centre 1998).

Thus differences between women and men in the labour market may arise

extent of segregation is obviously sensitive to the size of occupational groupings.

[26] Also, Marnie (1998) suggests that the requirement that jobs be reserved via quota for disadvantaged women means that enterprises offer the most unattractive jobs which most would not prepared to take up.

as a result of differences on the supply-side, as well as discrimination against women. In Uzbekistan, as in Western economies, women and men in the labour force may differ in terms of their education, experience, sector of employment and so on.[27] Traditional gender roles and expectations about family size may well affect earnings outcomes, in a variety of ways. Women may choose occupations and careers that allow them to juggle family responsibilities, and they may invest less in human capital because they expect greater interruptions to labour force participation over their working life. If they give greater priority to family concerns over career, women may restrict their hours and work schedules as well as their availability for travel.[28]

Comparison of the observed characteristics of the female and male samples in Uzbekistan in 1995 shows several key differences in the means. Most notably, women have, on average, less than half the number of years of experience and a lower share with university education (16 versus 21 percent). There is a greater concentration of women in the sample into employment in the state sector, and fewer in private and military and other types employment.

In the empirical economics literature, the most popular approach to accounting for gender differences in earnings has been to adopt the methodology of Blinder (1973) and Oaxaca (1973), and decompose the overall gap into explained (differences in observed productivity characteristics) and unexplained parts. This methodology, and its main weaknesses, are set out in the next section before going on to applications.

8.5.2 Models of Wage Discrimination

Writings on lower pay for women can be traced back to early religious references, nineteenth century writings of John Stuart Mill and a number of

[27] Blau and Ferber (1992, Chapter 6) provide a useful review of the evidence on supply-side explanations, especially for the US.

[28] In Uzbekistan, these priorities are supported by protective legislation, but may nonetheless restrict women to certain kinds of (generally lower-paid) jobs.

British commentators in the early twentieth century.[29] The empirical evidence suggests that there are pay differences between men and women that are not accounted for by (potential) productivity differences.[30] Economists have developed a variety of models that may be used to analyse these differences, including models based on "tastes" for discrimination, "statistical" discrimination and overcrowding. Each of these models is briefly reviewed before going on to present the usual approach to decomposition of the gender wage gap.[31] For the most part, these explanations are not mutually exclusive and each may shed light on the nature and impact of labour market discrimination on women's earnings (Blau and Ferber 1992, p. 200).

Tastes for Discrimination

The foundation for the modern neoclassical analysis of labour market discrimination was laid by Becker (1957). In his work, discrimination arises because of individual "tastes" – an employer who does not want to employ women is willing to "either pay or forfeit income for this privilege" (Becker 1957, p.14).[32] Becker suggested that a discrimination coefficient could be conceived as the net cost to the employer associated with employing women, which included the wage paid plus the disutility caused by the presence of women.

In this framework, discrimination can be measured as the difference between the equilibrium wage rates of men and women, and equilibrium wage rates for men and women in the absence of discrimination. More formally, assuming perfect substitutability in production between women and men, this can be written as:

$$DC = \frac{W_m}{W_f} - \frac{W_m^0}{W_f^0} \tag{8.1}$$

[29] See Sapsford and Tzannatos 1993, pp. 210-212 for an interesting overview.

[30] Blau and Ferber 1992, p. 199.

[31] This section draws on Blau and Ferber (1992), pp. 199-218.

[32] In addition to the tastes of employers, co-workers and/or customers may also have potentially discriminatory tastes. See Blau and Ferber (1992) pp. 205-208.

The discrimination coefficient (DC) is the difference between the equilibrium wage rates of men (W_m) and women (W_f), and equilibrium wage rates for men (W_m^0) and women (W_f^0) in the absence of discrimination. One implication of tastes antithetical to women is that the demand curve for women's labour would shift inward to compensate for the associated psychic cost.[33] Among the contributions of the Becker model is the idea that discrimination is potentially measurable on a continuous scale, and later analyses have developed this point.[34]

Statistical Discrimination

Models of statistical discrimination developed by Phelps (1972) and others[35] attribute the existence of discrimination to decision-making under conditions of incomplete information. Decisions about hiring and promotion can be costly in the sense that fixed recruitment and training costs are involved. In such a situation, employers use any readily available information to aid in their decisions. If they believe that, *on average*, women are more likely than men to have career breaks, statistical discrimination against *individual* women may result.[36] Employers may systematically overstate the costs of employing women – for example, their perception of differences in quit likelihoods and labour turnover rates between the sexes may be wrong. Nonetheless if an employer believes that for a given level of educational qualifications, women as a group are less likely to remain with the firm than men, then the

[33] A number of other predictions are associated with the model – for example, if women's wages are lower than men's, under the assumption of perfect substitutability in production, then the higher the percentage of men in the labour force, the lower the firm's profits would be (indeed, the profits of the discriminating employer will become negative before the workforce becomes all-male). Another implication is that in the long run under perfect competition, the discriminating employer will be driven out of the market by non-discriminating employers: see Sapsford and Tzannatos (1993), p. 213-216.

[34] At the same time, among the shortcomings of the Becker aproach is that discrimination is simply assumed to exist, but its origins are neglected (Dex, 1986, p.21).

[35] See, for example, Arrow (1973); Aigner and Cain (1977).

[36] This has been shown to be the case in Australia, for example: see Chapman, 1984.

employer would hire the woman only at a lower wage (or perhaps simply hire a man instead).[37]

In Uzbekistan, women on average tend to have discontinuous work attachment (Chapter 6). Although employers only bear part of the direct monetary cost of maternity leave (the rest being paid by social insurance funds), they may well prefer to employ individuals who are unlikely to take leave to bear and raise children. There is anecdotal evidence that, while there is officially no discrimination in hiring practices, employers in the public and private sectors try to avoid hiring women of child-bearing age because of the very generous maternity leave and various rights accorded to women with children (Marnie 1998).

One important distinction between statistical discrimination and discrimination based on tastes is that, in the former model, discrimination is not likely to be eroded by the forces of competition. Employer thinking based on stereotypes is discriminatory (and contrary to the provision of the Labour Code in Uzbekistan), but it is nonetheless based on employers' correct assessment of *average* gender differences.

Overcrowding

This model, attributed to Bergmann (1974), demonstrates that regardless of the sources of gender segregation in the workforce, the consequence may be a female-male wage differential. The argument is that the relative oversupply of women in certain sectors of the labour force will tend to push down the wage in those sectors. This can arise if, for example, job opportunities in the female sector are small relative to the supply of women available for such work (see Blau and Ferber 1992, p. 214).

The overcrowding model is consistent with the evidence that has been

[37] As noted by Blau and Ferber (1992, p. 210), the effects of statistical discrimination are particularly pernicious when there are feedback effects. If women are given low paid jobs and given less training, they have less incentive to stay, thus reinforcing employer expectations of "unstable" behaviour.

presented about the Uzbek labour market: women are concentrated into certain sectors, which tend to be low paid. One important development in the transition, noted in Chapter 3, has been the demechanisation of agriculture: manual cotton picking has traditionally (and still is) considered to be a female job (Expert Centre 1998, Chapter 4). However the overcrowding model does not explain *why* women are concentrated into certain sectors – in Uzbekistan, women may be trading higher wages and steeper earnings profiles for job conditions that allow them to balance home responsibilities, for example. Nor does the model explain why women are so under-represented at higher levels even within these sectors.

8.5.3 Decomposition Methodology

This section presents the most commonly used approach to decomposing the gender wage gap, which is applied in the next section to the Uzbek data. Blinder (1973) developed an approach which decomposed $\frac{W_m}{W_f}$ into two parts: the first, attributable to differences in individual characteristics, and the second, to differences in treatment.

Earnings equations, similar in form to those estimated in Section 8.2, are constructed separately for men and women, as follows:

$$\ln W_i^f = \alpha_i^f + \sum_{j=1}^{n} \beta_j^f X_{ji}^f + \varepsilon_i^f \tag{8.2}$$

$$\ln W_i^m = \alpha_i^m + \sum_{j=1}^{n} \beta_j^m X_{ji}^m + \varepsilon_i^m \tag{8.3}$$

where α is a constant term, X is a vector of individual characteristics and $\beta's$ are the returns to those characteristics, and ε is an error term.[38] The two

[38] An alternative approach is to simply add a sex dummy to a pooled earnings regression model. The coefficient on the sex dummy shows whether, on average, women recieve lower pay than men, other things being equal. However this model constrains the values on the other explanatory variables (such as education and experience) to be the same for men and women. Since sex-specific earnings functions have significantly different coefficients

regressions must have a strictly comparable specification, that is the number and type of variables should be the same in the female and male equations.

Utilising the regression property that the error term has a mean value of zero, the predicted difference in the mean log wages can be decomposed as (Oaxaca 1973):

$$\ln W_i^m - \ln W_i^f = \left(\sum_{j=1}^{n} \beta_j^m X_{ji}^m - \sum_{j=1}^{n} \beta_j^f X_{ji}^f \right) \tag{8.4}$$

Adopting matrix notation, this can be further decomposed as:

$$\beta^m X^m - \beta^f X^f = \beta^m (X^m - X^f) + X^f (\beta^m - \beta^f) \tag{8.5}$$

or

$$\beta^m X^m - \beta^f X^f = \beta^f (X^m - X^f) + X^m (\beta^m - \beta^f) \tag{8.6}$$

The first term on the right-hand side shows the contribution of differences in endowments or characteristics to the wage differential. The second term reflects that part of the overall differential attributable to differing returns to those characteristics, or unjustified "discrimination".

While this decomposition approach has been widely adopted in empirical labour economics, it is useful to recall several caveats:

First, the second component of the decomposition equations (8.5 and 8.6), that is ($X^f(\beta^m - \beta^f)$, or $X^m(\beta^m - \beta^f)$) is simply a residual; for this to be an exact measure of discrimination all of the factors that determine the wage must have been included in the model. In fact, that will typically not be true – in the present case the adjusted R^2 is about .39 – so that the residual will reflect the omitted influences as well. As Cotton (1988, p. 237) notes, this is a long standing problem and nothing very much can be done except to recognise the caution needed in our interpretation of the results.

(as shown for Uzbekistan in Section 8.2 above), the pooled approach would in general lead to biased results.

Second, it is immediately clear that equations 8.5 and 8.6 do not produce the same results. The former decomposition evaluates the components as if women were paid as men, whereas the latter assumes that men are paid as women. This is a common problem with index numbers. Jones (1983) and others have noted that the "decomposition depends critically upon the reference point from which the differences are calculated." It is not *a priori* known whether a decomposition based on female means will produce higher or lower estimates of discrimination than a decomposition based on male means. It depends on the relative positions and shapes of the female and male earnings functions. If the male earnings function lies above the female function and has a steeper slope, then the female weighted estimate of discrimination will be larger (Sloan 1985).

This is shown graphically in Figure 8.2. The horizontal axis measures productivity characteristics (e.g. education in terms of years of schooling) and the vertical axis measures wages. A stylised case is presented, where the male earnings function has both a higher intercept and steeper slope than the female function. Let X^f and X^m be the average productivity characteristics (years of schooling) of women and men respectively. β^f and β^m are the returns to those characteristics (that is, the slopes of the functions).

The way Figure 8.2 is drawn suggests that women have lower earnings than men ($W^m > W^f$) for three reasons. Namely, because

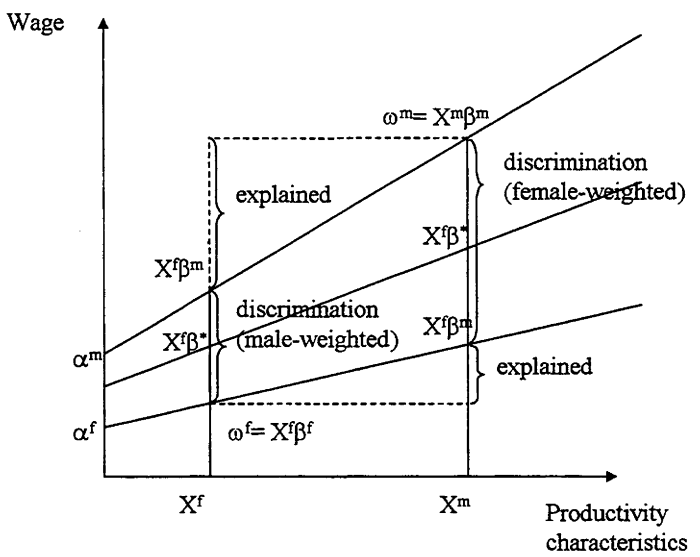
(i) women have fewer years of schooling than men ($X^f < X^m$);

(ii) their education attainments are rewarded less than men's ($\beta^m > \beta^f$); and

(iii) the intercept (constant term) is smaller for women ($\alpha^f < \alpha^m$).

The measured extent of discrimination depends on whether it is assumed that, in the absence of discrimination, men would be paid as women, or vice versa. Alternatively, the structure of earnings that would prevail in the absence of discrimination might well lie somewhere in between (Cotton 1988). Each of these scenarios are shown in Figure 8.2.

Figure 8.2: Gender wage decomposition: hypothetical case



If no discrimination means that women should be paid as men, then their earnings would rise from $\beta^f X^f$ to $\beta^m X^f$. That is, the returns to women's education (X^f) would be equal to that accorded to men (β^m). This is evaluated at the position on the X axis that is equivalent to female average education (X^f),which is referred to in the literature as the "male-weighted"case. The difference arising because of the differences in the $\beta's$ represents the "unexplained" part of the earnings gap. On the other hand, if no discrimination is taken to mean that men would be paid as if they were women, then the unexplained part is much larger ($\beta^m X^m - \beta^f X^m$). This is referred to in the literature as the "female-weighted" case.

Cotton (1988) pointed out that the standard Blinder-Oaxaca approach fails to portray the wage structure that would prevail in the absence of discrimination ($\frac{W_m^0}{W_f^0}$), which was a critical element of Becker's theory. He suggested that, in reality, the preferred group is overvalued *and* the discriminated group is undervalued, and that the latter subsidises the former. In this

case, in the absence of discrimination, neither the female nor male structure would prevail. This is illustrated in Figure 8.2 by the positions related to β^*. Under a "Cotton" scenario, women would be paid $\beta^* X^f$, and men would be paid $\beta^* X^m$. In the analysis below, the possible range of discrimination effects are shown using the male and female-weighted cases as well as the so-called Cotton method.

A third caveat is that Becker's assumption that women and men are perfect substitutes in production underlies all the decomposition models, including Cotton's.[39] This assumption may be problematic if women and men have very different characteristics, and work in very different types of jobs. In the US, for example, women are more likely to work in the state sector, since they attach greater weight to job security and related benefits. In Uzbekistan, large average family size and extensive maternity leave entitlements mean that women tend to have fewer years of experience; women in Uzbekistan are also more likely to work in the state sector, and especially in social services, while evidence from elsewhere in the Soviet Union suggests that women attach greater importance to job security and non-pecuniary aspects of work than men, even at the expense of higher earnings.[40]

Just how different the characteristics and jobs have to be to overturn the assumption of perfect substitution is *a priori* unclear. However this point calls for caution in the interpretation of the decomposition results: the decomposition may not cast much light on the "true" extent of discrimination in the labour market since the differences arise in the respective "choices" of their X's (such as the level of experience and occupation).[41] In the present analysis, occupational controls are not available beyond broad sectoral break-

[39] This is also generally true of the models of discrimination that were reviewed in the previous section.

[40] Evidence for Russia is presented in Zubova and Kovalyova, Chapter 10 in Klugman (ed.) (1997).

[41] While occupational outcomes do reflect choices, rarely are these choices unconstrained. In this sense, it is reasonable to assume that the distribution of women and men across occupations is given (see Miller, 1994; Wooden, 1998).

downs. The inclusion of more detailed occupational dummies would increase the proportion of the pay gap attributed to occupational segregation (or discrimination) (Blau and Ferber 1992, p. 197).

This raises a more fundamental problem that is inherent in the conventional decomposition methodology. Differences in individual characteristics ("endowments") are considered to be non-discriminatory, but this assumption is open to criticism. Most obviously, women tend to have less labour force experience and on-the-job training because they undertake the bulk of domestic responsibilities. They may also participate less in the labour market because of lower expected earnings – raising a "chicken-or-the-egg" problem (Gronau 1988). This is also known as "feedback effects".[42] Societal discrimination and employee expectation of future labour market discrimination may induce differences in factor endowments (Goldin and Polachek 1987, p. 144).

Another practical problem with the conventional gender wage decomposition is that Mincerian experience is used as a proxy for time in the labour force. It has been widely recognised that this will tend to over-estimate actual labour market experience for women (see Kidd and Shannon 1997, and references therein). Yet the studies of the gender wage gap in transition that have been undertaken to date have ignored this problem. The investigations of the Russian gender wage gap undertaken by both Newell and Reilly (1996) and Glinskaya and Mroz (1997) use age rather than a closer measure of true female experience. In the next section the implications of mismeasurement of female experience are investigated for the case of Uzbekistan.

8.5.4 Decomposition Results

In this section, the results of Chapter 6 are reviewed before going on to decompose the wage gap using alternative measures of experience. A comparison of the results from a basic OLS regression of the female log wage on

[42] As already noted above. See Blau and Ferber (1992), pp 217-218.

years of school and "experience" (Table 6.6) showed that the imputed experience term affects not only estimates of the average amount of experience, but also the returns to experience. The measure of imputed experience suggests that women, on average, have far fewer years in employment, which in turn significantly increased the estimated returns to experience. Age and Mincerian experience as a proxy for time in employment suggests that additional years on average bring less than a 0.5 percent increase in wages (though in both cases the term is very insignificant).[43]

A comparison of the estimation results shows that the imputed experience term has substantial repercussions not only for the estimated size of returns to experience, but also for returns to education. Table 8A.7 in the appendix presents extended models of earnings determination using alternative measures of experience. The first two columns show the female coefficients. At every level of education, the returns to education are much higher in Model A, which is based on imputed experience. This is more pronounced here than was evident in Chapter 6 from the comparison of the basic models with a continuous years of schooling variable (Table 6.6). The coefficient on the term indicating the presence of young children in the household turns from negative in the Mincerian model (Model B) to positive in Model A. On the other hand, the coefficients on the other variables – sector, region, ethnicity and arrears - are not much affected.

The differences in the coefficients in the two models will affect the estimated extent of discrimination in the labour market. Two models of the Oaxaca decomposition are estimated: the first (Model A) uses imputed experience and the second (Model B), a Mincerian proxy. Male and female earnings are regressed separately on a vector of variables that includes the relevant measure of experience and its cubic, and dummies for the level of education, marital status, ethnicity, sector of employment and location. Two

[43] By way of contrast, a study of the gender wage gap in Australia presents coefficient estimates for experience that are broadly similar across the alternative definitions (Rummery 1992, p. 360).

alternative base cases are presented in Table 8.9. It is assumed that in the absence of discrimination, either the male wage would prevail (male weighted), or that the female wage would prevail (female weighted).

Table 8.9: Decomposition results: Oaxaca-Blinder method

	Model A	Model B
$\beta^m X^m$	7.91	7.91
$\beta^m X^f$	6.02	6.73
$X^f \beta^f$	6.45	6.08
$\beta^f X^m$	7.65	6.18
Unexplained (%)		
Male weighted	-28.7	35.0
Female weighted	18.0	95.0

The differences between Model A and Model B are immediately obvious: under Model B, women would be paid over 10 percent more if their characteristics were rewarded as men's ($X^f \beta^m > \beta^f X^f$); whereas under Model A, they would receive less ($X^f \beta^m < \beta^f X^f$). This affects the assessed extent of discrimination in earnings. However the results are also sensitive to the structure of wages that is assumed to prevail in the absence of discrimination, as discussed below.

The rows labelled "unexplained" show the percentage of the wage gap that is due to the difference in returns: that is, $X^f(\beta^m - \beta^f)/(\beta^m X^m - \beta^f X^f)$ and $X^m(\beta^f - \beta^m)/(\beta^m X^m - \beta^f X^f)$, for the cases of male and female weighted estimations, respectively. One example is derived here for the purpose of exposition. If the female structure of wages is assumed to prevail in the absence of discrimination – that is, that discrimination implied that there was aversion to women, as well as favouritism toward men - then in Model A, the unexplained part of the gap can be calculated simply as:

$$\frac{7.91 - 7.65}{7.91 - 6.45} = \frac{0.26}{1.47} = 18\%$$

The results for the other cases are presented in Table 8.9. (The vectors of male and female characteristics are presented in Table 8A.7 in the appendix.)

The situation can be depicted graphically to illustrate how Uzbekistan differs from the preceding stylised case (Figure 8.3). By way of contrast to Figure 8.2, this figure suggests that men are paid more than women ($W^m > W^f$) for two basic reasons:

(i) women have a lower level of productivity characteristics than men ($X^f < X^m$); and

(ii) their characteristics are rewarded less than men's ($\beta^m > \beta^f$).

If no discrimination is taken to mean that men would be paid as if they were women, then the unexplained part is sizeable (and is shown by the difference between $\beta^m X^m$ and $\beta^f X^m$).

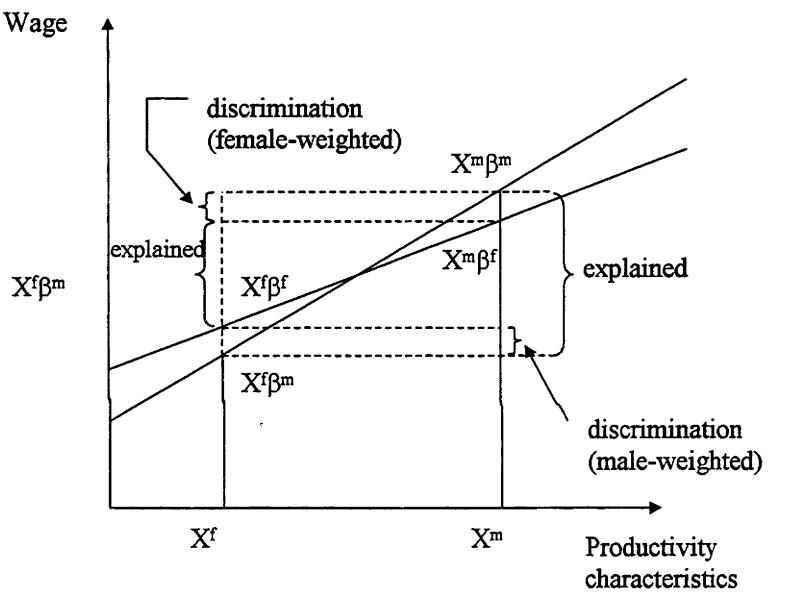
Note, however, that the constant term is not smaller for women; rather, $\alpha^f > \alpha^m$.[44] This raises a somewhat unexpected scenario. If no discrimination was taken to mean that women should be paid as if they were men, then their earnings would actually fall, from $\beta^f X^f$ to $\beta^m X^f$. This difference represents the "unexplained" part of the earnings gap in the male-weighted case.

The adjustment of experience makes an enormous difference to the estimated extent of discrimination in the labour market. The hypothesis was that the use of Mincerian experience would greatly inflate the estimated extent of discrimination. When the Oaxaca decomposition is re-estimated according to Model B, this is indeed the case. The assessed extent of unjustified discrimination increases dramatically for both the male- and female-weighted cases. In the former, the results suggest that the unexplained component accounts for over nine-tenths of the difference in female and male wages. Similarly, Rummery (1992) found that decomposition based on Mincerian experience attributed virtually the entire wage gap to discrimination.

The results for Model A, when the male-weighted structure is assumed to

[44]Typically the intercept term is shown to be higher for men: see, eg, Goldin and Polachek (1987) and Rummery (1992).

Figure 8.3: Gender wage decomposition: Uzbekistan, 1995



be the non-discriminatory norm, indicate that men have "superior" observed endowments to women. In particular, in Model A, men have about twice as much measured experience as women. In this scenario, there is no adverse treatment of women: indeed if women were rewarded as if they were men, their earnings would fall. The more detailed decomposition presented in the appendix (Table 8A.7) shows where the differences arise.

However even more striking than the differences associated with alternative measures of experience is the arbitrariness of the conventional Blinder-Oaxaca decomposition. Table 8.9 highlights a huge range of measured discrimination depending upon whether a male or female weighted structure of wages is assumed to exist in the absence of discrimination. Indeed, under Model A, the unexplained portion entirely disappears in the male-weighted case. Such large differences between the female and male wage structures suggest that their labour markets are segmented. Labour market segmentation makes the application and interpretation of the traditional decomposition problematic – is it appropriate to assume that men (women) are being treated like women (men) if the labour market(s) in this economy would not?

Recall that a basic assumption of Becker's (1957) analysis that enabled the quantification of discrimination in the labour market was that men and women are perfectly substitutable in production. In the present case, occupational segregation may be so extensive as to overturn this assumption. Earlier studies of the Soviet labour market have documented the female dominance of low-paid jobs and low paid sectors (see, e.g., McAuley 1981 and Katz 1994).

The extreme sensitivity of the results to the choice between the male and female weighted estimations suggests that alternative approaches should be tested. Cotton (1988) set out an approach that uses the weighted average of the male and female estimations. More formally:

$$\ln W_i^m - \ln W_i^f = \beta_j^*(X_j^m - X_j^f) + X_j^m(\beta_j^m - \beta_j^*) + X_j^f(\beta_j^* - \beta_j^f) \qquad (8.7)$$

where β^* represents the "non-discriminatory" wage structure which lies some-

where between the current male and female wage structures (Cotton 1988, p. 239). It is assumed that this wage structure would be some function of the forces that currently determine the male and female wage structures, and will be closer to the wage structure which accounts for the majority of the labour force. Specifically,

$$\beta^* = f^m \beta^m + f^f \beta^f$$

where f^m and f^f are the employment shares of men and women respectively.[45]

The results of this extension are presented in Table 8.10. (The terms $X^f\beta^m$, $X^f\beta^f$, $\beta^m X^m$, and $\beta^f X^m$ are unchanged.)

Table 8.10: Decomposition results: Cotton method

	Model A	Model B
$\beta^* X^m$	7.04	6.56
$\beta^* X^f$	5.56	5.85
Unexplained (%)	-1.3	60.7

By construction, the Cotton decomposition suggests that in each model (A and B), the extent of discrimination lies somewhere between that found in the male-weighted and female-weighted cases. It still indicates that an imputed measure of experience for women in Uzbekistan that takes intermittent workforce attachment into account will dramatically reduce, and indeed eliminate, the assessed extent of unexplained gender wage differences. These comparisons suggest that an appropriate measure of female labour force is important. Mismeasurement will not only bias our estimated returns to experience, but also assessments of, inter alia, the extent of discrimination in the labour market.

[45] A further assumption implicit in this assumption, as noted by Cotton (1988) is that neither total actual output nor the total wage bill would change in the absence of discrimination. The only effect would be a redistribution of income and jobs (p. 240).

8.6 Conclusions

This chapter has investigated a range of extensions and applications of the basic model that was introduced in Chapter 5.

The first section introduced a range of extra controls to the basic model. This built on the analysis in Part I and Chapter 5 which suggested the importance of ethnicity and regional differentiation in Uzbekistan. The analysis, undertaken separately for men and women, provides a number of important insights into the determinants of earnings in Uzbekistan and, for the first time, quantifies their significance.

For both men and women, the estimates showed significant effects for the regional and ethnic dummies. There is a premium associated with living in the capital; somewhat less expected was the finding that Fergana has a larger negative effect than the better-known poor region of KKP. The data suggests that the traditional advantages associated with Slavic ethnicity have persisted since independence from Moscow. This somewhat surprising result could be explained in terms of the selection effects resulting from the large-scale migration of Russians since the early 1990s.

The sectoral effects confirmed the picture that was presented in PART I: higher earnings are associated with all sectors of employment relative to the agricultural *kolkhoz*. An arrears dummy had large and significant negative effects, and interaction terms were used to indicated that the negative effect of arrears was compounded for residents of Fergana and non-Uzbeks.

The results of the extended model for women in many ways mirrored that for men, although in several cases the orders of magnitude differed. Women exhibit higher returns to university education than men, a phenomenon which is not uncommon in international studies, and reasons for this are advanced. The negative effect of arrears is also larger for women than for men. The picture overall suggests that many of the effects of transition have either been more adverse, or at least less advantageous, for women. The continuing gap between men and women's average earnings was investigated in Section 8.5.

The next task was to explore the apparent peculiarities in the returns to education in Uzbekistan. The question investigated was whether or not there were gains associated with completion (a "diploma effect"), over and above the productivity gains associated with an additional year of education. Such effects, known as "sheepskin effects" have been found to exist in a range of industrial and developing countries, although there are no published studies for transition economies. The data set allowed the differences associated with actual completion to be investigated, in contrast to a number of international studies that had to impute completion from information about the number of years of schooling completed. The differences between completion and non-completion were tested and found to be statistically insignificant. This analysis confirmed that pooling of individuals with complete and incomplete education at each of the respective level is the appropriate approach.

Section 8.4 investigated the possibility of statistically significant differences in the returns to human capital between those individuals who are affected by arrears, and those who are not. Estimation of separate earnings functions for the two groups (and by sex) suggests that there are large differences in the returns to education and experience. However formal testing of the observed differences, by way of an F, or Chow-type test, reveals that the differences are not statistically significant. These results confirm that the appropriateness of the modelling approach adopted in this thesis, which pools individuals regardless of whether or not they have been affected by arrears.

The final section has shown the sensitivity of estimates of wage discrimination to the measure of female experience. An imputed measure of female experience, derived in Chapter 6, was applied to illustrate its importance for the estimates of unexplained gender wage differences in the labour market. The exercise suggested two main results. First, the use of Mincerian experience, or age, in earnings functions for women in the former Soviet republic of Uzbekistan, and by implication, in the Russian Federation and elsewhere,

will tend to overestimate the extent of gender discrimination in the labour market. Second, the extreme sensitivity of any conclusions about the extent of discrimination to the method of gender wage decomposition used demonstrates the need for caution in drawing any firm conclusions about the magnitude of discrimination using conventional methods.

From a policy perspective, some tentative conclusions are possible about gender differences in wages. The education system appears to have provided equitable access for men and women, at least relative to neighbouring countries outside the Soviet bloc at similar levels of per capita income (Falkingham *et al.* 1997). The main exception was at the tertiary level. This could be cause for concern given the evidence about the earnings advantages accruing to university graduates presented in Chapter 7.

Overall, the differences in characteristics between men and women are the primary source of earnings differences. In particular the tendency toward large families and the associated discontinuities in female labour force participation are an important difference between male and female productivity profiles.

Caution is however needed in interpreting the results about the apparently extent of discrimination in the Uzbek labour market. The fact that women do have extensive interruptions to their working careers may be attributable, at least in part, to lower earnings expectations. The possibility of feedback effects in the generation of discrimination in the labour market was discussed. In this sense, government efforts to promote family planning, which have already been associated with marked declines in the fertility rate since independence (Klugman and Schieber 1997) could help to raise women's earnings in the long term.

8.A Appendix

Table 8A.1: Extended male model, with quadratic experience

	Coefficient	t-statistic
Experience		
exp	0.048	5.47
exp2/100	-.601	-4.91
Education (relative to primary or less)		
high	0.175	1.12
college	0.245	1.51
vocational	0.257	1.58
university	0.477	3.01
arrears	-.338	-6.07
Ethnicity (relative to Uzbek)		
Slavic	0.159	2.40
Non-Uzbek	0.247	0.450
Sector (relative to kolkhoz)		
State	0.517	7.88
Private	0.714	7.77
military	1.16	9.29
non-wage benefits	.024	0.42
Region (relative to Tashkent)		
Fergana	-0.327	-6.12
KKP	-0.263	-3.95
Constant	5.04	24.38
N	925	
$\overline{R}^2$	0.3437	

Table 8A.2: Extended female model, with quadratic experience

	Coefficient	t-statistic
Experience		
exp	0.172	1.56
exp2/100	-0.04	-0.93
Education (relative to primary or less)		
high	0.181	0.83
college	.406	1.80
vocational	0.389	1.73
university	0.604	2.70
arrears	-.417	-7.43
Ethnicity (relative to Uzbek)		
Slavic	0.087	1.37
non-Uzbek	0.083	1.43
Sector (relative to kolkhoz)		
State	0.469	6.20
Private	0.559	4.96
Military	0.775	2.81
non-wage benefits	-0.021	-.33
Region (relative to Tashkent)		
Fergana	-0.237	-4.20
KKP	-0.239	-3.63
Constant	5.45	23.4
N	685	
$\overline{R}^2$	.435	

Table 8A.3: Quadratic model with interaction terms: women

	Coefficient	t-statistic
Experience		
exp	0.013	1.276
exp2/100	-.034	-0.75
Education (relative to elementary or less)		
high	0.293	1.30
college	0.449	2.12
vocational	0.458	2.00
university	0.728	3.10
arrears	0.405	1.81
Ethnicity (relative to Uzbek)		
Slavic	0.112	1.78
Other non-Uzbek	0.171	2.82
Sector (relative to kolkhoz)		
State	-.092	-0.61
Private	0.379	2.15
Military	0.421	1.44
Non-wage benefit	-.065	-1.05
Region (relative to Tashkent)		
Fergana	-.440	-2.58
KKP	-.332	-5.03
Interaction terms		
non-Uzbek*arrears	-.453	-3.32
Fergana*arrears	-.900	-6.76
State*Fergana	0.356	2.06
Hire*Fergana	-.637	-2.42
Yrsch*arrears	-.030	-1.78
Constant	5.68	20.51
N	685	
$\overline{R}^2$	.436	

Table 8A.4: Fully interacted model: men

	Coefficient	t-statistic
experience	0.092	3.23
exp2/100	-.210	-2.40
exp3/100	0.000	1.70
high	0.137	.86
college	0.190	1.13
vocational	0.206	1.23
university	0.429	2.55
arrears	-590	-2.15
Slavic	0.285	1.34
non-Uzbek	0.089	1.40
State	0.225	1.52
Private	0.556	3.80
Military	1.06	8.17
Non wage benefit	0.019	0.34
Fergana	-.472	-3.05
KKP	-.369	-2.32
Interaction terms		
Slavic*arrears	0.010	.05
non-Uzbek*arrears	-.207	-1.66
State*arrears	0.305	2.31
Fergana*arrears	-.452	-2.57
KKP*arrears	-.109	-.63
State*Fergana	0.238	1.47
State*KKP	0.054	0.33
Hire*Fergana	-.213	-.99
Experience*arrears	0.007	1.35
Yrsch*arrears	0.009	0.57
Yrsch*Slavic	-.012	-.69
Constant	4.95	14.03
N	925	
$\overline{R}^2$	.3641	

Table 8A.5: Fully interacted model: women

	Coefficient	t-statistic
experience	0.045	1.83
exp2/100	-.407	-1.58
exp3/100	0.011	1.49
high	0.352	1.54
college	0.547	2.30
vocational	0.519	2.19
university	0.805	3.34
arrears	0.353	1.28
Slavic	0.357	1.41
non-Uzbek	0.178	2.95
State	-.088	-0.43
Private	0.246	1.20
Military	0.344	1.13
Non wage benefit	-.055	-087
Fergana	-.617	-2.80
KKP	-.589	-3.01
Interaction terms		
Slavic*arrears	0.046	-.20
non-Uzbek*arrears	-.485	-3.43
State*arrears	-.029	-.19
Fergana*arrears	0.801	-4.28
KKP*arrears	0.158	.94
State*Fergana	0.533	2.38
State*KKP	0.250	1.25
Hire*Fergana	-.484	-1.70
Experience*arrears	0.001	-1.85
Yrsch*arrears	-.031	-1.85
Constant	5.74	18.24
N	685	
$\overline{R}^2$	.435	

Table 8A.6: Revised basic results, by sex

	Men		Women	
	Coefficient	t-statistic	Coefficient	t-statistic
experience	0.034	2.37	0.082	2.94
$exp^2/100$	-.009	-1.48	-.776	-2.64
$exp^3/100$	0.00	1.05	0.022	2.53
high	0.395	2.14	0.508	2.48
vocational	0.557	2.88	0.851	4.05
college	0.561	2.90	0.909	4.32
university	0.904	4.78	1.14	5.47
constant	5.542	27.00	5.18	24.00
$\overline{R}^2$	.173		0.176	
N	724		708	

Table 8A.7: Decomposition with alternative experience measures

	Coefficients			Characteristics	
	A ($\beta^{f(a)}$)	B ($\beta^{f(b)}$)	Male β^m	X^f	X^m
Experience					
exp	0.063	0.006	0.092	9.4 (A)	30.2
exp2/100	-0.581	-0.01	-0.2	17.2 (B)	
exp3/100	0.016	0	0		
Education					
high	0.193	0.119	0.196	0.496	0.467
college	0.406	0.31	0.278	0.134	0.166
vocational	0.404	0.34	0.272	0.116	0.141
university	0.622	0.55	0.491	0.158	0.206
Arrears	-.415	-0.43	-0.34	0.18	0.20
Ethnicity					
Slavic	0.740	0.075	0.169	0.21	0.13
non-Uzbek	0.093	0.078	0.044	0.26	0.25
Sector					
state	0.477	0.504	0.535	0.833	0.76
private	0.572	0.586	0.716	0.054	0.09
military	0.803	0.817	1.19	0.006	0.03
Region					
Fergana	-0.227	-0.222	-0.324	0.33	0.35
KKP	-0.239	-0.234	-0.161	0.21	0.24
Constant	5.36	5.47	4.58	1	1

Chapter 9

Who Gets Paid in Transition?

9.1 Introduction

Payment arrears have become a widespread issue in a number of former Soviet countries, including Russia, Ukraine, Armenia, Georgia and Moldova. The phenomenon has on occasion threatened political stability (at least according to Western press reports about delays in payment of wages to Russian coal miners) and was cited as a prime reason for the dismissal of the entire Russian cabinet in March 1998, to take the best-known recent example. While the origins of arrears are beyond the scope of the present analysis, it is important to note that arrears pervade the enterprise and financial sectors, and the taxation system. For example, the IMF estimated that in late 1996 the stock of tax arrears had reached 3.5 percent of GDP, up from 2.5 percent in 1994 and 1995. The focus here is on one, albeit important, aspect of the arrears problem, the late payment of wages.

Arrears in this context refer to non-payment of the contracted wage (see Chapter 5). Since wages are typically calculated on a monthly basis, arrears refer to payments not received in the month due. The payments may be received in a later month, in part or in full, or not at all. The key point from the perspective of wages and workers is that there is typically no indexation of payments if and when these are eventually made. In this context it is

important to recall the high prevailing rates of inflation - in 1995, *monthly* inflation was running at about 13 percent.[1]

Arrears are generally thought to affect large numbers of workers in the former Soviet republics, although to date specific evidence has been scant. Official data is typically limited to quantifying the aggregate amount of arrears. For example in March 1996, in the region of Karakalpakstan, Goskomprognostat estimated the extent of aggregate wage arrears to be about 20 percent of the wage fund (Klugman 1997a).

There is household level evidence that arrears have significant repercussions for poverty and the distribution of income. In March 1996, in a sociological survey of Karakalpakstan and Khorezm, 60 percent of respondents cited delayed payment of wages as 'the most' significant problem facing the family (Expert Centre 1996). A Ministry of Labour survey in Andizhan oblast in December 1996 found that 60 percent of households reported arrears, which represented, on average, 29 percent of their household budget. Beyond the inherent interest in the distributive effects of arrears, the phenomenon also casts light on the nature and scale of labour market adjustment in a country which has in several respects been somewhat of a puzzle for analysts (see Chapter 3). This study is the first to quantify the incidence *and* size of wage arrears in Uzbekistan, or indeed in any former Soviet republic.

Two studies have looked at wage arrears in the Russian Federation. The most useful analysis, Lehmann, Wadsworth and Acquisti (1997), found that arrears affected about 37 percent of employees in 1996. Prevalence of arrears varied by region, and also by sector, with workers in mining, agriculture and manufacture being most often affected. Standing (1997) found that over 60 percent of Russian enterprises reported that they had experienced "severe difficulty" in paying wages in mid-1994, up from about 47 percent in mid-1993, thus supporting union claims that millions of workers had not been

[1] Annual inflation was running at 645, 534, 746 and 315 percent in the years 1992, 1993, 1994 and 1995: see Chapter 3.

paid the wages contracted.[2]

The analysis in this chapter is motivated by the need to understand what has become an integral part of the transition experience for workers. Although arrears are pervasive in most of the fifteen former Soviet republics outside the Baltics, there is little systematic evidence about the distribution, size and consequences of arrears in wage payments. One problem with the surveys available for Russia, however, is that they indicate who is affected, but cannot identify the real value of the arrears.[3]

It was demonstrated in the previous chapter that arrears are a significant factor in explaining earnings outcomes. The data on arrears are of further interest in several respects, which fall broadly under the headings of incidence, size and consequences. The present data set allows a detailed investigation of arrears at the individual level, although unfortunately, there is no direct information at the firm-level that could be used to compliment this information. The chapter is structured as follows.

The institutional and economic framework within which arrears arise has key implications for the economic interpretation of arrears. This is reviewed in Section 9.2, where a conceptual framework for thinking about arrears is proposed. The chapter is then in a position to embark upon empirical analysis, and investigate whether there are systematic patterns in the distribution of arrears. Adopting a two-step approach, the chapter employs multi-variate analysis to show who was affected by arrears (probit analysis), and second, among those affected, by how much (using OLS regression analysis).[4] Section

[2]These estimates are based on the Russian Labour Flexibility Survey, which covered about 400 establishments and was intended to be representative of the manufacturing industry in four oblasts (Moscow, St Petersburg, Nizhny Novgorod and Ivanovo). See Standing, 1997.

[3]Hence the effect on wages is indeterminate because it is not known by how much individuals are affected (the survey questions in the Russian case refer to aggregate accumulated arrears, rather than a specific period, so it difficult to interpret relative to the wage or whatever).

[4]An alternative multi-variate approach would be to employ a Tobit, or censored regression, model (see Greene, 1994, pp. 694-696).

9.3 describes the characteristics of the individuals experiencing wage arrears in June 1995. In Section 9.4 a probit model is estimated to isolate the impact of individual characteristics and to cast light on the alternative hypotheses set out in Section 9.2.

By how much are individuals being affected by arrears? From an individual and household perspective, the size of arrears is at least as important as whether or not one is affected. Section 9.5 examines the distributive repercussions of arrears in greater detail, specifically, whether individuals at the bottom end of the distribution of contract wages are disproportionately affected, as well as the contribution of arrears to the overall widening of the wage distribution during the transition. In Section 9.6, a regression model is estimated to trace the impact of observed characteristics on the extent of non-payment since, from the individual's point of view, whether one is owed 5 or 85 percent of the contract wage makes a substantial difference.

What are the consequences of arrears? The data allows an investigation of whether the potential welfare effects are alleviated by the receipt of non-monetary benefits from the employer. For this reason, Section 9.7 examines whether the individuals in arrears are being otherwise compensated for their labour. A broader dimension of the consequences of arrears for the economy is considered in Section 9.8. Arrears imply substantial cuts in real labour costs in the economy, and matter for our understanding of the transition process in Uzbekistan because official data (reviewed in Chapter 3) have previously indicated that there have been only limited reductions in the real wage.

9.2 Institutional and Economic Context

Broadly speaking, in the specific economic and institutional context of transition in Uzbekistan, arrears come about at two levels. First, at the firm level, enterprises are faced with shortages of funds to pay employees. It will

be argued that the pattern of such shortages among firms is at least partly a product of government enterprise and financial policies. Second, within the firm, employers can discriminate among individuals as to whom should be paid in full. In the sections that follow, these patterns are first described, and then analysed and modelled more formally.

Before investigating the incidence and size of arrears, there is a need to clarify what types of economic interpretation and behaviour might be given to the results. This section provides a conceptual framework, a series of hypotheses to be tested, and some institutional background.

9.2.1 A Conceptual Framework

A conceptual framework for understanding how arrears arise in Uzbekistan can be presented as follows.

1. Arrears for any individual, regardless of their level of skill or contract wage, represent a reduction in their effective or net wage.

2. Such reductions can only be sustained – that is, accepted by the employee – if the contract wage is above the worker's reservation wage. In a competitive labour market, the reservation wage is equal to the worker's marginal productivity (which is also equal to her alternative job option). Formal institutional norms and the legacy of old-style Soviet wage fixation which inhibit relative wage adjustments may account for contract wages being above marginal products for at least some workers and sectors in the economy. Alternatively, in the presence of worker immobility (due to, for example, housing costs) and other search costs (due to the relative isolation of rural workers, for example), the worker's real wage may be below her marginal product. One would expect the latter scenario to have practical importance in the Uzbek context.

3. The question then arises, which workers have contract wages above their reservation wage (that is, assuming competitive conditions, above their marginal product)? The presence of arrears for some workers suggests that

their contract wages are above their marginal products.

Proceeding from this conceptual framework, the empirical analysis addresses a series of behavioural hypotheses, specifically:

(I): EFFICIENCY. Workers with characteristics associated with higher productivity and/or working in sectors that are doing relatively well are less likely to be in arrears. On the other hand, workers with low productivity characteristics (who may have traditionally been relatively "overpaid") and/or workers in poorly performing sectors are more likely to have contract wages above their marginal product. This comes about because formal and informal institutional constraints inhibit adjustment of the structure of wages that was inherited from the command economy. Potential productivity-related characteristics are: level of education; age; sector of employment; and length of tenure.

The predicted effect of age is ambiguous. Increases in an employee's age could either increase the value of that employee to the firm (given firm-specific experience) or reduce the employee's value because her skills have been made redundant during the transition. The analysis in Chapter 7 suggested that the age-earnings profile is rather flat, so that the latter effect might be expected to dominate. Similarly, the effect of short tenure could be to either increase or decrease the perceived value of the employee. Sector of employment effects could be interpreted as evidence of efficiency, or from a political economic perspective.

(II): POLITICAL ECONOMY. political economic considerations would suggest that workers in Tashkent are less likely to be affected by arrears, insofar as the risk of collective urban discontent poses a greater threat to the regime than scattered rural workers. From a political economic perspective, the sectoral distribution of arrears could be taken to reflect the sectoral priorities of the government. In the latter case it is however difficult to separate political economy and productivity-related factors.

(III): EMPLOYER BENEVOLENCE. Benevolent employers may take the

potential social repercussions of arrears into account in determining the incidence of non-payment. This is an indirect test of the extent to which employers are operating in a profit-maximising way. A number of dummy variables related to the individual's personal characteristics can be included: specifically, ethnicity; marital status; number of children; and gender. Having a second job might be evidence of employer benevolence, in allowing latitude to employees in augmenting their incomes outside the firm.

(IV): BARGAINING POWER. Workers with lower bargaining power are more likely to accept arrears rather than leave the firm. Proxies for the bargaining power of individual workers include: the level of contract wage relative to the poverty line, having a second job, and being on involuntary leave. It has already been noted that the labour market may not clear because of individual immobility and/or search costs, for example. Individual immobility has been a traditional trait of the rural regions of Uzbekistan (Lubin 1984).

(V): NON-WAGE COMPENSATION. The distribution of non-wage benefits may offset the distribution of arrears. Non-wage benefits – such as provision of private plots for farming to *kolkhoz* workers – may be used by employers to secure worker attachment to the firm. This practice is however consistent with the employer benevolence, political economy and efficiency hypotheses. Benevolent employers and a government seeking to minimise the welfare impact of arrears could respectively rely upon, and encourage, non-wage compensation. Alternatively, profit maximising firms with cash flow problems could seek to minimise worker turnover through the provision of such benefits.

Before proceeding to investigate these hypotheses, a consideration of the economic and institutional context is required.

9.2.2 Existing Evidence and Institutional Factors

The absence of specific information on the individual's place of work in the present data set means that it is difficult to disentangle individual and firm-level factors. For example, the data does not allow a test of the hypothesis that wage arrears are essentially a firm-level phenomenon.[5] If this hypothesis were true, using individual-level data on workers to go beyond data description to develop a model of how and why arrears affect different types of workers would not be appropriate. There are, however, several counter arguments against such an assertion, as explained below.

First, there is anecdotal evidence that firms pay some workers contracted wages, but not others. Hence within the same firm, some workers are not paid at all in a given month, while others are paid most or all of their contracted wage. According to information provided by local experts, in the event of shortfalls in the wage fund in Uzbekistan the priority of payment is as follows: first, workers of the "administrative apparatus" (managers and office workers) are paid; second, engineers (so-called ITR– *inzhenerno-tekhnichekie rabotniki*; see Chapter 2); and finally, ordinary workers.[6]

This is consistent with a recent study of wage arrears in Russia, which found evidence that firms can to some degree discriminate among individuals when in comes to not paying wages (Lehmann *et al* 1997). Their conclusion was based on the fact that some demographic factors – age, gender and education – had a statistically significant effect on the probability of a worker being in arrears, over and above controls for enterprise characteristics (specifically, size, sector and ownership) and region.

Second, within the conceptual framework presented above, the pattern of

[5]It is possible that certain firms in the economy suffer cash constraints (which might arise from, for example, inter-enterprise arrears), in which event the firm reduces the wages of *all* their staff.

[6]Personal communication: Alisher Ilkamov, Director, The Center for Social and Marketing Research, Tashkent, known as the "Expert Centre," which is the foremost independent survey organisation in the country.

arrears across worker types and across sectors could be consistent with the types of wage adjustment that might have been expected in an economy in transition. For example, less well educated workers may be disproportionately affected by arrears if the structure of contract wages was previously "biased" in their favour, as the evidence in Chapter 2 suggested. If institutional norms prevent changes in relative contract wages, the accumulation of wage arrears may be used by employers to effect the same result. Low-paid and low-skilled workers may also be perceived to be more easily replaced from the existing pool of unemployed. On the other hand, if low-skilled workers are already being paid their reservation wage (i.e. the lowest the firm can pay them), then the firm will be reluctant to impose arrears on this group.

Third, however, the specific post-Soviet context may affect employer decisions. Even if contract wages exceed the marginal product of low skilled workers, Uzbek employers may not respond in a strictly profit-maximising fashion. Hence there will be counteracting forces if employers have benevolent motives and take social and family-related factors into account. There is anecdotal evidence that this has occurred, on occasion, in Russia.[7] Earlier studies of firm employment decisions in the post-Soviet period have suggested the importance of benevolent motives (see Commander and Yemtsov 1997). This is reinforced in Uzbekistan by the continuation of legislative norms that accord social protection functions to employers with respect to disadvantaged groups in the economy (see Chapter 3). The operation of benevolent motives could be evidenced by the demographic characteristics of those affected by arrears, and/or by the effect of arrears being cushioned by employers through the provision of non-wage benefits.

[7]For example, in one factory where the wage fund was only one-sixth of the contract wages owed, a meeting of senior management and union representatives called by the general manager agreed that senior managers would forego wages altogether and that they were going to give most to low-income workers most in need (Standing, 1997, p. 383). A recent enterprise level survey in Russia provides further evidence of employer paternalism, since employment maximisation was one of the two top goals of 27 percent of enterprise directors (Ickes and Gaddy, 1998).

Fourth, the large role of government in the economy and in particular in the labour market and the agricultural and financial sectors needs to be borne in mind. This will influence the behaviour of firms even if they are solely motivated by profits, and raises a key political economic dimension of transition. The objectives of government and the instruments that are employed to affect economic outcomes play a critical role in transition, especially in Uzbekistan given the gradual pace and partial extent of liberalisation that was reviewed in Chapter 3. The government has sought to distinguish its policies from those of neighbouring countries by stressing its desire to alleviate the social costs of transition. This is evidenced, for example, in the highly-publicised Presidential decrees at regular intervals announcing that all wages (and pensions) should rise by a certain proportion. In the early part of the transition, firms with insufficient funds to finance the mandated wage increase had recourse to government loans (World Bank 1994), although this practice ceased following stabilisation of the economy in late 1994.

Government decisions about credit allocation and payment for state orders have critical implications for the capacity of firms to pay contract wages. The financial sector is very much state dominated, and bank credit decisions are still largely subject to Government direction (World Bank 1996c; FAPU/TACIS 1997).[8] The *kolkhozes* are also vulnerable to state decisions about payment, since the bulk of cotton and grain output at the time of the survey was subject to compulsory procurement. The extraction of surplus from agriculture, through the implementation of state orders and delayed payment for procured output, has made an important contribution to government revenues in Uzbekistan through the transition (Herman 1998; IMF 1997). In this sense, even if wage arrears are a firm-specific phenomenon, they might basically reflect government policy decisions about which firms ought to be able to pay their wage obligations. Hence, if there are significant

[8]There have been serious problems with access to deposits, and even greater ones with respect to credit, for individual customers and small enterprises (World Bank 1998a). See also Lubin and Zholdasov (1998).

regional and sectoral patterns in the distribution of wage arrears, it may be appropriate to interpret these in a political economic framework.

While the individual worker always has the option of leaving the firm, a number of authors have pointed to reasons motivating individual workers to remain formally attached to the firm, even if they are not paid (see also Chapter 3, Section 4). First, pension entitlements are based on the length of an individual's official work record (*stazh*): even if they are not being paid wages, workers with arrears are still accumulating pension entitlements.[9] Second, in Uzbekistan as elsewhere, the workplace itself may provide better opportunities for job search (through contacts, access to telephones and so on) than the local employment office.[10] Third, in agriculture, rights of the individual to farm on plots linked to the collective farm are contingent upon the individual continuing to work on the *kolkhoz*.[11]

Fourth, the large degree of economic uncertainty that has characterised the transition, and lack of information about alternative opportunities, may well motivate individuals to remain attached to their employer, especially if they expect the arrears to be repaid the following month. A fifth reason for continuing attachment, which tends to have been stressed by the World Bank in other former Soviet countries, is that access to non-wage benefits is tied to employment, and that even where cash wages are not being paid, other payments in-kind provide sufficient incentive for the individual to remain with the firm. This point is directly examined below.

Consideration of the institutional and economic context facilitates interpretation of the empirical results. Before proceeding to econometrically test the hypotheses, however, the descriptive patterns underlying the incidence of arrears are presented.

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[9] This is one of the most common answers to the question of why unpaid employees stay on at enterprises (Marnie 1998).

[10] See Commander and Yemtsov (1997) on this point for Russia.

[11] Allocation of such plots depends on *kolkhoz* management – household plots account for only 15 percent of irrigated land, but about half the total value of agricultural production (mainly fruits, vegetables and livestock) (Herman 1998, p. 5).

9.3 Who is Affected?

In this section some basic indications of the incidence of wage arrears are described, in terms of the number of people affected, and their characteristics. The sample under investigation was described in Chapter 5. In June 1995, wage arrears affected 37 percent of working individuals in the sample. Moreover, arrears are very significant in size for those affected, with mean reported arrears for the month amounting to 86 percent of contract wages.

Looking at the characteristics of individuals affected by wage arrears suggests some interesting patterns. The results are presented in Table 9.1. The descriptive statistics indicate that the incidence of arrears is systematic rather than random, particularly affecting workers in agriculture and those located in regions outside the capital. There are some marked correlations in the incidence of arrears by level of education, ethnicity, sector of employment and oblast. There appears to be a strong negative association between the presence of arrears and the level of education: almost half of the individuals with less than primary education are affected (although this is a small group), compared to only one in four university graduates.

By sector of employment, arrears are clearly more pervasive in the agricultural sector (kolkhoz or collective farms), affecting almost six out of ten workers. The incidence of arrears is fairly similar in state and private enterprises, at around 32 and 29 percent respectively.

The sectoral differences in the incidence of arrears are consistent with what is known about recent structural changes in the economy. Transition and adjustment had been associated with substantial declines in the prices of agricultural output (Chapter 2). Yet employment in the sector has actually expanded. While contract wages in agriculture have fallen relative to the national average, by some 32 percent (Chapter 3), one might have expected even larger declines. It seems that arrears have been used to effect such real wage cuts. The high prevalence of arrears in agriculture is also consistent with the structural problems in that sector as reviewed in Chapter 3, which

Table 9.1: Incidence and size of arrears: descriptive statistics

	Number affected (percent of group)	Mean arrears (SD) (sum/ month)	Arrear Share (percent)
Demographic			
Men	616 (36)	524 (328)	86.0
Women	414 (38)	426 (203)	86.0
Age			
Youth (< 26)	246 (38)	386 (202)	90.3
Young (26-35)	278 (39)	492 (280)	86.4
Middle (35-45)	251 (37)	540 (375)	85.6
Older (46 +)	171 (33)	520 (242)	78.8
Married	806 (37)	503 (303)	84.9
Children under 7	700 (41)	470 (278)	86.3
Employment			
Recent recruit	62 (40)	381 (204)	84.2
Second job	114 (40)	435 (224)	91.6
Forced leave	7 (19.4)	407 (241)	100.0
Education			
elementary or less	15 (47)	398 (145)	85.8
elementary	7 (44)	450 (178)	93.5
high	539 (40.4)	415 (224)	88.6
college	162 (43)	552 (350)	83.3
vocational	165 (35)	503 (317)	86.8
university	140 (25)	657 (316)	76.1
Contract Wage			
Poor	391 (55)	291 (85)	96.0
Not poor	639 (31)	608 (304)	79.1
Ethnicity			
Uzbek	572 (36.2)	449 (264)	86.0
Slavic	51 (16)	728 (497)	74.6
Karakalpak	165 (57)	518 (289)	89.5
other	242 (41)	491 (252)	84.5
Sector			
State	555 (32)	545 (310)	80.6
Agriculture	373 (57)	375 (209)	93.1
Private	58 (29)	558 (306)	86.8
military	18 (35)	644 (354)	72.0
Region			
Fergana	366 (38)	441 (284)	90.7
Karakal.	571 (60)	482 (265)	85.5
Tashkent	93 (11)	664 (367)	68.5
Total	1030 (37)	484 (288)	86.0

need to be interpreted in the overall political economic context. In particular, the continuing dominance of state orders (quotas) means that the majority of *kolkhozes* must sell target quantities of output at prices which are considerably below world market prices. *Kolkhozes* are also vulnerable to overall government fiscal constraints. A recent report of a European Union agricultural advisory group found that "..[l]ate payment from state-controlled buyers is one of the most commonly heard complaints from farmers... Contracts for supply are rather one-sided and are in any case not enforceable under the law in any practical sense"(FAPU/TACIS 1997 p.6). Reductions in government expenditure in accordance with overall macroeconomic stabilisation objectives (in particular, reduced recourse to deficit financing) have been associated with arrears in the payment of state obligations in Uzbekistan and elsewhere in the former Soviet Union, in particular, Russia.[12]

Private and state enterprises reveal similar rates of non-payment of wages.[13] This result would be surprising if one expected state enterprises to be less efficient and therefore in worse financial condition than their private sector counterparts. On the other hand, arrears could be larger in private establishments because they face harder budget constraints due to relatively restricted access to credit from the state-dominated banking sector. The latter explanation is consistent with the limited extent of financial sector reform to date that was reviewed in Chapter 3.

Another explanation for the equivalence of arrears in the private sector and the public sector lies in the legislation that has governed the privatisation process. Enterprises are not permitted to retrench workers for a three year period after privatisation. Faced with this constraint, employers may simply not pay redundant workers, possibly with the objectives of encouraging "voluntary" quits.

[12]Budget problems have caused delays in several aspects of government operations, from the payment of farms for their produce, to public service employees' salaries, and various social transfers like pensions.

[13]A similar pattern is evident in Russia: see Standing (1997), Figure 5.8.

The relative prevalence of arrears among different ethnic groups matches what is observed by oblast. (The independent effect of ethnicity is investigated below using multi-variate analysis.) Karakalpakstan, populated largely by people of the Karakalpak and Kazakh ethnic groups, has by far the highest incidence of arrears, with over three out of four individuals affected. On the other hand, arrears are far less common in the capital Tashkent, and also among ethnic groups that tend to reside in urban areas, in particular, the Slavic groups (see Chapter 5).

Finally, the regional patterns, whereby a much higher proportion of individuals living in the capital are paid in full, may reflect better financial intermediation in Tashkent. Private commercial activity and banking infrastructure is much more developed in the nation's capital. In addition, this pattern could be interpreted in terms of domestic political considerations. That is, an unpaid urban worker is likely to be a far more potent force of discontent, than one living in a remote regions like Karakalpakstan. Hence government policy, through the direction of credit and other means, may enable enterprises in the capital to pay their wage bills on time, but limit credit to firms outside the capital. Such actions can be interpreted in the political framework set out above: the government wants to both (i) limit inflationary possibilities associated with credit expansion; and (ii) meet the popular expectations created by the mandated increases in the contract wage. These somewhat conflicting objectives require prioritisation among groups of workers, and this is done in favour of those in the capital, given the potential for popular discontent to be associated with unpaid wages.

In several respects the results for Uzbekistan mirror what Lehmann *et al* (1997) found for Russia. Divergent regional patterns were an important characteristic of the incidence of wage arrears, as was the relatively better off position of workers in the capital, Moscow. In their probit analysis controlling for the demographic composition of the workforce, enterprise ownership and regional industrial structure, regional location was still found to have

overriding importance. In Section 9.4, multi-variate analysis is used to test which of the observed factors associated with wage arrears are statistically significant in Uzbekistan.

9.4 Probit Analysis

The next step is to investigate the determinants of the presence of arrears. The conceptual framework presented in Section 9.2 indicated a series of economic and social factors that are expected to influence whether or not someone is paid in full. These various potential influences on the probability of experiencing arrears can be tested econometrically.

The econometric modelling approach is formally identical to statistical description – that is, the expectation of arrears conditional on a vector of variables (Deaton 1997, p. 64). However this section seeks to go beyond a simple descriptive analysis to draw some behavioural inferences. That is, how does the vector of independent variables determine the dependent variable of interest (arrears). Multi-variate probit analysis enables the independent effect of each factor to be established. As always, caution is needed in interpretation, since correlation does not mean causation. However, even where causal inference is not possible, careful inspection of the data using multivariate techniques can yield important insights about the phenomenon of wage arrears.

Formally, the procedure can be described as follows. A probit model is a nonlinear (in the parameters) statistical model that meets the objective of relating the probability of being in arrears to explanatory factors in such a way that the probability remains in the $[0, 1]$ interval. A maximum likelihood estimation is used for this problem because of the discrete nature of the outcome variable (being in arrears, or not in arrears) (Griffiths *et al* 1994, p.744). The idea of maximum likelihood estimation is to choose, as estimates of the unknown parameters β of the probit model, the values of β that

maximise the probability of obtaining the sample that is actually observed.

A maximum likelihood probit model was estimated using STATA, formulated as:

$$A_{it} = \Phi(\alpha + \beta X_{it} + u_{it}) \tag{9.1}$$

where the transformed dependent variable, A_{it} takes the value $A_{it} = 1$ when arrears are positive and, $A_{it} = 0$ otherwise. The vector X is a set of independent factors that are expected to influence the probability of being in arrears, u_{it} represent random errors, and Φ is the cumulative distribution function of the normal distribution.

In order to test the hypotheses set out in Section 9.2, the model specifies the probability of being in arrears as a function of the individual's personal characteristics (gender, number of children, marital status and ethnicity); employment and productivity-related characteristics (age, sector of employment, level of education, tenure); the influence of political economy (region), as well as the bargaining power of the individual (proxied by the level of the contract wage, length of tenure and holding a second job).

More formally, the marginal effects of the independent variable X_k is calculated as:

$$\Phi\left(X^1\beta\right) - \Phi\left(X^0\beta\right) \tag{9.2}$$

where β is the vector of coefficient estimates from the probit regression for the probability of having arrears (equation 9.1), X^0 is a vector of characteristics with $X_k^0 = 0$, and X^1 is a vector of characteristics which differs only in the kth component, i.e., with $X_j^1 = X_j^0$ for all $j \neq k$, and $X_k^1 = 1$. All the independent variables utilised in the regression are dummy variables. The coefficient therefore shows the marginal effect (in percentage terms) of changing the value of the dummy from zero to one, relative to the base case.

To illustrate the impact of the range of socio-economic variables on the probability of arrears, marginal effects were estimated relative to a base case. A base case was constructed with the following characteristics: a male under 26 years of age, who has been in his present job, in the private sector, for at

least one year, with primary or less schooling, of Uzbek ethnicity, and living in Karakalpakstan, and is unmarried. The probability of such an individual not having been fully paid in the previous month is about 0.41, which is close to the overall average for the sample (see the descriptive statistics in Table 9.1 above). The incremental effect of the presence of the other characteristics is compared to this case.

The probit estimates suggest some striking patterns in the factors affecting the likelihood of an individual being in arrears (Table 9.2). A wide range of factors are statistically significant. The fact of an individual having contract earnings below the poverty line, relative to the base case, raises the probability of that individual not being paid in full to .58, about 17 points higher than the base case. Recall that poverty here is defined as having a contract wage (received plus arrears) of less than the minimum wage of 413 sum. This can be interpreted as evidence of the weak bargaining power of workers with low contract wages, and as evidence against employer benevolence. This could also reflect relative immobility on the part of low wage workers.

From an efficiency perspective, it was hypothesised that recent recruits might be more likely to be in arrears than established workers with greater firm-specific training. However the coefficient on the variable capturing job tenure of less than one year is insignificant, suggesting that recent recruits are not more likely to be in arrears as against workers with longer tenure. This is consistent with the pattern observed with respect to younger and older workers discussed below, and also with the proposition that recent recruits are more valued by firms during the transition.[14]

Significant age effects are apparent. Relative to youth, individuals in the 26-35, and over 35 year age groups have a 9 percent greater probability of not having been paid. Hence it seems that younger workers are less likely to

[14]Evidence in Chapter 7 suggested that this was especially true for male university and college graduates.

Table 9.2: Probit model of arrears

	Probability of being in arrears	Z-value
Base Case	.407	
Poor	0.580	6.69
Recent recruit	0.452	.92
Involuntary leave	0.200	2.44
Sector		
State	0.519	1.55
Kolkhoz	0.648	3.99
Military/other	0.433	.26
Age		
Young (26-35 years)	0.487	2.58
Middle (36-45 years)	0.498	2.79
Older (over 46 years)	0.481	2.08
Education		
Primary	0.441	.83
Secondary	0.421	.56
Vocational	0.557	.81
College	0.483	.44
University	0.401	.20
Region		
Fergana	0.168	9.16
Tashkent	0.036	14.70
Personal		
Married	0.368	1.33
More than two children	0.410	.37
Female	0.451	1.94
Ethnicity		
Slavic	0.480	1.59
Karakalpak	0.368	.90
Kazakh	0.300	2.66
Other	0.298	.19

Notes: See text for definition of dummy variables and of the base case.

Number of observations = 929

experience arrears, lending support to results in earlier chapters suggesting that pre-transition experience is not valued by employers, and that youth are entering the labour market on successively higher experience-net earnings profiles (as suggested by the non-parametric results in Chapter 7). In terms of the conceptual framework that was presented at the outset, the results suggest younger workers are less likely to have contract wages in excess of their marginal product (or market clearing levels). This is consistent with the expectation that employers have found relative adjustment of contract wages of new recruits easier than changes in the relativities of established workers.

The negative association between higher levels of educational attainment and the presence of arrears suggested by the descriptive statistics is statistically insignificant once other controls are introduced. This is contrary to what one might expect if arrears were operating to realign a structure of wage relativities that was biased toward the low-skilled.

The marginal effects of the variables indicating sector of employment are large and significant. By type of employment, individuals working on collective farms are much more likely to have wage arrears than individuals employed in the private sector. The probability, 65 percent, is significantly different from zero at the five percent level. This is consistent with the weak financial position of *kolkhozes* in the wake of the break up of the Soviet Union, as highlighted in the previous section and described in Chapter 3. The probability of wage arrears for those individuals working in the state sector is almost as large, though the Z-value is low (1.55). This again may reflect those firms' failure to adjust to changing economic conditions during the transition, and their consequently relatively poor financial position. These results can be interpreted as supportive of either the marginal productivity/ efficiency view of arrears (arising because contract wages in the *kolkhozes* and state sectors are above market-clearing levels), or within the political economic framework. The sectors with the highest incidence of arrears (*kolkhozes* and

state firms) are those most influenced by government policy – it seems that government has, for political/populist reasons, been setting contract wages in those sectors at higher levels than can actually be paid.

There are strong regional effects, confirming the significance of the earlier descriptive patterns, so that individuals working in either the capital Tashkent or Fergana, all else being equal, are much less likely to experience arrears relative to individuals in Karakalpakstan. The estimated probability of experiencing wage arrears for workers in the capital is especially small, only about 4 percent. This finding lends further support to the political economy view since, as noted above, the government may be especially concerned to avoid the emergence of discontent due to unpaid wages in Tashkent (population 2.1 million: see Chapter 5) in the largest urban area of the country.

Possibly unexpected is the result that individuals on involuntary leave are less likely (of the order of 20 percent) to report arrears than the base case. The relationship with this factor is significant. However the number of individuals on involuntary leave is small (of whom only 7 reported arrears), and further, individuals on leave may not report themselves as being owed wages since they are not working.

Some of the earlier observed correlations with ethnicity are insignificant once regional and other controls are introduced – this is the case with respect to Slavic and Karakalpak ethnicity. Nonetheless, an individual who is Kazakh or from elsewhere in Central Asia is significantly less likely to not have been fully paid relative to the majority Uzbek group.

Finally, most of the controls that were introduced to capture potential social concerns are not statistically significant. The hypothesis was that benevolent employers might place priority on full payment to workers who have three or more children or are married is not confirmed. While those groups are less likely to experience arrears, the Z-values are not significant. Nor is there a significant gender effect.

On the other hand, the result that individuals with secondary jobs are

more likely to experience arrears in payment from their main place of work may indicate some latitude or benevolence on the part of employers. However the causation is unclear, since non-payment may well have motivated multiple job-holding in the first place.

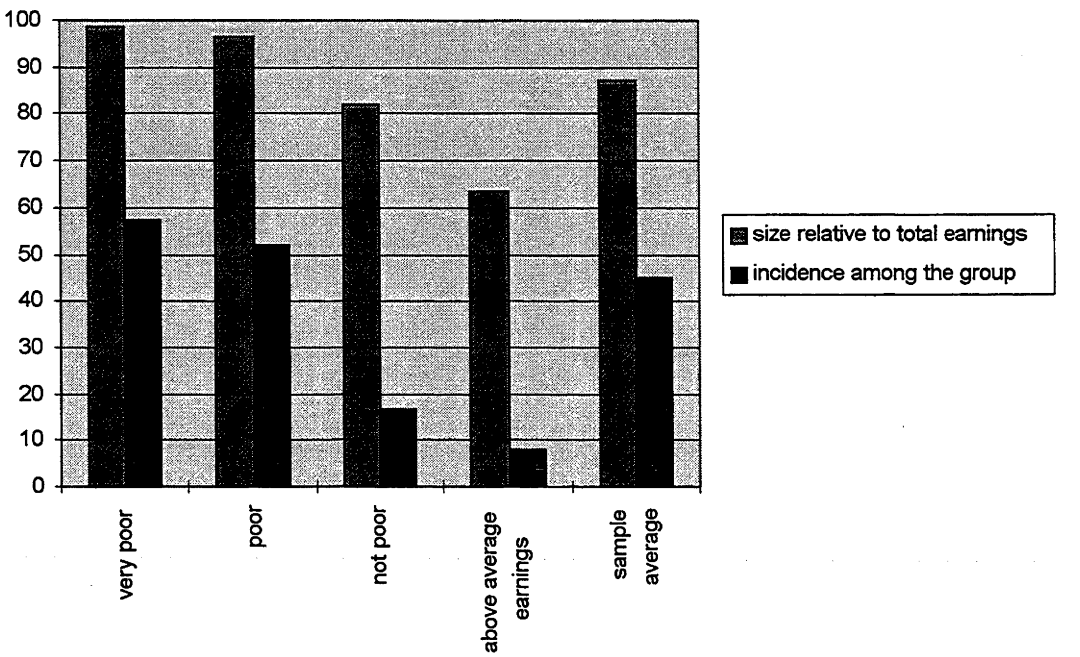
9.5 Distributive Effects

Earlier work has shown that the share of households in poverty in Uzbekistan in 1995 almost doubles, to about 30 percent, once the effect of arrears in payment of wages and transfers is taken into account (Coudouel 1998). There are two questions of interest related to the distributive effects of arrears. First, are arrears distributed evenly across individuals with different levels of earnings, or concentrated on the lower end of the distribution? Second, do arrears operate to widen the distribution of net wages, relative to the outcome had the contract wage been fulfilled? Both questions are addressed in this section.

Figure 9.1 illustrates the pattern of arrears by earnings group. The groups are defined on the basis of their contract wage – that is, earnings received plus arrears – so that the presence of arrears *per se* is not more likely to place individuals in the poor category. The poverty line is defined consistently with the practice of the national authorities, using the minimum wage (at that time, 413 sum) as the threshold (see World Bank 1994; Coudouel 1998).[15] In order to reveal differentiation among the poor; severe poverty is used to refer to those individuals reporting contract earnings less than half the poverty threshold. The non-poor, as the term implies, have contract earnings above the threshold, while the above average group reported contract wages above the level of average earnings (752 sum).

[15]The poverty line is based on the cost of a basket of consumption goods, and has been used by the government to set the minimum wage and the level of benefits, as well as to determine income thresholds for eligibility to means-tested benefits: see World Bank, 1994; Klugman and Marnie, 1998.

Figure 9.1: Incidence of arrears by contract earnings group



The pattern across income groups is quite pronounced. The share of individuals in wage arrears is highest among the very poor, as is the share of arrears in their contract wage. Indeed more than half of the very poor were receiving virtually none of their contracted wage. At the other end of the scale, less than 8 percent of individuals with above average earnings were affected by arrears, and their reported arrears as share of earnings were some 20 percentage points below the sample average. These results are consistent with those of Coudouel (1998), who focused on household-level income.

This variation by income group is clearly suggestive of an impact of arrears on the overall distribution of wages. It is generally expected that the distribution of earnings will widen during the course of transition from a

planned economy (Rutkowski 1995; World Bank 1996a; Allison and Ringold 1996). There is evidence across a range of countries that this has indeed been the case with respect to contract wages (based on official data) and with respect to net wages (based on individual level data) (Milanovic 1998; see also Flemming and Micklewright, forthcoming, for a survey). However there are no published studies which have directly examined the impact of arrears on the distribution of earnings.

How do arrears affect the contract earnings distribution in Uzbekistan? The hypothesis is that, consistent with their observed poverty impact, the distributive effect of arrears would be to widen the distribution of wages. This can be tested for by comparing the summary distribution statistics contracted and net wages.

Following the review of the strengths and weaknesses of some commonly used measures of inequality in Chapter 2, several alternative measures are used, specifically, the relative mean deviation, the Gini coefficient, the decile (90/10) ratio and 75/25 measures of inequality. Each of these measures focus on different dimensions of inequality. In a population of size n, the relative mean deviation shows the extent to which individual wages, w_i , $i = 1, ..., n$, differ from the mean, $\bar{w}$. The relative mean deviation is defined by:

$$RMD = \frac{1}{2\,\bar{w}\,n} \sum \left| w_i - \bar{w} \right|$$

The RMD shows the proportion of total wages that would have to be transferred to those below the mean wage in order to achieve equality. However this measure is insensitive to differences among individuals on the same side of the mean.[16]

The Gini coefficient is a commonly used indicator of the extent of income inequality. The basis of this measure was set out in Chapter 2. Lower values

[16]The RMD therefore violates the "Pigou-Dalton" condition that a fruitful index of inequality should decrease whenever income is transferred to a poorer individual (see Wolfson, 1997).

Table 9.3: Measures of earnings inequality: contract versus net wage

Measure of Inequality	Pre-transition	Contract 1995	Net 1995
Relative Mean Deviation		0.299	0.455
Gini coefficient	0.280	0.434	0.606
Decile ratio (90/ 10)	2.98	4.83	6.00
75/ 25		2.00	2.01

SOURCE: Pre-transition, Atkinson and Micklewright (1992); 1995 figures are author estimates.

of the Gini coefficient indicate a lesser degree of inequality.[17] Together with the decile ratio, this measure has the advantage of enabling comparison with the pre-transition picture of inequality.

The decile ratio and 75/25 measures both simply show the ratio of earnings between the respective points in the distribution. The latter is typically more robust in the sense that it utilises "thicker" points in the distribution, but obviously at the expense of excluding information about the tails of the distribution, which is arguably the prime interest in this inequality analysis. It is nonetheless a useful complementary measure, to be considered alongside the decile ratio and the other measures.

The results are presented in Table 9.3. With one exception, all the measures show significantly higher inequality in the distribution of the net wage, compared to the contract wage. The fact that the 75/25 measure of inequality does not appear to widen is consistent with the fact that arrears disproportionately affect people at the bottom of the earnings distribution (who are below the 25^{th} percentile).

Table 9.3 suggests that arrears have operated as a route to widen the wage differentials inherited from the Soviet period. This result is consistent with both the marginal productivity/ efficiency hypothesis about the role of

[17]There are, however, a number of criticisms made of the Gini coefficient including, for example, that it is most sensitive to income transfers near to the mean (see Atkinson 1970; Kakwani, 1980).

wage arrears, and a political economic framework. From an efficiency viewpoint, many commentators including for example the World Bank (1996a), have seen a significant widening of the earnings distribution as an inevitable part of transition to a market economy. To the extent that contract wage relativities adjust slowly, arrears act to speed up this process. On the other hand, in a political economy framework the commitment of the government to social stability limits widening of the contract wage distribution. One might well expect that institutional and political factors would inhibit the adjustment of *ex ante* relativities – just as it is argued that the notion of comparative wage justice has helped to entrench wage relativities in Australia.[18] *Ex post*, however, the government is prepared to allow a widening of the wage distribution in response to market pressures via non-payment of wages.

At the same time, it is interesting to note that arrears are not the only avenue by which the expected widening in the wage distribution has occurred. The extent of inequality in the contract wage in 1995, measured by a Gini coefficient of approximately .43, is much larger than that suggested for the Soviet period by Atkinson and Micklewright (1992), who report a Gini coefficient of .276.[19] The same is true with respect to the decile ratio, which was estimated at 2.98 prior to the transition, and has risen to 4.83 with respect to the contract wage.

The contribution of arrears to the widening of the earnings distribution is reflected in a simple decomposition of the overall change (Table 9.4). This suggests that arrears have contributed between almost half to two-thirds of the overall rise in earnings inequality over the period of transition. Decomposition of the decile ratio, which focuses on changes at the ends of the distribution, indicates that arrears account for about 63 percent of the increase in wage inequality over the period.

[18] See, for example, Norris (1986).

[19] Milanovic (1998) also reports a Gini coefficient for household incomes in Uzbekistan in 1987-8 of .280.

Table 9.4: Decomposition of the rise in wage inequality, 1989-95

	Absolute change 1995/1989	Percentage of change due to arrears
Gini coefficient	.326	47.2
Decile ratio	2.92	63.0

Even taking into account the sensitivity of the measured extent of inequality is sensitive to the index used, the conclusions are clear. Arrears disproportionately affect the poor, and have operated to significantly widen the distribution of earnings. It is now appropriate to turn to examine more directly the determinants of the size of arrears.

9.6 How Much is Not Being Paid?

So far the investigation has been limited to the determinants of whether or not an individual was fully paid. For the individual, however, the *size* of arrears relative to the contract wage is likely to be of greater significance. As reported in Table 9.1, the mean share of arrears in total earnings was 86 per cent among the 1030 workers with positive arrears in the sample, with a range from 5 to 100 percent.

What are the characteristics associated with a higher arrears share, among those who reported arrears? In other words, given that an individual was not paid in full, what factors determine how much the individual was owed?

The estimates in this section rely on the share of arrears in the contract wage, rather than the absolute amount of arrears, as the dependent variable. The correlates of absolute arrear amounts are difficult to interpret since these may simply be correlated with differences in the amount of contract wages. Instead, the *share* of arrears in the contract wage is used to differentiate those individual factors which the framework in Section 9.2 suggested would be relevant.

More formally, we posit the relationship

$$\log \frac{a}{w_c} = \alpha + \beta' X + u$$

where $\log \frac{a}{w_c}$ is the log share of arrears in contracted earnings, α is a constant, and β is a vector of coefficients on the set of independent variables (X), related to human capital, sectoral, regional and personal characteristics of the individual, as used and defined in the previous section which conducted probit analysis.[20]

This functional form allows one to interpret the β coefficients as percentage effects. That is, writing $(a/w)_0$ as the estimated share of arrears in the base case (i.e., with each dummy variable set to zero), we assume

$$\frac{\left(\frac{a}{w}\right)}{\left(\frac{a}{w}\right)_0} = 1 + \beta' X$$

Taking logs and rearranging,

$$\begin{aligned} \log\left(\frac{a}{w}\right) - \log\left(\frac{a}{w}\right)_0 &= \log(1 + \beta' X) \\ &\approx \beta' X \end{aligned}$$

(under the assumption that $\beta' X$ is small) so that

$$\log\left(\frac{a}{w}\right) = \alpha + \beta' X + u$$

where $\alpha = \log\left(\frac{a}{w}\right)_0$,and u is an error term.

The model was estimated for the 910 workers in the sample with arrears for whom complete information on the set of independent variables is available, as well as separately by gender. Two models were estimated for the entire sample of workers with arrears: the first model is limited to human

[20]There is no explicit model of arrears, in the sense that there is no theory of functional form that is used to determine the structure of this regression model. The choice of individual variables arises from the conceptual framework and the objective of testing the alternative hypotheses, as set out in Section 9.2.

capital and personal variables; whereas the second extends the list of independent variables to include ethnic, sector and regional variables, and is also estimated separately by gender.

The regression results presented in Table 9.5 for the determinants of the size of arrears confirm and begin to quantify the distributive effects suggested by the probit results. The results are described in this section before providing a fuller interpretation in the next section. The focus here is on the results of the extended model, while drawing attention to any differences in results between the two models.

The most striking result is that arrears are especially severe among individuals at the bottom end of the contract wage distribution. The comparison group is individuals with contracted wages above the minimum wage. Not only are the individuals with below the minimum contract wage (defined above as the poor) much more likely to have not been paid (Table 9.2), the extent of arrears is proportionately much higher. This is true for both men and women with arrears, with the average impact on the arrears share of having contract wages below the minimum wage/poverty line in the extended model being about 19 percent and even higher, 21 percent, for men. In the limited model without the regional and other controls, the coefficient is larger still, raising the arrears share by about 24 percent.

Among different ethnic groups, the OLS results show that Karakalpaks have larger arrears than Uzbeks (the omitted ethnic group). The difference is of the order of about 12 percent. This is consistent with the significant regional effects. Living in KKP, all else being equal, raises the size of arrears by 10 percent relative to living in the national capital. For rural Fergana, the effect is even greater, around 15 percent. This provides some support for the political economic interpretation, as noted below.

The omitted category for the different types of employment is a job in a *kolkhoz*. There is a significant negative relationship between working at a state enterprise and the relative size of individual arrears, the size of the

Table 9.5: OLS model of size of arrears: employees with arrears

	Basic Model		Extended Model					
	All		All		Men		Women	
	coef	t-stat	coef	t-stat	coef	t-stat	coef	t-stat
Low cont. w.	.237	9.33	.188	(7.6)	.211	(6.28)	.159	(3.79)
Age (relative to <26)								
young	-.007	(-.24)	.000	(.03)	-.018	(-.68)	.013	(.44)
middle	-.001	(-.021)	-.001	(.05)	-.012	(-.43)	.005	(.15)
older	-.093	(-2.48)	-.039	(-1.67)	-.060	(-1.51)	-.048	(-1.21)
Education								
secondary	-.074	(.94)	-.071	(-.79)	-.099	(-.97)	.008	.06
vocational	-.043	(-.52)	-.026	(-.31)	-.213	(-.20)	.018	.12
teknikum	-.094	(-1.13)	-.087	(-1.00)	-.108	(-1.00)	-.009	-.06
university	-.152	(-1.82)	-.110	(-1.26)	-.147	(-1.36)	.017	.117
second job	.052	(1.32)	.025	(1.01)	.020	(.68)	.024	(.56)
no tenure	-.044	(-.83)	-.032	(-1.06)	-078	(-1.53)	-.002	(-.04)
Personal								
children	-.020	(-.63)	-.001	(-.07)	.008	(.38)	-.146	(-2.78)
married	.013	(.40)	-.016	(-.84)	-.011	(-.40)	-.015	(-.56)
male	.012	(.32)	.020	(.40)				
Slavic			.045	(1.24)	.051	(1.03)	.030	(.54)
Karakalpak			.115	(3.68)	.112	(2.85)	.102	(1.68)
Other ethnic			.017	(.94)	.034	(1.40)	-.011	(-.37)
Sector (relative to kolkhoz)								
state			-.075	(-2.43)	-.060	(-1.51)	-.093	(-1.91)
private			-.017	(-.53)	-.021	(-.50)	-.020	(-.39)
military			-.224	(-3.24)	-.228	(-3.15)	.064	(.54)
Region (relative to Tashkent)								
Fergana			.262	(5.04)	.135	(3.46)	.298	(3.59)
KKP			.207	(4.02)	.073	(1.85)	.307	(3.94)
Constant	-.216	(-2.61)	-.379	(-3.79)	.822	(13.31)	-.493	(-2.56)
N	940		910		538		372	
$\overline{R}^2$	.125		.172		.177		.165	

effect is about 7 percent on average, and slightly larger (9 percent) for women. The dummy variable on 'military and other' group in employment has a large negative effect overall and for men (of the order of 23 percent), which also provides support for a political economic view.

The age of the individual, a variable that significantly influenced whether or not someone was fully paid does *not*, however, affect the extent of non-payment in the extended model. The only exception is in the limited model, where older age relative to being under 26 year of age has a significant negative effect on the size of arrears, of around 9 percent.

The t-values of dummy variables for education suggest that schooling is not statistically significant with respect to the extent of non-payment. This is true for both the limited and extended models, and casts some doubt on the efficiency adjustment hypothesis, as noted below.

And, as in the probit results, the family-structure variables (number of children and marital status) are not significant for the pooled sample, with one important exception. The presence of young children has a large and statistically significant negative effect on the size of arrears for the female sample, of around 15 percent. This provides support for the "benevolent employer" hypothesis, and is consistent with the legal duties imposed on employers to protect women with young children, as described in Chapter 3.

Looking at other differences in the results by gender, the reduction in arrears for women associated with state sector employment is about one-third higher for women than men, at about 9 percent, which could indicate the operation of benevolent motives on the part of state managers. Finally, it is notable that the effects of the regional factors (being outside the capital) are also relatively larger for women than for men; the negative coefficient on KKP is about double that for men.

Interpretation

It is appropriate at this stage to provide an overall interpretation of the patterns observed in the incidence and size of arrears. The evidence presented in Chapter 3 and in this chapter has confirmed that in Uzbekistan, as in Russia, adjustment in the labour market during the transition in response to declines in output has taken place on the price rather than the quantity side of the labour market. Beyond the reductions in the contract wage, insecurity for many workers arises as a result of delays in wage payments. Non-payment of contract wages creates tremendous uncertainty for workers, especially in the presence of high inflation, and where they cannot anticipate the incidence nor extent of arrears. Sociological evidence cited at the beginning of the chapter suggests that arrears have been the most important problem facing families in Uzbekistan. Almost four out of ten workers in the 1995 survey were affected by arrears, for whom the share of arrears averaged about 86 percent of the contract wage.

While caution is needed in interpretation of the results, the evidence is consistent with the nature of transition and the institutional context in Uzbekistan. It also provides support for the hypothesis that firms discriminate among employees in the allocation of arrears.

The analysis suggested that workers at the bottom of the contract wage distribution are most affected by arrears. Not only were they more likely to not be paid in full, but the size of arrears was relatively large. Hence, it was shown that arrears have the effect of widening the distribution of earnings, suggesting that arrears are being used to achieve an *ex post* widening in the structure of wages that was inherited from the Soviet command economy. This finding provides some support for the efficiency hypothesis, in so far as a less equal distribution of earnings is a necessary part of the transition to an efficiently functioning labour market (World Bank 1996a). Yet while the level of the individual's contract wage is clearly an important dimension of the pattern of arrears, there are a series of further significant factors, over

and above the contract wage.

It was hypothesised that arrears might be used by employers to achieve *de facto* adjustments in wage relativities, consistent with differences between individual marginal productivity and the contract wage. This hypothesis does receive some support from the empirical analysis, in several respects. The likelihood of having arrears was positively correlated with age. This would have been somewhat surprising if one had expected employers to reward individual experience, but it is consistent with evidence presented in earlier chapters (and other studies of earnings in transition, for example, Flanagan (1998)) that employers do not place much value on pre-transition experience. Chapter 7 suggested that younger workers, particularly males with higher levels of education, are receiving wage premiums. The descriptive statistics suggested an inverse relation between level of education and the likelihood of being in arrears, though this relationship was generally insignificant once further controls were introduced.

There is mixed evidence for an alternative hypothesis that the behaviour of firms in Uzbekistan is not profit-maximising and is affected by benevolent motives. Certain characteristics associated with potential labour market disadvantage – such as being female and having larger numbers of young children – did not mean that one was more likely to be paid. On the other hand, the presence of young children significantly reduced the size of arrears for women. Also the fact that secondary employment and arrears are positively correlated could be interpreted as employers giving latitude to employees to seek to alleviate the welfare impact of arrears.

The political economic perspective – wherein government policies are seen as deliberately affecting the incidence and size of arrears – gained some support from the descriptive and multivariate analysis. It was hypothesised that, for political reasons, the government had ostensibly preserved wage relativities through wage indexation decrees which increased all workers' wages by the same proportionate amount. Similarly, there is legislative prohibition

against reductions in employment for a two year period following privatisation. That is, for political economic reasons, the government wants to be seen to be preserving the status quo in the labour market.

The government nonetheless causes adjustments in wage relativities through the system of state orders and credit policies, which in turn lead to wage arrears. The relative disadvantage of workers in agriculture was clearly demonstrated – and it was argued that this can be directly attributed to state procurement and payment policies. The importance of arrears in the private sector is consistent with a picture where the employment decisions of privatised firms are significantly constrained, leading to large *de facto* adjustments on the price side, and is consistent with state financial policies which limit private sector access to credit.

There were very strong regional effects. The finding that workers outside the capital were much less likely to be paid, and that they experienced higher arrears shares, cannot be interpreted as a result of firm-level decisions. Rather, this could be seen as flowing from the stance of government. In particular, firms outside the capital have difficulties in obtaining access to credit from the state dominated financial sector (World Bank 1996c). The fact that workers in Tashkent are relatively rarely affected by arrears helps to minimise the potentially explosive political consequences of non-payment of wages.

Overall, among the alternative hypotheses presented above, the empirical evidence provided greatest support for a political economic perspective on wage arrears. The sectoral and regional patterns dominate productivity and other potential factors that might have explained the observed pattern. The situation may be similar to that in neighbouring Russia, where the government has promised periodically to require repayment of all the wage arrears owed in the economy, in recognition of political imperatives.

9.7 Do Non-Wage Benefits Matter?

The foregoing analysis has addressed delays in payment of money wages. It is however possible that money wages "do not matter", because non-wage benefits are at least as important a form of labour compensation (see, e.g. World Bank 1996a). It is true that non-wage benefits played an important role in the Soviet economic system, and that enterprises and farms have been slow to divest themselves of their "social" responsibilities (World Bank 1994). The distribution of non-wage remuneration was traditionally biased in favour of so-called priority sectors, in particular heavy industry and mining (Commander and Jackman 1993). Hence studies of the scale of enterprise spending in the early 1990s suggested a lesser degree of importance in Uzbekistan, given the largely rural nature of the economy, relative to more industrialised parts of the former Soviet Union (see Chapter 5).

Section 9.2 suggested that the provision of non-wage benefits to workers in arrears is consistent with alternative perspectives on the transition process, specifically, with efficiency (reduce worker turnover), political economy and employer benevolence (by mitigating the welfare impact of arrears). Bearing these possibilities in mind, this section examines whether workers who are not being paid are in fact receiving non-wage compensation from their place of work. The present data allows this question to be addressed directly. All adult respondents are asked whether they received any material benefits from their place of work in the preceding month.

The types of benefit listed are: free or subsidised food or animal food; housing; subsidised medical care; lease of agricultural equipment; and other benefits. There is an additional question that asks the respondent about total "wages-in-kind". However, the respondent is not asked to value each of the different types of non-wage compensation separately. For the different benefit types listed, one knows only whether or not the good/service was received.

A variable was constructed to capture those individuals who reported

Table 9.6: Frequency of arrears and non-wage benefits

	Non-wage benefit	No benefits	$\frac{\text{benefit}}{\text{no benefit}}$	Total
No arrears	203	1549	13.1	1752
In arrears	202	828	24.4	1030
TOTAL	405	2377	17.0	2850

any benefit, with the result being that 14.3 percent of the sample reported receiving at least one benefit. This variable is used to investigate the relationship between having arrears and non-wage benefits. Table 9.6 compares the numbers of individuals reporting having benefits or not, on the basis of whether or not they were experiencing wage arrears.

In June 1995, about 17 percent of all workers who reported receipt of non-wage benefits. About 24 percent of workers who had not been fully paid their contracted money wage in the preceding month received other compensation from their employer. Thus the share is higher than that for the overall sample. For those not in arrears, only 13 percent had additional non-wage compensation. This picture calls for some caution in interpretation of earlier results. Non-wage benefits appear to offset the effect of arrears on household welfare for some, but not all, workers with arrears.

The importance of non-wage benefits for certain groups is illustrated by a more disaggregated analysis of the joint incidence of benefits and arrears. Among workers in agriculture with arrears, for example, almost three in ten (29 percent) reported receipt of non-wage benefits. This is consistent with the above discussion that pointed to the links between continued employment on the *kolkhoz* and access to land for farming. Non-wage benefits are also more important than average among workers with arrears in Fergana, among whom about one in four receive non-wage benefits. From a political economic perspective, access to non-wage compensation may be encouraged by government as a way to alleviate hardship (and therefore potential social unrest) in rural areas.

On the other hand, non-wage benefits are less prevalent among individuals with arrears than what statements by the World Bank and others might lead us to expect. The hypothesis that non-wage compensation substitutes for the non-payment of money wages can be rejected, since 80 percent of workers in arrears do not receive any other benefits from their employers. This is true even if the *value* of non-wage benefits has been under-reported by respondents (see Chapter 5), since the focus here is on receipt or non-receipt rather than the size of benefits.

This finding is explicable in terms of the distribution of arrears. The chapter has shown that arrears disproportionately affect workers at the bottom of the contract wage distribution. Hence arrears are acting as a *de facto* adjustment mechanism to widen the wage distribution. Earlier studies have suggested that non-wage benefits also tend to widen the distribution of labour compensation (Commander and Jackman 1993). In other words, there is a tendency for high wage firms to offer more benefits – that is, wages and benefits are *complements* rather than substitutes. This was the case in Poland, for example, where the determinants of the provision of non-wage benefits was examined using an enterprise survey (Estrin *et al.* 1997). In this context, it is not surprising that the incidence of non-wage benefits fails to offset the effect of arrears on the wage distribution.

A second reason for the limited overall importance of non-wage benefits is that firms unable to pay their wage bill are likely to be in financial distress, and may have already shed the ancillary social functions inherited from the Soviet period. Again, in Poland, reductions in the scale of benefits were inversely associated with firm profitability (Estrin *et al.* 1997). Firms with cash flow problems may be unable to minimise worker turnover through the provision of such benefits.

9.8 Effects on the Real Wage

Government and international agencies typically report levels and trends in wage figures that ignore the presence of arrears. In other words, the real wage figures reported in Chapter 3 were trends in 'contract earnings' that combine payments that were received with payments still owed (arrears). From a political economic perspective, as noted in Section 9.2, this practice is used to strengthen the "social" credentials of government consistent with its announced commitment to minimising the social costs of transition on workers.

Evidence from the sample survey suggests that such reporting may be seriously misleading.[21] In this section simulations are undertaken which incorporate the effect of arrears on the average real wage. While the results from the sample survey month of June 1995 cannot be projected across the whole year, let alone the entire period of transition, the results set upper and lower bounds on the effect of arrears on the real wage, and are therefore illustrative.

For 1995 as a whole, the rate of inflation as measured by the CPI was 315 percent (World Bank 1996a). This translates into a monthly rate of approximately 12.6 percent. To calculate the impact of arrears on the reported real wage, alternative scenarios of repayment are examined, since there is no direct information as to when repayment was actually made. The data only show how much was owed for the month of May.

If arrears are repaid after one month, the real wage is reduced to:

$$\widehat{W} = W\left(1 - \alpha\frac{i}{1+i}\right) \tag{9.3}$$

where $\widehat{W}$ = the value of the real wage after arrears, α is the share of arrears

[21] This point has been made for Russia by Standing (1997, p. 132), noting that the apparent recovery of the real wage in official statistics in 1993-4 was misleading, since "(i)n reality the reported wages from the quarterly forms filled in for Goskomstat were the .. wages to which enterprises were committed, not necessarily those that they actually paid."

in the contract wage (.86) and i is the monthly rate of inflation. If arrears are repaid after t months, the value of the real wage is reduced to

$$\widehat{W}(t) = W\left(1 - \alpha\left(1 - \frac{1}{(1+i)^t}\right)\right) \tag{9.4}$$

The effect of arrears on the total wage bill is thus to reduce it to

$$E = \overline{\widehat{W}} \times N$$

where N is the share of the workforce affected by arrears (.37), and $\overline{\widehat{W}}$ is the average real wage across individuals with different repayment delays.

Two different scenarios are estimated and presented in Table 9.7. The table enables comparison of estimates of trends in the real wage, to determine what might be the case once arrears have been taken into account. First, it is assumed that all individuals are repaid at various intervals. For example, if the arrears incurred in May were fully repaid in June, for those affected, the delay would be equivalent to a real wage cut of about 9.6 percent. This is the lower bound of the effect of arrears, and reveals a substantial cut in real wages even if the individuals were to be repaid in full the following month. The same delay would mean a reduction in the contract wage bill of about 3.5 percent. Hence the wage deflation that took place in 1995 is sharper once arrears are taken into account. If full repayment followed two months late, in July, then the individuals affected would have experienced the equivalent of a 21.1 percent wage cut, and the contract wage bill would have been reduced by about 7.8 percent. It is also possible that the amount in arrears will never be repaid (in which case $t = \infty$), in which case the contract wage bill for May 1995 would have been about 32 percent less than reported in official statistics.[22] This is the upper bound of the effect of arrears on the economy's total wage bill. It is obvious that the longer the delay, the large the effect on the value of the real wage.

[22]Standing (1997, p. 132) concludes from enterprise survey results that "wage arrears were often really non-payment – in many factories the managers admitted that there was little prospect of the arrears being paid".

Table 9.7: Effect of arrears on real wage trends

official wage index			Wage net of arrears			
1991	1994	1995	1995			
			length of delay (t)			
			one month	2 months	never paid	'Russia case'
100	117	95	91	87	62	85

SOURCE: Official series based on IMF figures.
Net wage estimates are the author's; see text for details.

Second, evidence about the repayment scenario can be based on that presented by Lehmann *et al* (1997) for Russia. In Russia in October 1996, 54 percent of the sample of workers were in wage arrears, of whom 26 percent had been owed wages for less than one month, another 26 percent for between one and two months, 18 percent for two to three months and 30 percent over three months. In other words, the repayment schedules differ across individuals in Russia. If this were the case in Uzbekistan, arrears would still have a marked effect on the real wage index even though almost two-thirds of workers in the economy are being paid on time.[23]

The prevalence of arrears in payment is a cause for caution in the interpretation of official data about wage inflation. Obviously the effect on the aggregate level of real wages in the economy would be larger the longer the average period of non-payment and the higher the rate of inflation. Given data for a single month only, and in the absence of information about when repayment was being made, and whether or not arrears were being incurred more than once, it is difficult to estimate the general effects of arrears on key macro-economic variables like the rate of wage inflation. It is nonetheless apparent that under each of the scenarios presented in Table 9.7, the slowdown in wage growth that occurred following stabilisation of the economy in late 1994 is much sharper than official statistics suggest. Clearly, if arrears were

[23]For the group who reported a delay of "more than four months", an average of eight months is assumed.

being incurred every month, the impact would be magnified. The foregoing simulations are illustrative, and put upper and lower bounds on the effects of arrears on the rate of wage inflation and real wage levels in the economy.

9.9 Conclusions

Arrears have been widespread throughout the former Soviet republics during the transition. Before now, understanding of arrears has constrained by the lack of appropriate micro data. This chapter has addressed a number of key questions about wage arrears for the case of Uzbekistan.

Broadly speaking, in the specific economic and institutional context of transition in Uzbekistan, arrears come about at two levels. First, at the firm level, enterprises are faced with shortages of funds to pay employees. It was argued that the pattern of such shortages among firms is at least partly a product of the government's enterprise and financial policies. Second, within the firm, employers can discriminate among individuals as to whom should be paid in full.

A neo-classical conceptual framework was outlined wherein arrears were used to effect changes in the structure of contract wages consistent with the marginal productivities of individual workers – so that characteristics associated with higher productivity and/or working in sectors that are doing relatively well were less likely to be in arrears. However it was also recognised at the outset that a political economic perspective on arrears might be fruitful in relating patterns of arrears to government objectives and policies. The possibility that employers are not acting in a profit-maximising fashion was also noted and attributed to specific elements of the post-Soviet context.

Analysis of microdata on the pattern of wage arrears has revealed distinct patterns. Adopting a two-step approach, this chapter showed who was affected by arrears, and second, among those affected, by how much. In general the individual characteristics most frequently associated with the presence

of arrears were also associated with larger amounts of arrears. In particular those working on collective farms and people living outside the capital were found to be most affected. These regional and rural/urban disparities are compounded by the fact that the individuals with low contract wages are more frequently and worst affected by arrears. Hence arrears have a critical distributive impact.

In terms of transition and adjustment, the extent and incidence of arrears provided support for the efficiency hypothesis: that arrears are one way for employers to shift net wages toward market-clearing levels in the face of institutional and other constraints. In this sense, the aggregate picture presented by official statistics where adjustments in wages and employment appear to have lagged behind the declines in output and productivity fail to reveal the extent of wage adjustment in Uzbekistan. It was shown that arrears account for between half and two-thirds of the widening of the earnings distribution that has occurred since 1989, and in this sense may be contributing to a more efficient labour market (World Bank 1996a).

On the other hand, there was only mixed support for the hypothesis that indicators of individual productivity reflected in human capital variables would be a significant factor in explaining the pattern of arrears. Education was not important once additional controls were introduced. Age was however significant in explaining the incidence of arrears, and is consistent with the efficiency hypothesis if recent training is more valuable for employers, who are prepared to pay a premium to young workers.

A political economic perspective is perhaps a more fruitful approach to thinking about wage arrears. The pattern of arrears can be interpreted largely in terms of domestic political and fiscal considerations. On the one hand, the government has regularly announced decrees which have indexed the contract wage of all workers. But on the other hand, the government is concerned about macro-economic stability (i.e. reducing inflation) and unemployment, and would like to limit growth in labour costs. In the interests

of domestic political stability, the government has allowed (or caused) arrears to emerge, and has influenced the pattern of arrears in order to, respectively, minimise both (a) open unemployment and (b) arrears in wage payments to urban workers, for whom the possibilities for collective action and unrest may be greater.

The evidence about regional patterns of arrears, revealing that workers in the capital are least affected, provides strong support for the political economy hypothesis. Moreover, since the state exerts substantial control over the financial sector, and over much of agricultural production through the system of state orders, it can be argued that the concentration of arrears in agriculture is an outcome, albeit unintended, of government priorities. The reduction in labour costs caused by arrears may have facilitated expansion of employment in the agricultural sector, and thereby enabled what would otherwise be surplus labour to be formally employed. Whether or not such individuals are in fact properly regarded as 'employed' remains an open question that is beyond the scope of this chapter.

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