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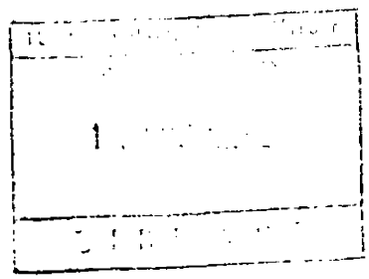

Essays on Worker Mobility, Skills and Unemployment in Transition Economies

Jarkko Turunen

Thesis submitted for assessment with a view to obtaining the degree of Doctor of the European University Institute

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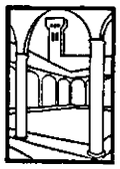

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Contents

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1 Preface

1.1 Introduction

Worker mobility is an essential part of transition from the socialist plan to a market economy. However, not all worker mobility is the same and the type of mobility is important for success in transition. Two features of worker mobility are particularly vital for a successful transition. First, according to the European Bank of Reconstruction and Development (EBRD): "...higher mobility is not necessarily desirable in itself. What is desirable is reallocation from less to more productive enterprises" (p.104; EBRD, 2000). This comment suggests that the direction of worker mobility matters. In the transition context higher productivity is *a priori* associated with private ownership, an assumption that is supported by empirical evidence. As a result, it is possible to rephrase the comment by stating that mobility from state jobs to private employment is more desirable than other types of worker mobility.

Second, the human capital characteristics of workers that move are important. Workers are different in the amount of human capital and skills that they possess, and consequently, some workers are more productive than others. Assuming that the private sector is more efficient in its use of resources, the reallocation of workers with high human capital and skills to the new private sector is more desirable. Moreover, the reallocation of human capital determines growth of the new private sector. The private sector requires workers and their skills – educated professionals, skilled machine-operators, as well as those who are able to adapt to the new environment – in order to grow and be productive.

In this dissertation, I evaluate worker mobility in transition. I combine the two features of worker mobility discussed above and study the mobility of workers with different levels of human

capital and skills from state to private jobs. As a result of the emphasis on ownership, the definition of the employment states differs from the standard definition. I adopt the term employment state by ownership to describe the three employment states of interest: state employment, private employment and nonemployment.

In order to restrict the dimension of the study, I also apply additional qualifications about human capital and skills that I consider. First, I evaluate human capital and skills that existed at the beginning of transition. Second, I assume that these human capital and skills are embodied in workers and thus that they move with them. I consider formal education as an example of the skill variable that best fits this description. These two qualifications exclude a discussion of creation of new human capital during transition, as well as, mismatch of skills across sectors.

This dissertation consists of four closely linked chapters. The first three chapters contain an empirical analysis of worker mobility in two transition economies: Russia and East Germany. I evaluate mobility of workers with different types of human capital across employment states by ownership, as defined above. Because of the differences in the overall transition experience, Russia and East Germany provide a useful comparison of worker mobility. The results suggest that the reallocation of workers is different for workers with different types of human capital. In Russia, those with higher general human capital or white-collar skills are less mobile across employment states by ownership and less likely to leave state jobs to nonstate jobs and nonemployment, while in East Germany differences in mobility and the probability to leave public jobs are less pronounced. While alternative interpretations of the results are possible, the results point to an underlying general feature of transition: the relatively low quality of new private sector jobs at the beginning of transition. However, institutional features of the labor market such as unemployment benefits and employment protection legislation are likely to contribute to the

different country experiences. In the fourth chapter, I build an equilibrium model of labor market transition with skill heterogeneity. I discuss the role of labor market institutions as an explanation of differences in the process of reallocation of workers with different types of human capital and skills. In particular, I illustrate how differences in the unemployment benefit regime can result in a differential speed of reallocation of human capital and skills.

1.2 Chapter summaries

1.2.1 Chapter 2. Education and Worker Mobility in Transition: Evidence from Russia and East Germany

In this chapter, I provide an introduction to the role of human capital in worker mobility in Russia and East Germany. I analyze worker mobility between three employment states: public/state employment, private/nonstate employment and nonemployment. I concentrate on education as a proxy for human capital and skills. Russia and East Germany differ in major dimensions of the transition process, including the economic environment, privatization and labor market institutions.

I use data from nationally representative household surveys, the Russian Longitudinal Monitoring Survey (RLMS) and the East German subsample of the German Socio-Economic Panel (GSOEP) to evaluate education and worker mobility across employment states by ownership. From these data, I calculate transition probabilities and mobility indices of yearly mobility with bootstrapped standard errors.

The results show that the overall trends in worker mobility are different in Russia and in East Germany. In general, workers are less mobile across employment states by ownership in

East Germany than in Russia. While in Russia those with the most education are less mobile, there is less evidence of a clear differentiation in East Germany. The time patterns of adjustment are different and, in particular, the observed differences become more pronounced in Russia as transition proceeds. Mobility measures indicate that worker mobility across employment states is relatively high in both Russia and East Germany. However, the methods used in this chapter do not control for individual characteristics of workers. As discussed in the introduction, the direction of mobility matters and worker reallocation from state employment to the private sectors is vital for success in transition. As a result, this chapter is a preliminary exploration and serves as an introduction to a more detailed analysis in chapters 3 and 4.

1.2.2 Chapter 3. Leaving State Jobs in Russia

In this chapter, I analyze the role of human capital and skills as determinants of the probability to leave state jobs in Russia. The study is motivated by the observation that both the direction of worker mobility and characteristics of the workers that move are important. In contrast to most previous studies, I evaluate worker mobility over employment states by ownership. The emphasis on ownership allows me to indirectly evaluate the nature of the private sector. Using this definition of employment states and the panel structure of the data I am also able to compare the determinants of worker mobility over most of the transition period in Russia.

The RLMS is well suited for the study of worker mobility. It is nationally representative of the Russian population, allows for comparison of worker mobility over time, and a consistent definition of firm ownership to state and nonstate jobs. Using the data, I estimate discrete choice models to evaluate the characteristics of those workers that leave state jobs within a year.

The results demonstrate that those with a higher education, supervisory responsibility or

in white-collar occupations are less likely to leave state jobs. The negative education effect is strongest for those with a university education. In addition, the determinants of mobility change over time and a large part of the negative effect is driven by the structure of privatization. I discuss various potential explanations of the results. I conclude that the results are driven by the structure of privatization that is biased towards blue-collar occupations and the prevalence of low quality nonstate jobs.

1.2.3 Chapter 4. Leaving Public Employment in East Germany

In this chapter, I repeat the analysis of worker mobility using data from East Germany. The purpose of the analysis is to provide a comparison of the results obtained for Russia and to re-evaluate the potential explanation of the results. The East German subsample GSOEP provides a good source of nationally representative, reliable data over an extended transition period. However, the definition of state jobs is restricted to those in public employment in East Germany. I estimate discrete choice models to evaluate the characteristics of those that leave public employment within a year.

The results indicate that those in white-collar occupations are less likely to leave public employment to private employment or nonemployment. A higher hourly wage also reduces the probability to leave public employment. However, there is no evidence of a negative education effect on the probability to leave public jobs. I compare the results for East Germany to those obtained for Russia and discuss potential explanations of the differences. I conclude that the results are likely to reflect both the low quality of private jobs and the effect of labor market institutions.

1.2.4 Chapter 5. Equilibrium Labor Market Transition with Skill Heterogeneity

In this chapter, I build and discuss an equilibrium model of reallocation of workers with different skill levels during transition. The model is motivated by heterogeneity in the overall labor market outcome across transition countries, as well as heterogeneity in worker mobility for workers with different skills within countries. Evidence presented in previous chapters indicate that the process of reallocation of skills is different in Russia and East Germany, and that workers with high skills have been less likely to leave state jobs to nonstate jobs. In order to capture these effects, I build an equilibrium model of labor market transition with heterogeneous workers based on the matching framework of Mortensen and Pissarides (1999). In addition to skill heterogeneity, I include endogenous job destruction and policy parameters. I evaluate the model and the role of policy using numerical values based on the actual transition experience in Russia.

The results obtained from the numerical model illustrate the potential effects of labor market policy on the speed of reallocation of skills. First, a basic feature of the model is that high skill workers experience less job destruction and more job creation (at a given level of unemployment) and thus less unemployment during and after transition. This feature follows the assumption that the value of leisure does not depend on skills. Thus, the relative value of nonemployment is lower for workers with higher skills.

Second, higher inflow of low skill workers to unemployment from the state sector during transition results in a higher rate of creation of low skill private jobs. This occurs despite more job creation for high skill workers in equilibrium. The numerical model provides benchmark results of reallocation of skills and illustrate the two results. Policy experiments suggest that small changes in the policy regime can have large effects on the speed of reallocation of skills.

For example, an introduction of higher unemployment benefits, similar to those in Central and East European (CEE) countries results in a large increase in low skill unemployment.

1.3 General conclusion

In this dissertation, I study the process of reallocation of human capital and skills during transition. I provide comparative empirical evidence about the process in two transition economies and a theoretical discussion of the potential role of labor market institutions in this process. In summary, the empirical results suggest that the reallocation of workers is dissimilar for workers with different types of human capital and skills. In Russia, those with higher general human capital or white-collar skills are less mobile across employment states by ownership and less likely to leave state jobs to nonstate jobs and nonemployment. To follow up its comment on the direction of mobility, the EBRD (2000) continues by noting that not all transition countries have been as successful in the reallocation of workers towards more productive, private jobs. In particular, they note that while there has been more worker mobility in Russia, there has been less reallocation of workers to the private sector. As a result, they contend that Russia has been caught in a low productivity, low skills trap (EBRD, 2000). The results in this dissertation support this conclusion. This conclusion is strengthened by the result that those with high human capital and skill are less likely to leave state jobs to private employment. In Russia, skilled workers either stay in unproductive state jobs or perform jobs that do not reflect their qualifications in the private sector.

In contrast to Russia, the differences across workers with different human capital and skills are less pronounced in East Germany. The results from East Germany suggest that the economic

environment and institutional features of the labor market influence the process of reallocation of skills. In particular, it is likely that both the generosity of unemployment benefits and the rigidity of employment protection legislation have increased the flow of workers to nonemployment and reduced creation of low skill jobs in the private sector. This result is partly confirmed by the theoretical study that suggests that even small differences in policy can have large effects on the outcome. In particular, low unemployment benefits similar to Russia result in a slower reallocation of skilled workers and less unemployment during transition.

The comparative results indicate an underlying general feature of transition: the relatively low quality of new private sector jobs. However, institutional features such as the generosity of unemployment benefits and the rigidity of employment protection regulation are likely to contribute to the different country experiences. This interpretation of the results implies that segmentation by human capital and skills evident in Russia can result in weaker economic performance in the short and medium term. To some extent these results are already evident in Russia. Thus, this dissertation concludes that labor market institutions influence the process of reallocation of human capital and skills in transition. During transition, they determine the differential speed of reallocation of human capital and skills. However, this influence is not limited to transition and the effects of the initial reallocation contribute to the growth potential of the post transition economy.

References

[1] EBRD (2000): *Transition report*, London.

Chapter 2: Education and Worker Mobility in Transition: Evidence from Russia and East Germany

May 2002

Abstract

I investigate educational attainment as a determinant of mobility of workers across employment states by ownership in Russia and East Germany during transition. Employment states by ownership are defined as state employment, private employment and nonemployment. I present a brief review of relevant institutional features, including education, privatization, and the labor market in Russia and East Germany. I use data from the RLMS and GSOEP to calculate yearly measures of sectoral mobility for subgroups with different educational attainment levels. The measures include transition probabilities and mobility indices. The results show that workers are less mobile across employment states by ownership in East Germany than in Russia. While those with most education are less mobile in Russia, there is less evidence of a clear differentiation in East Germany. The differences become more pronounced in Russia as transition proceeds. Worker mobility across employment states is relatively high in both countries. Finally, I evaluate sensitivity of the results using bootstrapping distributions.

2.1 Introduction

Worker mobility in transition economies has been a topic of a number of studies. These studies have identified various general patterns, as well as country idiosyncrasies. One of the general patterns identified is the observation that in most central and east European (CEE) countries worker mobility has been low. Low mobility in CEE countries extends to mobility across employment states, occupations, industries, and state/private employment (Boeri and Flinn, 1999). In particular, those in nonemployment have been relatively unlikely to find jobs, thus constituting a "stagnant pool" of unemployment (Boeri, 1998). In contrast to the CEE countries, worker mobility has been relatively high in Russia. Evidence of high mobility has been provided using measures of mobility across employment states (Foley, 1997 and Grogan, 2000), occupations (Sabirianova, 2000), and worker turnover between jobs (Gimpelson and Lippoldt, 1997). However, recent studies have indicated that not all workers in Russia are mobile. In particular, those with higher skills and human capital experienced less job turnover and are less likely to separate when hit by idiosyncratic shocks to firm output (Gimpelson and Lippoldt, 1997, and Grosfeldt *et al.*, 1999).

In this paper, I provide further evidence of worker mobility across employment states by ownership in transition. Two features of the type of mobility I discuss distinguish this paper from previous studies. First, I concentrate on mobility between three employment states: state employment, private employment and nonemployment. In contrast with previous studies, this definition of employment states distinguishes between types of ownership of the firm or sectors of employment. To differentiate from standard definitions of employment states, I label them employment states by ownership. The EBRD transition report argues that not all worker mobility

is equally useful, rather the direction of mobility from unproductive to productive jobs matters (EBRD, 2000). Here, ownership serves as a proxy for the productive potential of employment. Second, in order to evaluate the type of workers that move, I disaggregate workers by categories of educational attainment. Education is used as a proxy for the productivity of the worker. In particular, the level of education is positively correlated with other measures of skill and productivity. As a result, looking at the differences in mobility across employment states by ownership and educational categories allows for an evaluation of the usefulness of mobility.

In order to provide a comparison across transition countries, I evaluate mobility in two very different transition economies: Russia and former East Germany. The two countries differ in major dimensions of the transition process, including the process of privatization and labor market institutions. While Russia has struggled with the introduction of credible institutions, East Germany adopted West German institutions overnight. The contrast in institutional features provides a useful basis for comparison. The differences also enable me to study the role of country specific institutional features versus general properties of transition as determinants of worker mobility.

I use data from the Russian Longitudinal Monitoring Survey (RLMS) and the German Socio-Economic Panel (GSOEP). Using these data, I can identify employment states by ownership and educational categories that are comparable over time and across countries. I calculate transition probabilities and mobility indices of yearly mobility to examine determinants of mobility. Further, to evaluate the robustness of the differences I calculate standard errors using nonparametric bootstrap methods. The results show that the overall trends in worker mobility are different in Russia and in East Germany. In general, workers are less mobile across employment states by ownership in East Germany than in Russia. The results by educational categories show

some similarities. However, while in Russia those with most education are clearly less mobile, there is less evidence of a clear differentiation in East Germany. Further, the differences become more pronounced in Russia as transition proceeds. Finally, the mobility measures indicate that compared to other transition economies, both Russia and East Germany experience relatively high worker mobility.

The rest of the paper is organized as follows. In Section 2.2, I briefly present the main features of relevant institutions, education, privatization, and labor market institutions in Russia and East Germany. In Section 2.3, I introduce the data, definitions and methods used in the analysis. In Section 2.4, I present the main results for both countries. In Section 2.5, I discuss the results, provide some international comparison, and evaluate sensitivity of the results. Finally, I summarize the study in Section 2.6 and provide a motivation for further study of leaving state jobs.

2.2 Institutions in Russia and East Germany

2.2.1 Education

In general, eastern European socialist economies were known to have relatively strong educational systems. At the onset of transition, a highly educated workforce was expected to provide a strong foundation for future growth in these economies. However, recent commentators have found flaws in the structure of the educational systems in transition economies. In particular, it has been criticized for an emphasis on narrow curricula in the secondary or vocational education level (Boeri *et al.*, 1998). According to the critics, these flaws have led to a highly specialized workforce that has not been able to adjust to the demands of a market economy. In fact, there is increasing

evidence that while most eastern European economies began transition with a relatively skilled workforce, they have not been able to realize the benefits of their endowment (EBRD, 2000). Both the Russian and East German education systems share the overall characteristics of the socialist system, including a high level of education and an emphasis on specialized skills on the secondary level.

Russia The main building blocks of the Russian system of education are universal secondary education and vocational schooling. The main features of the Russian education system, including years of study and the typical age at each step are described in Table 1. Primary education begins at six years old and consists of four grades. Primary education is followed by five years of lower secondary education. Education is compulsory until the end of lower secondary education or until the students is 16 years old. There are two education tracks after lower secondary education: complete general secondary education or vocational education. Both tracks can lead to higher education. General secondary education, an equivalent of high school, requires a total of ten years of education. It is followed by either secondary vocational school or higher education. The vocational education track consists of lower vocational education and secondary vocational education.[1] Lower vocational education takes three years to complete and secondary vocational school requires another two to three years of study. The vocational education system in Russia is large and consists mostly of programs designed to provide labor force entrants with an occupational qualification (Gil *et al.* 2000). Higher education consists of specialist and university degrees. Both higher education tracks can be followed by postgraduate science degrees (OECD,

[1]Since 1996, the vocational track is divided into five components: basic, secondary technical, higher level technical, postgraduate professional and additional professional education (Gil *et al.*, 2000).

1996).

East Germany The East German system of education emphasized both a universal secondary education and practical experience through apprenticeships. The system can be divided into four main elements: kindergarten, polytechnic education, followed by either vocational education or general secondary education, and higher education. These elements are summarized in Table 2. Compulsory general polytechnic education began at age six and consisted of ten grades. It was divided into three stages with an increasing emphasis on science, technology and technical training. Beyond compulsory education there were three tracks: vocational training, general secondary education and extended polytechnic education. Both the vocational training and extended polytechnic courses included a period of apprenticeship. In all, extended polytechnic education consisted of three years of schooling. The three year general secondary education course led to an end-of-school examination that enabled students to apply to higher education. After the end of school examination or completed extended polytechnic education, the student was allowed to apply for higher education at a university or a technical institute. After unification, the East German educational system was to a large extent replaced by the system already in place in West Germany. In particular, the general polytechnic school was replaced by the various education models in the west. While there are some differences at the lower level of secondary education, both general secondary education and specialized secondary education are modelled after West Germany. At the level of higher education, new regional institutions were started, some schools were demoted to the status of special secondary education, and university staff was in general reduced (Burant, 1987).

2.2.2 Privatization

The radically different privatization methods adopted in Russia and East Germany were at the extremes of the spectrum of privatization methods. In Russia most firms were privatized through mass-privatization using privatization vouchers, while in East Germany state-owned enterprises were sold individually via a central privatization agency. However, despite the difference in methods, privatization was achieved rapidly in both countries.

Russia Privatization has been considered as the most successful part of the reform in Russia. Compared to CEE countries where privatization was done incrementally, Russia implemented a rapid mass-privatization program. According to government statistics in January 1996, firms owned by the state and municipal authorities amounted to 23% of all firms, while privately owned firms accounted for 63%. Currently, remaining state-owned companies are mostly in strategic industries such as energy, utilities and military production. However, privatization has not been successful in depolitization of firms and a large number of firms remain dominated by influential insiders. The insiders have been able to extract employment subsidies from the government to support labor hoarding. As a result, the budgets of state firms have hardened slowly and, initially, only few firms collapsed. Recently, improved legislation on bankruptcies in Russia has increased the pace of restructuring. While there has been a significant downward trend in state involvement, state and local authorities remain involved in some production sectors that are typically private in market economies.

East Germany The privatization process in East Germany differs significantly from those in other transition economies. Privatization was undertaken by a central privatization agency,

the Treuhandanstaldt, under the supervision of the Ministry of Finance. The Treuhandanstaldt transformed state firms into independent corporations and then sold them for cash to the highest bidder. In the process, it often restructured large firms to a more manageable size and closed others as unviable. Usually employment guarantees were required from potential buyers. The privatization process was completed relatively fast in East Germany, accomplished by the end of 1994. For those workers that remained in the public sphere, the public service system of western Germany was adopted. Initially, the East German public sector was significantly larger that its western counterpart. However, the sector was characterized by indoctrination, centralism and a poorly educated workforce (Derlien, 1999). As a result, the main process during transition was a purge of existing public employees, retraining remaining employees and importing expertise from West Germany. In addition, the unification resulted in a major reorganization of the structure of the public system. On the federal level, the reorganization involved adding new administrative branches in former East Germany, while other institutions came under West German control. As a result the East German public system was downsized quickly to roughly half the pre-transition level of employment in 1993.

2.2.3 Labor markets

Pre-transition labor market institutions were similar in East Germany and Russia. In Russia, regulation of the labor market was complete in principal: workers were centrally allocated and, during the Stalin era, sometimes forced to change jobs and regions. However, in practice labor markets were less regulated and relatively flexible in both countries. Unorganized labor reallocation was the rule: workers found, quit and changed jobs, and firms hired independently. Nevertheless, employment and labor reallocation decisions were characterized by high job secu-

rity in both countries. Firms were permitted to create redundancies, but were encouraged to hold on to their labor by economic incentives and permanent labor contracts. Since open unemployment was illegal no system of unemployment benefits existed. In both countries base money wages were centrally set by a tariff system. In addition to the base money wage, enterprises provided workers with social benefits, such as housing and subsidized goods, and bonuses. This additional compensation provided a source of variation in total compensation. The change in institutions in both East Germany and Russia has been substantial. However, policies that were implemented are dramatically different. As a rough description, while Russia adopted relatively *laissez-faire* labor market policies, rigid West German regulations were adopted in East Germany. In addition, labor market policies in Russia have been *de facto* even less restrictive due to lack of enforcement and support structures.

Russia Labor market reform in Russia began with the 1991 Employment Act. It legalized open unemployment, introduced unemployment benefits, set a severance pay of three-month's salary and introduced other labor market policies. The current level of the unemployment benefit in Russia is very low. In principal, all workers that have been laid-off are eligible for benefits and standard conditions for receiving the benefit, including active job search, reporting and non-refusal of appropriate job offers, are applied. The unindexed benefit is 75% of the average monthly wage for the first three months, 60% for the next three months and 45% for the following six months, with a minimum benefit equal to the minimum wage. However, in practice less than half of all job-seekers apply and only a small portion of all registered receive benefits[2]. Further, most

[2]Standing (1996) lists several reasons for the underreporting of registered unemployment. Low benefits and, recently delay of payment of benefits, appear to be the main reasons for underreporting.

unemployed receive the equivalent of the minimum wage, setting the average benefit at slightly above the minimum wage. After 12 months the unemployed receive minimal material assistance. The low number of registered unemployed and the weakness of the administrative infrastructure has kept spending on unemployment benefits low. The benefits are financed by a 1.5% payroll tax from enterprises. In addition to unemployment benefits, early retirement schemes are a growing part of passive policies. Legislation on firing is relatively relaxed. Firms are free to fire as long as they give advance notice of dismissals and pay the severance pay of three months average wage. Most Russian workers are on permanent contracts. Fixed term contracts are more common in the private sector, in particular in the construction, agriculture, and distribution and trade sub-sectors (Lehmann *et al.*, 1997). Wages are determined by tripartite negotiations that set the floor for other bargaining arrangements. At the enterprise level, wages are, in principal, determined by collective agreements that set a minimum based on the minimum wage. However, most wages are set independently of the negotiated minimum wage. In the budget sector wages are still determined by a tariff system based on wage grades. This has resulted in low wages in the budget sector compared to those in the private sector (OECD, 1995). In addition, the Russian tradition of social benefits provided by the firm continues at considerable costs to the firm.

East Germany Upon unification West German labor market institutions were adopted in East Germany. The new institutions included unemployment benefits, wage bargaining structures and the public service system. The German unemployment benefit system is relatively generous. The replacement rate of the unemployment benefit exceeds 60% for workers with at least 360 days of work in the past three years. The duration of the benefit depends on the length of employment

and can range from roughly 2 and a half months to over two years. The program is financed by a contribution of 6.5% of gross pay (up to a maximum limit). In addition to the unemployment benefit, the unemployed are eligible for other income assistance and after exhaustion of the benefit, receive a flat rate sum of unemployment assistance. In contrast to Russia, unions have a central role in the wage bargaining process in Germany. In particular, West German unions have had considerable success in organizing and bargaining for East German workers. The first round of wage bargaining resulted mostly in lumpsum increases in wages. Following the first round wages were set to roughly 50-60% of West German wages and were meant to achieve parity as transition proceeded (Krueger and Pischke, 1995).

Among the institutions adopted from West Germany is the relatively rigid and complicated public service system. The system consists of civil servants and those working under private contracts, manual laborers and white collar employees. The latter public employees are mostly in social and health services, research and physical work in the railways or waste disposal. Civil service provides particular status and in addition to lifelong tenure, support from the state in terms of pensions. Integrating the two public systems was achieved through a combination of a purge of the old East German system, training and retraining, and import of expertise from West Germany. Those whose administrative unit was dissolved, for whom there was no demand in the surviving units and those who were not sufficiently qualified lost their jobs within 3 months after unification.

2.3 Data and methods

I use data from the RLMS and the GSOEP to evaluate worker mobility. The strategy is to construct comparable nationally representative samples of working age individuals in Russia and East Germany. Appendix A. includes details of the original datasets, construction of the samples and definitions used to build both employment states and education categories. Some aspects of the data deserve to be mentioned here. First, both datasets cover the entire transition period, 1992-1996 in Russia and 1990-1997 in East Germany. Second, while definitions of employment states and education categories are constructed to be as comparable as possible across the two countries, the definition of the employment state is somewhat different. In particular, the employment state in Russia is defined using information about the ownership of the firm, while in East Germany it is defined using information about the sector of employment. Thus, the employment state for East Germany refers to employment in the public sector. This feature results in some lack of comparability between the East German and Russian results. In particular, those in public employment in East Germany are more likely to be concentrated in selected industries and the government sector than those in state employment in Russia.

I use transition probability matrices and mobility indices to summarize mobility across employment states by ownership. Transition probabilities are a simple tool to describe mobility between employment states. Movements between states are assumed to be a Markov process, i.e. probability of transition depends only on the current state, not on the history of states.[3] For three states: employed in the state sector E_S, employed in the nonstate sector E_P and nonem-

[3]Additional assumptions include that the transition matrix does not change over time (time homogeneity), that all individuals face the same transition probabilities (individual homogeneity), and that all probabilities are non-zero (regularity) (Shorrocks, 1978).

ployed E_U, a transition probability is given by: $P_{ij} = \frac{FLOW_{i,j}}{STOCK_i}$, $i,j = \{E_S, E_P, E_U\}$. With these three states the transition probability matrix is:

$$P = \begin{bmatrix} E_{SS} & E_{SP} & E_{SU} \\ E_{SP} & E_{PP} & E_{PU} \\ E_{US} & E_{UP} & E_{UU} \end{bmatrix} \tag{1}$$

Where for example, E_{SU} is the probability of moving from the state sector to unemployment. Notice that the rows of the transition matrix always add to one: $\sum_{j=1}^{n} P_{ij} = 1$, $\forall\ j$. The transition probabilities are calculated directly from sample frequencies.

From the transition probability matrices it is possible to calculate scalar mobility indicators that summarize the level of movement between states. A commonly used mobility indicator is:

$$MT = \frac{1}{J-1}(J - trace(P)) \tag{2}$$

Where J is the dimension of the transition probability matrix. The MT index satisfies standard conditions for mobility indices. In particular, the index lies between 0 and 1, and equals 0 for an identity matrix (zero mobility). A weakness of the MT index is that it uses only the staying probabilities on the diagonal, and is thus inefficient.[4] Finally, I calculate mobility indices both including all three employment states, the open mobility index, and excluding nonemployment, the closed index. The closed mobility index is calculated using the 2×2 matrix in the upper-left corner of the transition probability matrix (1).

To evaluate the accuracy of the transition probabilities and mobility indices I calculate standard errors using the bootstrapping method. Bootstrapping is a nonparametric method of ob-

[4]Alternative indices exist. In particular, an alternative index is: $MD = |P|^{\frac{1}{J-1}}$. I calculated the results using both the MT and MD indeces. The results using the MD index are nearly identical to those using the MT index and are thus omitted.

taining standard errors for a statistic originally suggested by Efron (1979). In brief, the method involves drawing a number of subsamples with replacement from the full sample and calculating an estimate of the sampling distribution of the statistic of interest. More formally, consider a random sample X of size N that is drawn from an unknown probability distribution $F(X)$. Denote the statistic of interest by $\sigma(F)$ and an estimator of the statistic that depends on both the unknown distribution function and the sample by $s(F, X)$. The bootstrapping method involves drawing a resample X_b^* with replacement from the original sample K times and calculating an estimate of the statistic of interest $\hat{\sigma}_b = s_b^*(F, X_b^*)$ from each resample. The final step involves constructing an estimate of the sampling distribution of $\sigma(F)$ by assigning a probability $\frac{1}{K}$ to each estimate $\hat{\sigma}_b$. I use 200 resamples, the upper limit of the recommended number of repetitions to calculate standard errors (Efron and Tibshirani, 1986).

Two issues arise in the practical application of the bootstrapping method. First, the accuracy of the calculated probabilities and indices clearly increases with sample size. Second, the method allows for the calculation of bias in the original statistic. However, since most bootstrapped distributions are normally distributed, the original estimate is considered instead of correcting for the bias.

2.4 Results

2.4.1 Russia

Mobility indices provide a convenient way to summarize data and to provide a general overview of the determinants of worker mobility. This is particularly true when a large number of different cuts of the data are evaluated. Thus, I begin the analysis by presenting mobility indices for

Russia. The results indicate that worker mobility across employment states by ownership in Russia is relatively high, changing over time and different for workers with different educational backgrounds. Mobility indices for the full sample, as well as for subsamples by education categories are presented in Table 3. The large indices confirm that the overall characteristic of high labor mobility in Russia extends to mobility across employment states by ownership. There is an initial increase in mobility until 1995 and a slight decrease thereafter. The initial increase is most likely due to an increase in the speed of privatization and consequent restructuring. Indeed 1994-1995 represents an intense period of mass-privatization in Russia. This observation seems to be confirmed by the fact that the increase in mobility is larger in the closed mobility index, suggesting that moves between state and nonstate employment increased more than moves to and from nonemployment. Moves to nonemployment seem to be less common than moves between employment states during the whole transition period.

Mobility across employment states is clearly different for workers with different educational levels in Russia. Those with higher education move less between employment and nonemployment than those with less education. The difference in mobility is strongest between those with a university education and primary education when moves to and from nonemployment are excluded. This suggests that those with less education are more likely to stay in nonemployment and to move between sectors in employment. In contrast, those with higher education are more likely to leave nonemployment, but are less mobile across sectors. Further, the difference between workers with different educational attainment seems to emerge as transition proceeds. Initially, workers are equally mobile and the confidence intervals suggested by the standard errors show no difference in mobility. However, as transition proceeds, those with less education become relatively more mobile across employment states. These results confirm previous findings that

the Russian labor market is segmented in terms of worker mobility. In particular, Gimpelson and Lippoldt (1997) find that hiring is concentrated to those with either certain high professionals skills or generally low skills, while most separations are observed in blue-collar occupations. They also find that those with low skills experience the highest turnover and least stable job matches (Gimpelson and Lippoldt, 1997).

To further investigate the determinants of worker mobility, I calculate mobility indices for different gender and age groups in Russia. The results are presented in Table 4. The results confirm that differences between worker groups emerge as transition proceeds. In particular, as transition proceeds males become more mobile than females. The difference in mobility is more pronounced when moves to and from nonemployment are excluded. This suggests, somewhat surprisingly, that males are more likely to stay in nonemployment and to move between state and private employment. As expected, young workers are more mobile than older workers across all three employment states. However, the relationship is reversed when nonemployment is excluded. This suggests that while the young are mobile between employment and nonemployment, older workers are more mobile between state and nonstate jobs. This result seems a natural consequence of weaker attachment to the labor market and job shopping by the young.

In summary, the mobility indices indicate that worker mobility in Russia is different for workers with different educational attainment, gender and age. However, as a result of the aggregation to a single mobility index, information about the underlying flows is lost. This disaggregated information is useful in providing additional insight about the origin of the differences in mobility. Transition probability matrices, presented in Table 5, provide a more disaggregated picture of worker mobility than mobility indices. In all matrices the diagonal entries are the largest, which suggest considerable persistence in both employment within sectors and nonemployment. As

transition proceeds, there seems to be a hump-shaped adjustment in the persistence of employment in both state and nonstate sectors, while persistence of nonemployment increases slightly over time. Among the off-diagonal entries, moves to nonemployment are relatively small, particularly for those leaving state jobs. Mobility varies across sectors and those in state employment are more likely to stay than those in nonstate employment. The probability to leave nonstate jobs to both nonemployment and state employment are larger than the corresponding probabilities for those in state jobs. This may reflect the relative insecurity of employment in the nonstate sector. However, notice that the staying probability includes job moves within a sector, and consequently, it is not a measure of persistence of state or nonstate employment *per se*. Since the majority of employment opportunities during the period were in the state sector, the observation that the probabilities to enter state employment from nonstate employment and nonemployment are large is not surprising. The fact that state firms continued to hire large amounts of workers may also reflect the employment bias observed in many state enterprises (Commander *et al.*, 1996). However, it is also clear that as transition proceeds, the nonstate sector emerges as the main destination of those moving from nonemployment.

There seems to be considerable mobility between state and nonstate employment in Russia. There are various potential explanations for this mobility. First, it is possible that some of the mobility between employment by ownership does not reflect true mobility. In particular, a significant portion of moves from state to nonstate employment are privatizations. This is more likely to explain mobility in 1994-1995. Indeed, the probability to leave state jobs to the private sector is highest during this period. However, the probability to leave nonstate jobs to state jobs is also high during the same period. Thus, it is reasonable to conclude that privatization is not the main driving factor of the results for all workers. Second, some of the observed

mobility may reflect mis-classification in the ownership variable that is reported by individuals. Misclassification by workers is more likely during a period of intense change where there is more uncertainty about actual ownership changes. Third, the relatively high mobility between state and nonstate employment is likely to reflect the importance of job-to-job mobility in Russia versus transitions to other employment via nonemployment (Foley, 1997).

Disaggregation of the mobility index for workers with different educational attainment offers additional insight into the observed differences in overall worker mobility. Transition probabilities for different education categories in Russia are presented in Table 6. Those with a university education seem to do particularly well in terms of staying in employment. They are most likely to stay in both state and nonstate employment in all periods with a particularly large probability to stay in state employment. Further, once in nonemployment they are less likely to stay and more likely to be hired in both state and nonstate jobs. Finally, those with a university education are the only category with significant flows to state employment from nonemployment in all periods. Those with a secondary education seem particularly likely to change between jobs in state and nonstate sectors, while those with only a primary education are more likely to leave employment to nonemployment and to stay in nonemployment. These results suggest that there is considerable resistance from those with higher education to moving away from employment in general and from state jobs in particular. Without controlling for other characteristics of the worker, those with higher education are less likely to move both to nonstate employment and to nonemployment than those with less education.

2.4.2 East Germany

The results for Russia suggest a strong pattern of segmentation in worker mobility. However, it is not clear whether these results represent a feature that is specific to Russian transition or whether they relate to more general characteristics of worker reallocation during transition. In order to provide a comparison and evaluate the driving force of the results for Russia, I use samples from the GSOEP to calculate comparable mobility indices and transition probability matrices for East Germany.

The results indicate that overall there is less worker mobility in East Germany, but similarly to Russia, the extent of mobility differs for workers with different educational attainment. Mobility indices for the full sample and subsamples by education are presented in Table 7. While the results show that mobility is lower in East Germany than in Russia, it is nevertheless surprisingly large given the relatively rigid structure of institutions that were adopted. There is a significant difference in mobility as measured by the open and closed indices. In particular, the smaller closed mobility index suggests that there is very little mobility between public and private jobs without movements to nonemployment. This is particularly true after the first sample period. In general, the mobility indices are large in the beginning, but decline as transition proceeds. It seems that the first period of transition is characterized by the purge of public employment in East Germany with significant mobility across employment states by ownership. Following this initial purge, mobility stabilizes, particularly excluding flows to nonemployment.

Similarly to Russia, there is some evidence of segmentation by education in East Germany. Initially, those with more education are more mobile across employment states. As transition proceeds the relationship is to some extent reversed. As measured by the closed index, those

with a primary education are more likely to move in the last period. The change over time reflects a decrease in mobility of those with higher education, while the mobility indices for the less educated workers remain stable during transition. In addition to the education categories presented above, I calculate mobility indices for those with and without a completed apprenticeship. As discussed above, the apprenticeship program represented an important component of vocational training in East Germany. In addition, the German apprenticeship program has been recognized as a relevant component of vocational training and suggested as an alternative to standard vocational training programs in transition economies (EBRD, 2000). Note that workers with a completed apprenticeship include workers in all education categories. The results in Table 9 indicate that having completed an apprenticeship does not matter for worker mobility across employment states by ownership. Those with an apprenticeship are only slightly more mobile across employment states. This evidence suggests that practical vocational training does not result in a different experience in terms of worker mobility, but rather any difference in mobility is determined by formal educational categories.

The results by gender and age show a similar adjustment pattern over time, i.e. initial differences in worker mobility subside over time. The results for different gender and age groups are presented in Table 8. Initially female workers are more mobile across all employment states, while male workers are more mobile across public and private jobs. However, as transition proceeds the difference disappears. Young workers are consistently more mobile and the difference in mobility between the youngest and the oldest workers is large. Again, however, the differences become less pronounced as transition proceeds.

The mobility indices indicate a decline in mobility and small differences across education categories, gender and age. Again, analyzing the transition probabilities adds insight into the

underlying reason behind the changes in mobility. Transition probabilities for all workers are presented in Table 9. As required by regularity of the mobility index, the diagonal entries are largest. There is a clear increase in the persistence of public employment over time, confirming the observation that there was an initial "purge" of the public sector of socialist era bureaucrats (Derlien, 1999). In addition, there is no significant inflow of new workers to the public sector from private employment. This may reflect the fact that many public sector jobs in East Germany were filled with professionals from West Germany, rather than East Germans. However, during the first part of transition, there is a significant flow of workers to public employment from nonemployment. During the whole period, private employment remains relatively stable. Finally, as transition proceeds the persistence of nonemployment increases, which is consistent with high and persistent unemployment in East Germany.

The disaggregation of flows by education categories helps explaining previous results. The transition probability matrices by education are presented in Table 10. Overall, public employment is more stable for those with a university education compared to those with a primary education. There is to be a large outflow of educated workers from public employment to nonemployment at the beginning of transition. There is also a persistent and large outflow of workers with a general secondary education from public employment to private employment. In general, however, the results indicate that the initial outflow of workers away from public employment is dominated by workers with less education. Finally, nonemployment is less stable for those with more education compared to those with less education and those with a university education are particularly likely to leave nonemployment to both public and private employment. As transition proceeds, nonemployment becomes more stable for workers in all categories. Finally, the transition probability matrices for those with and without an apprenticeship are presented in Table

11. Again, there are no large differences between the groups. Those with no apprenticeship are slightly more likely to stay in public employment and the outflow from public employment is concentrated to those with an apprenticeship.

2.5 Discussion

The results in the previous section indicate that while worker mobility across employment states by ownership in Russia and East Germany have some similarities, overall the results reflect a different pattern of adjustment. Before discussing the results further it is important to note two caveats. First, because of data limitations the definitions of state employment in Russia and public employment in East Germany are different. Thus, the results are comparable only to a limited extent. In particular, given the more limited and regulated nature of public employment in East Germany it is natural that overall worker mobility is lower in East Germany. The difference in definitions may also explain some of the differences in mobility across education categories. In particular, while the Russian experience partly reflects the emerging government sector, it was already relatively well-defined in East Germany at the beginning of transition. Second, the underlying transition probabilities reflect the different sizes of state employment in Russia and public employment in East Germany. The relatively large share of state sector employment in Russia explains the larger inflows to state employment.

Given these caveats, the overall trends in worker mobility are indeed different in Russia and East Germany. As expected, workers are less mobile across employment states by ownership in East Germany than in Russia. This is particularly true when moves to and from nonemployment are excluded. While in Russia mobility across state and nonstate employment without moves

to nonemployment dominate, the opposite is true for East Germany. This seems to confirm the observation that job-to-job mobility is more important in Russia. Stronger attachment to jobs and smaller flows to nonemployment are likely to reflect institutional features, and in particular the weakness of unemployment insurance and other social assistance programs in Russia. In addition, the time pattern of adjustment in worker mobility is different. While in East Germany mobility decreases over time, mobility in Russia is largest during the latter part of transition. This is likely to be explained by differences in privatization strategies and the fast transformation of East German public employment, with an initial purge of workers.

The disaggregation of mobility to different education categories reveals different adjustment patterns in Russia and East Germany. In Russia those with the highest education are without doubt less mobile, while there is less evidence of a clear differentiation in East Germany. In addition, the differences across education categories become more pronounced in Russia, while the initial differences in East Germany to a large extent, disappear as transition proceeds. Finally, the system of vocational training by apprenticeship did not contribute to the different adjustment in East Germany. Thus, there is evidence that instead of practical vocational training, levels of formal education determine mobility across employment states by ownership. The same pattern of emerging differences in mobility in Russia is repeated for gender and age categories. The results contribute to the view that Russia is moving toward a more segmented labor market. This segmentation contributes to a widening gap between winners and losers in Russian transition.

Mobility over employment states in Russia and East Germany appears to be high relative to other transition economies. Again, caution is required due to poor comparability of results across countries. Boeri and Flinn (1999) report mobility indices of moves over employment states by ownership in selected transition economies. Their results are reported in Table 12

together with comparable indices from Russia and East Germany. The Boeri and Flinn results are not directly comparable since they are based on yearly averages of quarterly measures of mobility. Naturally, mobility increases with length of observation period as a larger proportion of individuals move between employment states. However, even given this caveat the difference in mobility is strikingly large. The mobility indices reported by Boeri and Flinn rarely exceed 0.1. It is plausible that the difference is partly driven by the observation that worker turnover in general has been low in CEE countries. In particular, the adjustment in CEE countries has been characterized by large flows to inactivity and stagnant unemployment pools (Boeri, 1998). In addition, Russia and East Germany share a relatively fast privatization process that may have contributed to higher mobility as it is measured here. Finally, while worker mobility is high in both Russia and East Germany the explanations of this mobility may differ.

Finally, the results shown above vary widely in their accuracy as measured by the standard errors. Throughout the study, I use bootstrapped standard errors to evaluate the accuracy of the calculated mobility indices and transition probabilities. In general, bootstrapped standard errors suggest that the mobility indices and transition probabilities are fairly accurate for large subsamples. However, there are caveats to evaluating these measures.

The accuracy of the estimated mobility indices decreases dramatically with sample size. Note that the number of observations is considerably lower for East Germany, and that the differences in accuracy across countries are driven by differences in sample sizes. I illustrate the change in the accuracy of mobility indices for the sample from 1994-1995 for both Russia and East Germany. Figures 1 and 2, show the bootstrapping distributions of the mobility index for the whole sample with 4,405 and 2,383 observations for Russia and East Germany, respectively. The figures show that the index is calculated relatively accurately and the difference in mobility is

robust. However, as the sample is split to groups of individuals in different education categories accuracy suffers. This is shown in Figures 3-6 which plot the bootstrapping distributions for those with a university education and a primary education in Russia and East Germany. The number of observations varies from 813 to 237 for those with a university education in Russia and East Germany, respectively. The fall in accuracy is clear. However, for the Russian subsamples the difference in mobility between the two worker categories is undisputed despite the increased spread in the distribution. For East German subsamples, the reduction in accuracy is most evident for those with a university education. The difference between the two groups of workers is less clear. Because the accuracy of the calculations suffers considerably with decreasing sample size, I do not attempt to evaluate further disaggregation of the data. In addition, a cautionary note must be added for results from the smallest subsamples.

Some of the bootstrapping distributions are not normally distributed. Throughout the study, I test for normality using a joint test of kurtosis and skewness. Again, normality is more likely to be violated as the sample size decreases. This is clear from the illustrations of bootstrapping distributions above. While formal tests can not reject normality in any of the cases illustrated, the increase in irregularity of the distributions as sample size decreases is evident. Where the distribution is not normal the average of the bootstrapping distribution may differ significantly from the value obtained from the full sample. Non-normality suggests that calculations based on assumptions of normality, such as standard tests of equality of means, are not valid using the bootstrapping distributions. Thus, where normality is violated, the comparisons of the indices and probabilities across samples and categories are based on percentile-based confidence intervals.

2.6 Conclusion

I investigate worker mobility across employment states by ownership in two very different transition economies: Russia and East Germany. I use comparable data sources to evaluate determinants of yearly worker mobility by calculating both transition probabilities and mobility indices. The results show that the overall trends in worker mobility are different in Russia and in East Germany. In general, workers are less mobile across employment states by ownership in East Germany than in Russia and the time pattern of adjustment in mobility is different. In East Germany mobility decreases over time, while the opposite is true in Russia. The primary objective of this paper is to explore differences in worker mobility by worker characteristics and in particular, educational attainment as a measure of human capital. The results by educational categories show some similarities. However, while in Russia those with the highest education are clearly less mobile, there is less evidence of a clear differentiation in East Germany. In addition, the differences become more pronounced in Russia as transition proceeds. Finally, the mobility measures indicate that both Russia and East Germany experienced relatively high worker mobility across employment states compared to other transition economies.

This study is a preliminary exploration of the determinants of worker mobility in transition. The methods used in this study are purely descriptive and they do not allow controlling for other individual characteristics of workers. Thus, for reliable conclusions of the various directions of mobility a multivariate analysis is required. In addition, as discussed in the introduction, the direction of mobility matters more than mobility itself: mobility from unproductive to more productive jobs, or from state or public employment to the private sectors matters for success in transition.

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Table 1. The Russian educational system.

Institution and degree	Years of study	Typical age
Postgraduate (Doctorate)	+3	
Postgraduate (Candidate)	+3	22-28
University (Master)	+6	17-25
University (Bachelor)	+5	17-25
Specialist	+5	17-25
Secondary vocational school	12-13	15-17
Lower vocational school	12	15-17
General secondary school	11	15-17
Lower secondary school	9	10-14
Primary school	4	6/7-9
Kindergarten	-	3-5

Source: OECD (1996).

Table 2. The East German educational system.

Institution and degree	Years of study	Typical age
Postgraduate (Doctorate)	+3	
University (Diploma or Licence)	+5	19-
Extended polytechnical education	+3	16-19
Academic secondary school (*Abitur*)	+3	16-19
Vocational training	+2	16-18
General polytechnic school (of which):	10	6-16
Final stage	4	
Intermediate stage	3	
Primary stage	3	
Kindergarten	-	3-6

Source: Burant (1987).

Table 3. Mobility indices by education, Russia.

	1992 to 1993		1994 to 1995		1995 to 1996	
	Open	Closed	Open	Closed	Open	Closed
All employed	.450	.445	.527	.607	.472	.519
	(.010)	(.014)	(.011)	(.017)	(.011)	(.016)
Education categories:						
University	.437	.379	.495	.455	.402	.358
	(.028)	(.039)	(.028)	(.036)	(.030)	(.032)
Special secondary	.486	.487	.561	.625	.519	.558
	(.018)	(.025)	(.017)	(.029)	(.020)	(.025)[a]
General secondary	.442	.448	.515	.620	.490	.546
	(.018)	(.032)	(.022)	(.043)	(.021)	(.031)
Primary	.437	.428	.562	.750	.484	.601
	(.022)	(.035)	(.025)	(.050)	(.026)[a]	(.042)

Notes:

1. Author's calculations.

2. The closed transition probability matrix is calculated excluding moves to and from non-employment.

3. The mobility index used is: $MT = \frac{1}{J-1}(J - trace(P))$, where J is the dimension of the transition probability matrix P.

4. Bootstrapped standard errors in parenthesis, $K = 200$.

5. a indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 4. Mobility indices by gender and age, Russia.

	1992 to 1993		1994 to 1995		1995 to 1996	
	Open	Closed	Open	Closed	Open	Closed
Male	.450	.446	.564	.655	.499	.574
	(.014)	(.018)	(.014)	(.026)	(.016)	(.025)[a]
Female	.463	.465	.496	.559	.448	.471
	(.015)	(.027)	(.016)	(.027)	(.016)	(.022)
18-24	.464	.377	.595	.611	.521	.510
	(.029)	(.053)	(.033)	(.061)	(.032)	(.047)
25-34	.476	.452	.530	.534	.512	.542
	(.020)	(.027)	(.021)	(.035)	(.024)	(.034)
35-44	.453	.422	.560	.635	.449	.488
	(.020)	(.024)	(.023)	(.035)	(.022)	(.027)[a]
45-59	.446	.486	.470	.642	.442	.544
	(.020)[a]	(.030)	(.019)	(.034)	(.020)	(.031)

Notes:

1. Author's calculations.

2. The closed transition probability matrix is calculated excluding moves to and from non-employment.

3. The mobility index used is: $MT = \frac{1}{J-1}(J - trace(P))$, where J is the dimension of the transition probability matrix P.

4. Bootstrapped standard errors in parenthesis, $K = 200$.

5. a indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 5. Transition probability matrices, Russia.

Origin states	1992 to 1993			1994 to 1995		
	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
State	.727	.198	.076	.661	.257	.082
	(.007)	(.006)	(.004)	(.011)[a]	(.011)[a]	(.006)
Nonstate	.206	.684	.111	.280	.576	.144
	(.013)	(.015)	(.010)[a]	(.013)	(.013)[a]	(.010)
Nonemployment	.208	.102	.690	.149	.141	.710
	(.011)	(.007)	(.013)	(.010)	(.010)	(.012)

Table 5 (continued). Transition probability matrices, Russia.

Origin states	1995 to 1996		
	State	Nonstate	Nonempl.
State	.714	.205	.081
	(.011)	(.009)	(.007)
Nonstate	.261	.619	.120
	(.011)	(.013)	(.010)
Nonemployment	.126	.151	.722
	(.010)	(.012)	(.013)[a]

Note:

1. Author's calculations.

2. Bootstrapped standard errors in parenthesis, $K = 200$.

3. *a* indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 6. Transition probability matrices by education, Russia.

Origin states	1992 to 1993 State	1992 to 1993 Nonstate	1992 to 1993 Nonempl.	1994 to 1995 State	1994 to 1995 Nonstate	1994 to 1995 Nonempl.
University:						
State	.780 (.013)	.159 (.012)	.062 (.008)[a]	.737 (.018)	.205 (.017)	.058 (.012)
Nonstate	.200 (.034)	.753 (.037)	.047 (.018)[a]	.226 (.029)	.694 (.032)	.090 (.020)
Nonemployment	.274 (.037)	.134 (.029)	.592 (.041)	.261 (.038)	.159 (.029)	.580 (.040)[a]
Special secondary:						
State	.733 (.010)	.202 (.010)	.065 (.006)	.660 (.018)	.255 (.015)	.086 (.010)
Nonstate	.242 (.021)	.652 (.024)	.106 (.017)	.296 (.019)[a]	.558 (.020)[a]	.146 (.013)
Nonemployment	.227 (.020)	.131 (.015)[a]	.643 (.024)	.153 (.017)	.188 (.019)	.659 (.021)
General secondary:						
State	.714 (.014)	.211 (.013)	.075 (.008)	.627 (.023)[a]	.273 (.020)	.100 (.014)
Nonstate	.185 (.024)	.652 (.029)	.158 (.008)[a]	.270 (.025)	.583 (.028)	.147 (.020)
Nonemployment	.177 (.018)	.080 (.012)	.743 (.019)	.135 (.019)	.104 (.015)	.761 (.022)
Primary:						
State	.662 (.018)	.215 (.016)	.123 (.011)	.602 (.029)[a]	.316 (.027)	.082 (.017)
Nonstate	.163 (.026)	.727 (.032)	.110 (.022)	.324 (.033)	.476 (.034)	.200 (.031)[a]
Nonemployment	.191 (.022)	.072 (.016)	.737 (.025)	.095 (.020)	.107 (.019)	.798 (.026)[a]

Note:

1. Author's calculations.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. *a* indicates a bootstrapping distribution that is not normally distributed according to a oint test for kurtosis and skewness, at the 10% level or less.

Table 6 (continued). Transition probability matrices by education, Russia.

Origin states	1995 to 1996 State	Nonstate	Nonemployment
University:			
State	.854 (.015)[a]	.129 (.015)	.022 (.007)
Nonstate	.216 (.026)	.716 (.029)[a]	.069 (.017)
Nonemployment	.198 (.044)	.176 (.041)	.626 (.054)
Special secondary:			
State	.696 (.015)	.221 (.015)	.082 (.009)
Nonstate	.284 (.020)	.614 (.022)	.102 (.013)
Nonemployment	.150 (.019)	.199 (.022)	.651 (.026)
General secondary:			
State	.672 (.020)	.242 (.019)	.086 (.012)[a]
Nonstate	.238 (.023)	.609 (.025)	.153 (.018)
Nonemployment	.118 (.018)	.143 (.019)	.739 (.024)[a]
Primary:			
State	.638 (.029)	.215 (.024)	.147 (.021)
Nonstate	.294 (.031)	.548 (.034)	.157 (.025)
Nonemployment	.072 (.018)	.082 (.020)	.846 (.025)

Note:

1. Author's calculations.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. a indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 7. Mobility indices by education, East Germany.

	1990 to 1991		1992 to 1993		1994 to 1995		1996 to 1997	
	Open	Closed	Open	Closed	Open	Closed	Open	Closed
All employed	.421	.304	.368	.168	.322	.165	.304	.155
	(.016)	(.016)	(.012)[a]	(.014)	(.013)	(.016)	(.013)	(.016)[a]
Education categories:								
University	.545	.334	.469	.161	.422	.157	.324	.119
	(.072)	(.049)	(.047)[a]	(.040)	(.053)	(.034)[a]	(.056)	(.033)
Special secondary	.428	.261	.362	.139	.312	.155	.308	.163
	(.040)	(.029)	(.034)[a]	(.025)	(.029)	(.027)	(.029)[a]	(.029)
General secondary	.476	.379	.393	.190	.337	.188	.317	.149
	(.025)	(.029)	(.023)	(.026)[a]	(.021)	(.024)	(.020)	(.026)
Primary	.328	.264	.388	.207	.359	.157	.396	.262
	(.029)	(.034)	(.026)	(.038)	(.032)	(.040)	(.034)	(.058)
Apprenticeship	.422	.336	.378	.199	.335	.164	.326	.154
	(.022)	(.024)	(.018)	(.022)[a]	(.017)	(.021)	(.019)	(.021)
No apprenticeship	.418	.272	.364	.137	.308	.169	.279	.163
	(.024)	(.025)[a]	(.021)[a]	(.019)	(.020)	(.021)	(.019)	(.022)

Notes:

1. Author's calculations.
2. The closed transition probability matrix is calculated excluding moves to and from nonemployment.
3. The mobility index used is: $MT = \frac{1}{J-1}(J - trace(P))$, where J is the dimension of the transition probability matrix P.
4. Bootstrapped standard errors in parenthesis, $K = 200$.
5. a indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 8. Mobility indices by gender and age, East Germany.

	1990 to 1991		1992 to 1993		1994 to 1995		1996 to 1997	
	Open	Closed	Open	Closed	Open	Closed	Open	Closed
Male	.377	.369	.379	.187	.334	.199	.313	.158
	(.027)	(.026)	(.018)	(.022)	(.020)	(.026)[a]	(.022)[a]	(.027)[a]
Female	.454	.280	.375	.164	.330	.160	.305	.161
	(.022)	(.021)[a]	(.019)	(.020)[a]	(.019)	(.020)	(.020)	(.022)
18-24	.541	.403	.460	.200	.418	.268	.389	.286
	(.041)	(.053)	(.036)	(.051)[a]	(.041)[a]	(.056)	(.043)	(.070)
25-34	.488	.319	.430	.172	.346	.181	.334	.141
	(.030)	(.031)	(.025)[a]	(.026)	(.026)	(.032)	(.030)	(.032)[a]
35-44	.417	.346	.350	.168	.315	.119	.302	.141
	(.048)	(.033)	(.025)[a]	(.023)	(.023)	(.023)	(.028)	(.025)
45-59	.246	.206	.303	.156	.280	.173	.266	.141
	(.024)	(.026)	(.022)	(.026)	(.023)	(.029)	(.025)	(.026)[a]

Notes:

1. Author's calculations based on subsamples of the full sample.

2. The closed transition probability matrix is calculated excluding moves to and from non-employment, i.e. the index is based on a 2×2 matrix of state and nonstate employment.

3. The mobility index used is: $MT = \frac{1}{J-1}(J - trace(P))$, where J is the dimension of the transition probability matrix P. The index equals 0 when mobility is zero and 1 when mobility is perfect.

4. Bootstrapped standard errors in parenthesis, $K = 200$.

5. *a* indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 9. Transition probability matrices, East Germany.

Origin states	1990 to 1991			1992 to 1993		
	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
Public	.697	.202	.101	.782	.102	.117
	(.015)	(.013)	(.010)	(.015)	(.011)	(.011)
Private	.070	.810	.120	.046	.821	.123
	(.006)	(.009)	(.008)	(.006)	(.012)[a]	(.010)
Nonemployment	.171	.180	.651	.133	.206	.661
	(.023)	(.022)	(.027)	(.013)[a]	(.015)	(.018)[a]

Table 9 (continued). Transition probability matrices, East Germany.

Origin states	1994 to 1995			1996 to 1997		
	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
Public	.822	.123	.055	.822	.103	.075
	(.015)	(.013)	(.009)	(.017)	(.013)	(.012)
Private	.031	.868	.100	.038	.850	.112
	(.005)	(.009)[a]	(.008)	(.006)	(.010)	(.008)
Nonemployment	.105	.229	.666	.073	.206	.721
	(.013)	(.017)	(.019)	(.011)	(.017)	(.019)

Note:

1. Author's calculations based on the full sample.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. a indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 10. Transition probability matrices by education, East Germany.

	1990 to 1991			1992 to 1993		
Origin states	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
University:						
Public	.755 (.037)	.180 (.032)	.065 (.023)[a]	.858 (.032)	.055 (.020)[a]	.087 (.025)[a]
Private	.132 (.031)	.800 (.038)	.070 (.023)[a]	.092 (.031)	.816 (.041)	.092 (.030)
Nonemployment	.500 (.145)	.143 (.091)[a]	.357 (.141)	.290 (.081)	.323 (.082)	.387 (.081)
Special secondary:						
Public	.733 (.026)	.166 (.020)	.101 (.018)[a]	.816 (.025)	.090 (.019)	.094 (.018)[a]
Private	.070 (.013)	.852 (.019)	.078 (.014)	.037 (.011)[a]	.872 (.019)	.092 (.016)
Nonemployment	.220 (.057)	.220 (.055)	.560 (.071)	.206 (.046)	.206 (.044)	.588 (.058)
General secondary:						
Public	.641 (.028)	.266 (.027)	.093 (.016)[a]	.766 (.029)	.117 (.020)[a]	.117 (.022)
Private	.074 (.009)	.785 (.016)	.141 (.014)	.049 (.009)	.820 (.017)	.130 (.014)
Nonemployment	.169 (.032)	.209 (.036)	.622 (.042)	.111 (.018)	.260 (.026)	.629 (.029)
Primary:						
Public	.665 (.037)	.176 (.031)	.139 (.028)[a]	.684 (.038)	.137 (.029)[a]	.180 (.034)
Private	.051 (.011)[a]	.820 (.017)	.129 (.015)	.033 (.010)	.773 (.025)	.194 (.025)
Nonemployment	.072 (.031)[a]	.087 (.035)	.841 (.044)	.117 (.021)	.117 (.024)	.767 (.030)[a]

Note:

1. Author's calculations based on the full sample.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. *a* indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 10 (continued). Transition probability matrices by education, East Germany.

Origin states	1994 to 1995			1996 to 1997		
	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
University:						
State	.839 (.035)[a]	.119 (.030)	.042 (.017)[a]	.885 (.032)	.058 (.023)	.058 (.022)
Nonstate	.031 (.018)	.888 (.032)	.082 (.028)	.056 (.022)	.907 (.028)	.037 (.012)
Nonemployment	.143 (.082)	.429 (.109)	.429 (.100)[a]	.120 (.070)	.320 (.096)	.560 (.104)
Special secondary:						
State	.862 (.025)	.118 (.023)	.021 (.011)[a]	.882 (.026)	.089 (.024)	.030 (.012)
Nonstate	.032 (.010)[a]	.894 (.019)	.074 (.016)	.067 (.015)	.866 (.019)	.067 (.014)
Nonemployment	.107 (.031)	.272 (.044)	.621 (.048)	.141 (.036)	.224 (.039)	.635 (.050)
General secondary:						
State	.795 (.028)	.144 (.023)	.061 (.017)[a]	.807 (.026)	.112 (.022)	.081 (.019)
Nonstate	.032 (.008)	.890 (.013)	.078 (.011)[a]	.025 (.006)	.855 (.016)	.121 (.014)
Nonemployment	.124 (.020)	.235 (.024)	.641 (.027)	.046 (.012)	.249 (.024)	.705 (.026)
Primary:						
State	.753 (.048)	.106 (.034)	.141 (.038)	.627 (.059)	.179 (.049)	.194 (.043)
Nonstate	.028 (.010)[a]	.786 (.026)	.187 (.025)	.033 (.012)	.789 (.028)	.178 (.026)
Nonemployment	.076 (.016)	.180 (.027)	.744 (.030)	.079 (.019)	.129 (.023)	.792 (.026)

Note:

1. Author's calculations based on the full sample.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. *a* indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 11. Transition probability matrices by apprenticeship experience, East Germany.

	1990 to 1991			1992 to 1993		
Origin states	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
Apprenticeship:						
Public	.664	.235	.101	.741	.128	.131
	(.022)[a]	(.019)	(.014)	(..022)	(.018)	(.017)
Private	.065	.811	.124	.046	.827	.128
	(.008)	(.011)	(.009)	(.008)[a]	(.013)	(.011)
Nonemployment	.118	.201	.681	.112	.213	.675
	(.028)	(.035)	(.041)	(.017)	(.020)	(.024)
No apprenticeship:						
Public	.734	.164	.101	.825	.073	.102
	(.022)	(.019)	(.015)[a]	(.020)	(.012)	(.017)
Private	.079	.808	.112	.047	.813	.140
	(.012)	(.016)	(.012)	(.010)	(.017)	(.015)[a]
Nonemployment	.226	.153	.620	.171	.194	.635
	(.037)	(.030)	(.039)[a]	(.028)	(.026)[a]	(.034)

Note:

1. Author's calculations based on the full sample.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. a indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 11 (continued). Transition probability matrices by apprenticeship experience, East Germany.

	1994 to 1995			1996 to 1997		
Origin states	State	Nonstate	Nonempl.	State	Nonstate	Nonempl.
Apprenticeship:						
State	.801	.122	.077	.796	.112	.092
	(.021)	(.018)[a]	(.014)	(.024)	(.020)	(.017)
Nonstate	.028	.871	.101	.027	.845	.129
	(.006)	(.012)	(.011)	(.006)	(.013)	(.012)
Nonemployment	.106	.235	.658	.060	.232	.708
	(.015)	(.021)	(.024)	(.013)	(.022)	(.023)
No apprenticeship:						
State	.841	.124	.035	.846	.096	.059
	(.021)	(.020)	(.010)	(.023)	(.018)	(.016)
Nonstate	.036	.865	.099	.057	.858	.086
	(.009)	(.016)	(.014)	(.010)	(.016)	(.013)
Nonemployment	.103	.219	.678	.094	.167	.739
	(.019)	(.025)	(.028)	(.020)	(.028)	(.031)

Note:

1. Author's calculations based on the full sample.
2. Bootstrapped standard errors in parenthesis, $K = 200$.
3. *a* indicates a bootstrapping distribution that is not normally distributed according to a joint test for kurtosis and skewness, at the 10% level or less.

Table 12. International comparison of mobility across employment states by ownership.

	90-91	92-93	93-94	94-95	95-96	96-97
Open:						
Hungary					0.08	0.08
Poland		0.13	0.17	0.17	0.15	
Slovak Rep.				0.08	0.08	
East Germany	0.42	0.42		0.32		0.30
Russia		0.45		0.53	0.47	
Closed:						
Hungary					0.02	0.01
Poland		0.07	0.07	0.07	0.05	
Slovak Rep.				0.04	0.02	
East Germany	0.30	0.30		0.17		0.15
Russia		0.45		0.61	0.52	

Notes:

1. Author's calculations for Russia and East Germany, and Boeri and Flinn (1999) for other countries.

2. The mobility indices for countries other than Russia and East Germany are based on yearly averages of quarterly data.

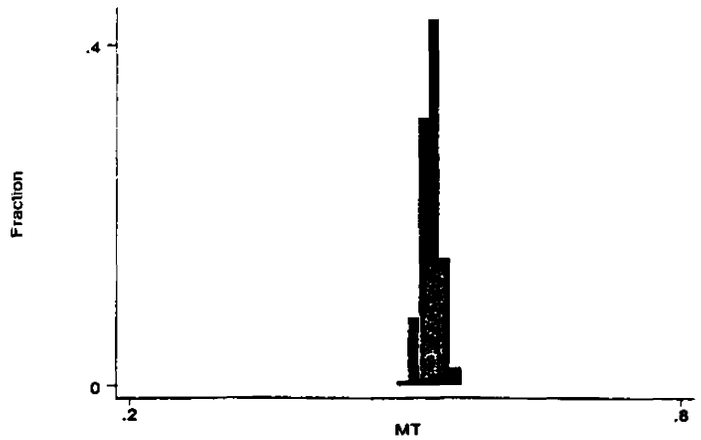

Figure 1. Bootstrapping distribution of the open mobility index in Russia, 1994 to 1995 ($N = 4,405$).

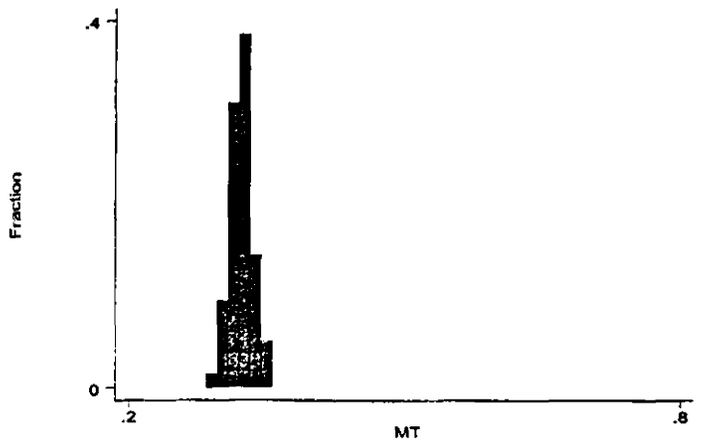

Figure 2. Bootstrapping distribution of the open mobility index for East Germany, 1994 to 1995 ($N = 2,383$).

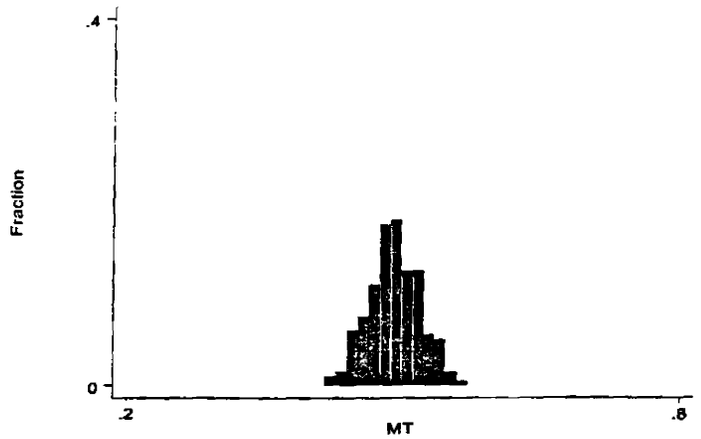

Figure 3. Bootstrapping distribution of the open mobility index for those with a university education in Russia, 1994 to 1995 ($N = 813$).

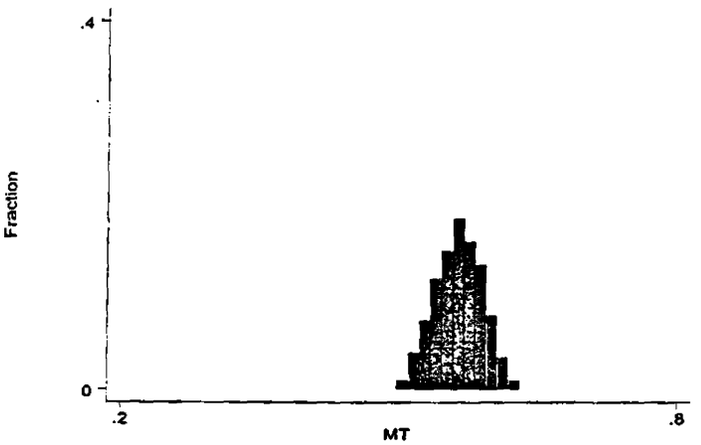

Figure 4. Bootstrapping distribution of the open mobility index for those with a primary only education in Russia, 1994 to 1995 ($N = 731$).

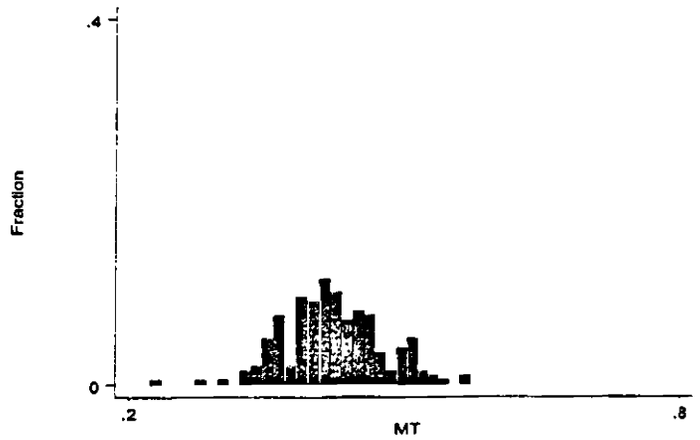

Figure 5. Bootstrapping distribution of the open mobility index for those with a university education in East Germany, 1994 to 1995 ($N = 237$).

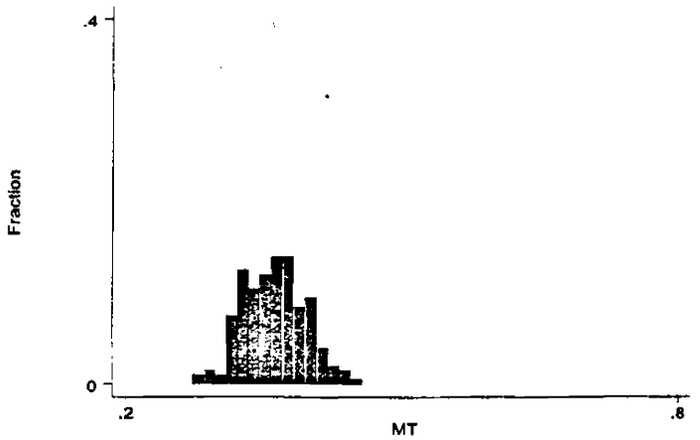

Figure 6. Bootstrapping distribution of the open mobility index for those with a primary education only in East Germany, 1994 to 1995 ($N = 548$).

Chapter 3: Leaving State Jobs in Russia

May 2002

Abstract

I analyze the reallocation of labor and human capital from the state sector to the nonstate sector and nonemployment in Russia. I use a nationally representative household data set, the Russian Longitudinal Monitoring Survey, to study sectoral mobility in two periods of transition using multivariate discrete choice models. The results show that sectoral mobility of different skill groups varies. Those with university education, with supervisory responsibility and in white-collar occupations are less likely to leave state jobs to both nonstate employment and nonemployment. The results suggest that there may be mismatch of skills across state/nonstate employment and that nonstate employment consists mostly of low skill, bad jobs.

3.1 Introduction

One of the decisive factors of success in transition from plan to market is the reallocation of labor and human capital from the state to the private sector. The reallocation of labor determines growth of the new private sector. The private sector requires workers and their skills – educated professionals, skilled machine-operators, as well as those with a knack for adapting to the new environment – in order to grow and be productive. The reallocation of labor also determines economic performance both during and after transition. During transition, the extent of unemployment and economic costs associated with it, such as lost income, deteriorating skills and under-use of human resources, depend on the nature of the reallocation process. In the long run, assuming that the private sector is more efficient in its use of resources, the growth potential of the economy is decided by the reallocation of human capital to the private sector. Further, any human capital inherited from the plan economy that is not useful in the new economic environment constitutes lost investment.

The Russian experience in reallocation of labor and human capital is mixed. The apparently positive features include fast privatization, high job turnover and low unemployment. First, as a result of the mass privatization program, the share of private employment and production increased rapidly. After only three years of transition in 1994, 50% of Russian GDP was produced by private firms. Second, job mobility as measured by job turnover has been relatively high in Russia during transition. Remarkably, up until 1996 nearly half of all jobs involved a hire or a separation within a year (Gimpelson and Lippoldt, 1997). Third, in contrast to other transition economies, the Russian unemployment rate remained below 10% during the early part of the transition. These features together with a downward adjustment of real wages, encouraged the

OECD to conclude that the flexible Russian labor market was "one of the most encouraging aspects of economic performance" in Russia (p.143, OECD, 1995). The negative features of labor reallocation in Russia include labor hoarding and poor output performance. Russian firms hoarded labor in masses. The extent of labor hoarding is evident from comparing output and employment growth figures between 1992 and 1995: while output fell by a total of 35.5 percent, employment declined by 10.5% only. Finally, a closer look at some of the apparently positive features suggests that labor market performance may have not been so encouraging after all. In particular, studies of labor mobility have found that job mobility is lower for those with more education and higher skills, suggesting that the reallocation of some types of human capital may have been slow (Gimpelson and Lippoldt, 1997, Grosfeldt *et al.*, 1999).

I evaluate a particular aspect of reallocation of labor and human capital in Russia: the role of skills and human capital in the decision to leave state jobs. The study contributes to existing knowledge of worker mobility in Russia in three directions. First, I evaluate labor mobility over employment states by ownership versus moves between employment and nonemployment per se. Foley (1997) and Lehmann and Wadsworth (2000) study worker mobility between employment and nonemployment with an emphasis on the determinants of leaving to new jobs. Consequently, their definition of mobility differs from the definition of mobility adopted in this study. In particular, I focus on the determinants of leaving jobs in the state sector to other employment states, i.e. nonstate employment and nonemployment, where changing jobs within the state sector is not considered as mobility. The focus on employment states by ownership and leaving the state sector underlines the importance of the direction of reallocation from the state to the private sector as progress in transition. Second, the emphasis on employment by ownership allows me to indirectly evaluate the nature of the private sector. In a recent study, Gimpelson

and Lippoldt (1999), evaluate private sector employment directly using various data sources. As all studies of the private sector in Russia, their study suffers from the difficulty of consistently measuring private employment. Third, the approach to study mobility allows me to compare the determinants of leaving state jobs in three different time periods of Russian transition. While Sabirianova (2000) notes that most occupational change in Russia occurred between 1991 and 1994, all existing studies of worker mobility use data from 1994 onwards only. In contrast, because of the emphasis on employment states by ownership, I can evaluate determinants of mobility in the early transition and compare them to those later in transition.[5]

I use a household data set, the Russian Longitudinal Monitoring Survey (RLMS) to study mobility between employment states by ownership. Three features of the RLMS data are particularly valuable for the study: first, the data is nationally representative of the Russian population; second, the panel structure of the data enables me to compare labor mobility over time; and third, the data allows for a consistent definition of firm ownership to state and nonstate. I estimate discrete choice models to evaluate the characteristics of those that leave state jobs within a year. The results show those with higher education, supervisory responsibility or in white-collar occupations are less likely to leave state jobs. The negative education effect is strongest for those with a university education. The determinants of mobility change over time. In addition, a large part of the negative effect is driven by the structure of privatization that is biased towards blue-collar employment.

The rest of the paper is organized as follows. In section 3.2, I review existing literature on

[5]In the RLMS data prior to the 1995 wave it is not possible to fully identify a job move without using available characteristics of the job as a guide. In my study, I use information about ownership of the firm to identify mobility across sectors.

labor mobility and skills, and composition of the private sector in Russia. In section 3.3, I present the RLMS data and the samples used in the analysis, as well as definitions of employment states and skill proxies. In section 3.4, I present the results of the study in three subsections: sample characteristics, leaving state jobs using a logit model, and leaving state jobs to nonstate employment or nonemployment using a multinomial logit model. In section 3.5, I discuss alternative interpretations of the results. Finally, I summarize the study in section 6.

3.2 Literature

The studies of job mobility in Russia are limited by available data sources. As a result, most early studies adopted a case study approach or use fragmented sources of aggregate and cross-sectional data to evaluate mobility. These early studies point to a puzzling coexistence of relatively high labor turnover and continued labor hoarding in Russia. Several studies have confirmed that high turnover is an important feature of the Russian labor market. Using official aggregate statistics, Gimpelson and Lippoldt report that labor turnover was between 46 to 50% before 1996, slowing down to approximately 42 thereafter. Comparable figures from other transition economies point to much smaller turnover, between 32 to 42% (Gimpelson and Lippoldt, 1997).[6] However, based on aggregate data, labor hoarding was also common. Between 1992 and 1995, the time period of this study, output fell by a total of 35.5 percent while employment declined by 10.5%. The difference between declines in output and employment suggests that a large employment overhang persisted during the transition. Various explanations for this extensive labor hoarding have been suggested in the literature. These explanations include the structure

[6]Gimpelson and Lippoldt stress that the official statistics are likely to understate the extent of labor turnover in Russia, mainly because of the exclusion of small enterprises (Gimpelson and Lippoldt, 1997).

of decision making within firms, technological constraints, various institutional factors of the labor market and socio-cultural factors (for a discussion, see Commander *et al.* articles in World Bank, 1995, Metalina, 1996 and Standing, 1996).

The coexistence of high labor turnover and labor hoarding suggests that labor turnover varies for groups of workers with different characteristics. Two studies have explicitly looked at the extent of differentiation. Gimpelson and Lippoldt were the first to point out the segmentation of the Russian labor market by turnover (Gimpelson and Lippoldt, 1997). First, they cite case study evidence that in the Russian industry most hires are either workers with specific high skills or those with poor skills, and particularly young workers. The case studies also suggest that low skill workers are more likely to separate than high skill workers. This evidence is supported by official aggregate data that confirms that those in blue-collar occupations and the young are more likely to be hired and to separate. Gimpelson and Lippoldt also look at the covariates of job tenure in the 1995 round of the RLMS. They find that those with short tenure are more likely to be young, less educated and to work in small, private firms. In total, the evidence provided by Gimpelson and Lippoldt points towards a large degree of segmentation in terms of skills and labor mobility (Gimpelson and Lippoldt, 1997). In a recent study Grosfeldt *et al.* (1999) look for evidence of segmentation using a panel of enterprise data. Their results confirm segmentation by skill. They find out that employment of blue-collar workers, as opposed to white-collar workers, is more responsive to idiosyncratic shocks to firm output. In their analysis, they are able to control for various firm characteristics and for unobserved heterogeneity across firms (Grosfeldt *et al.*, 1999).

Additional evidence of the labor reallocation process is provided by studies that use the RLMS to describe worker mobility between employment and nonemployment. Note that the definition

of mobility adopted in these studies differs significantly from the one used in this Chapter. Foley (1997) examines transitions of workers between employment states. His results confirm high labor mobility in Russia and point to various individual characteristics as determinants of transitions between employment states. He estimates multinomial logit models to study the determinants of transitions between old employment, new employment, unemployment and out of the labor force.[7] The explanatory variables that explain transitions from employment to nonemployment are sex, age, education and sectors by ownership. In particular, he finds that university education reduces the probability of moving to unemployment or out of the labor force. However, he does not find any effect of education in moving to new jobs. Also, working in a state firm reduces the probability of moving to unemployment or out of the labor force, and to new jobs. In contrast, working in a private firm increases the probability of moving to both states. In summary, the results point to the importance of both sectors by ownership and skills as determinants of employment transitions (Foley, 1997). Lehmann and Wadsworth (2000) study the role of tenure as a measure of job specific skill in determining worker mobility in Russia. Using a short panel of the RLMS, from 1994 to 1996, and simple probit models of leaving jobs, they find that those with less tenure are more likely to leave. For all jobs, they also find some evidence that those with more education are less likely to leave, however, once they separate state and private jobs they find that education has no effect on the probability to leave. In a previous version of the paper, Lehmann and Wadsworth, also use multinomial logit models to study mobility and find only a weak negative effect of education on moves from state jobs to nonemployment. However, the focus on tenure greatly reduces the available number of observations that are available in the

[7]Foley (1997) uses data from both the first and the second phase of the RLMS. Unfortunately the data in the first phase does not allow for a correct classification of moves to new employment.

study and may reduce the reliability of the results.

Finally, a recent study by Gimpelson and Lippoldt provides evidence about the composition of the private sector (Gimpelson and Lippoldt, 1999). They use official aggregate statistics, as well as microdata, to evaluate the size and composition of private employment. They find conflicting results on the composition of private employment depending on the data source. The robust results include the observations that those in private sector employment are younger and relatively more likely to be in blue-collar occupations. In addition, the data suggests a differentiation within the private sector across education: the private sector includes both those with high education and those with low education, while those with intermediate degrees are more likely to be in the state sector. In general the results point to large variation across regions, firm size and sectors. Gimpelson and Lippoldt conclude that the private sector is characterized by greater labor turnover, younger and probably more adaptable workers.

3.3 Data, definitions and methods

I use data from the RLMS to evaluate determinants of worker mobility between employment states by ownership. Appendix A. includes details of the original dataset, construction of the sample and definitions used. I use the restricted sample of those in state employment in the base year of each panel. Three measures of skills are available: education, supervisory responsibility and occupation. Unfortunately, only education and supervisory responsibility are available in all panels. Education is assumed to measure general human capital. Some education categories, special secondary education in particular, also reflect more specific training that may be firm or sector specific. Contrary to education categories, supervisory responsibility is assumed to proxy

higher job-specific skills and attachment to the job. The third skill proxy, white-collar occupation is a more standard measure of skills. Hourly wage is an additional measure of both productivity and the quality of the job match. Note that the hourly wage is potentially measured with error. This is particularly true in the presence of wage arrears, common in Russia during that later part of transition. Because of the growing importance of wage arrears and unpaid leave during the sample period, those who report either missing or zero wages and hours are not excluded from the final samples. Instead a dummy control variable for missing or zero values for wage and hours is included in all models. However, the results are not altered by the choice of the wage variable. In particular, the effects of skill proxies are not changed if monthly wage is used instead of the hourly wage or no wage variable is included.

The employment state by ownership is constructed using information on the main occupation of the respondent and ownership status of the enterprise. There are some difficulties in using the employment state by ownership in this context. First, it is possible that firms in the two sectors, state and nonstate, do not behave differently. Most theoretical models of transition assume that the two sectors are fundamentally different (for example, Aghion and Blanchard, 1994). However, it is well understood in the transition literature that privatization does not necessarily lead to changes in the core strategies of the firm (see Blanchard, 1997). Unfortunately it is not possible to identify restructuring using household data. Thus, the distinction used here is then taken as a proxy for potential restructuring. Second, some changes from state to nonstate employment are name-plate changes that have no real effect on the strategy of the firm or the position of the employees. Various studies have suggested that privatized and new private firms behave very differently when it comes to employment decisions. For example, Gimpelson and Lippoldt (1999) point out that in many cases mixed ownership firms (a common result of partial privatization)

have turned out to have poorer economic performance as well as a less dynamic employment policy than fully private firms. Clearly, the extent to which the classification matters for the results depends on the time period. The proportion of privatized jobs is low at the early part of transition, whereas it increases after 1994. I evaluate the importance of privatized jobs in the last two panels by separating those individuals who made a real job move to the nonstate sector from those whose firm was simply privatized. Unfortunately no information on the latest job move is available in the first panel.

All models include a set of control variables: age, age squared, female dummy engaged in individual economic activity dummy, has an additional job dummy and seven region dummies. Unfortunately, information on industry is not available in the public use version of the RLMS data. All individual characteristics of the individuals are measured in the base year, i.e. in 1992, 1994 and 1995. The only information from the following year is the destination employment state by ownership. I use various discrete choice models to estimate the probability to leave state employment. The methods are described in Appendix B.

3.4 Results

3.4.1 Composition of state employment

There is some change in the composition of state employment over time. The characteristics of those in state employment 1992, 1994 and 1995 are shown in Table 1. Compared to those in state employment in 1992, the state employed in the last two panels are younger, more likely to have university education, to engage in individual economic activity and not to be paid at

all.[8] In addition there are changes in the regional composition of the state employed between the first and the last two panels. The increase of those with wage arrears is remarkable but not surprising given previous evidence about the general increase in arrears around 1994. The increase in individual economic activity reflects an alternative survival mechanism that has been typical for Russia. In addition, compared to the state employed in 1992 and 1994, those in state employment in 1995 are more likely to be female. Finally, compared to state employed in 1994 those in state employment are more likely to be in a white-collar occupation. An increasing share of the state employed leave to nonstate employment or nonemployment within a year as shown in Table 2. In particular, the share of those leaving state jobs to nonstate employment increases over time. This may partly reflect an increase in privatization activity in the second period. However, relative to those that stay the share of those who leave state jobs within a year is small.

3.4.2 Logit results of leaving state jobs

The main part of the analysis consists of estimating discrete choice models of leaving state jobs. I first investigate the determinants of leaving state jobs to other employment states using the logit model. The results of leaving state jobs for the first period are shown in Table 3.[9] The

[8] In all cases, changes in the composition of those in state employment over time are confirmed by two-sample tests at the 10 per cent level or less.

[9] The skill measures are estimated separately for two reasons. First, the focus is on general human capital, and in particular the effect of education on the probability to leave state jobs. This effect can be direct or also reflected in the occupational choice. Second, an additional caveat for the multivariate analysis is high correlation between skill variables, which results in less accurate estimation of the model coefficients. Indeed, the level of pairwise correlation is relatively high for variables that measure skill. Somewhat surprisingly, the high correlation

results strongly support the hypothesis that those with poorest skills are more likely to leave state employment in the early part of the transition. In particular, those with a university or special secondary education are less likely to leave state employment. The negative education effect coincides roughly with the negative effect of supervisory responsibility. Having supervisory responsibility reduces the probability of leaving state employment by 14%, slightly less than higher education. Finally, hourly wage has negative but insignificant effect in all models.[10] Comparable logit results for the second period are shown in Table 4. They confirm the negative effect of skill proxies on the probability to leave state jobs with some important changes. The effect of education is restricted to those with a university education only. However, the remaining negative effect is large and having university education reduces the probability of leaving state employment by 30%. Although negative, the effect of supervisory responsibility is insignificant. The same is true for the hourly wage. The weaker effect of wages reflects measurement problem and the increasing importance of abnormal working conditions and payments. Indeed, those that have a missing wage in the previous month are more likely to leave. Finally, having a white collar occupation turns out to have a strong negative effect on the probability to leave state em-

does not extend to the hourly wage. As a result, I estimate skill variables in separate models, controlling for the hourly wage. As a robustness check, models with both skill measures included at the same time where also estimated. In some cases, if both education and occupation measures are included at the same time, the results of individual skill measures are not significant.

[10]In order to evaluate the robustness of the results concerning hourly wage I have estimated all models in the study also with and without the hourly wage, and with monthly wage instead of the hourly wage. The results for the skill proxies remain the same throughout the study. While, the increase in nonpayment of wages and non-normal working hours is likely to increase mismeasurement in the hourly wage measure using a monthly wage measure instead does not change the results of the study.

ployment that is similar to the size of the effect of university education. This is consistent with results by Grosfeldt *et al.* (1999) from enterprise data, who find that white collar employment is less responsive to idiosyncratic shocks to firm's output. Finally, the results for the last period show that the negative effect of education is stronger in the later part of transition. The results are shown in Table 5. All skill variables have a strong negative effect on leaving state jobs. For example, having university education results in a 50% decrease in the probability to leave state jobs. Both supervisory responsibility and white collar occupation have similar strong negative effects. Finally, based on the logit results the determinants of leaving state jobs change during transition. In particular, university education has a stronger negative effect on the probability to leave state jobs in the last panel. Similarly, other skill proxies become more important determinants of leaving state jobs as transition proceeds.[11]

In addition to skill proxies, various control variables have a significant effect on the probability to leave state employment (not shown). In all panels age has a negative, quadratic effect with a turning point at around 40 years of age. This implies that among the working age population the young and those close to retirement age are more likely to leave state employment. Being female reduces the probability of leaving state employment in all panels. However, the negative effect is smaller when occupation is controlled for, suggesting that the negative effect for females

[11] Again the change over time is confirmed by testing. To formally evaluate the differences over time, I perform a pooled data tests of stability of the results. I pool data from the three periods pairwise and estimate the logit models above including a time dummy and interactions of all variables with the dummy. The interactions of the first and second period dummies with university and white collar occupation dummies are signiificant in respective models, showing that the differences over time are valid. However, there are enough differences in the results to consider the models unstable over time. This result is confirmed by likelihood ratio tests that clearly reject stationarity.

may reflect the overall change in the occupational structure. Regional patterns are important in the first period and living in Moscow/St. Petersburg regions reduce the probability to leave state employment. The effect of regions more or less disappears in the last two panels. Over time, the emphasis shifts from regional differences to differences in non-normal compensation and outside activity. Those engaged in individual economic activity, those that do not receive a wage or report working zero hours are more likely to leave. Having an additional job, however, does not have a significant effect on the probability to leave. Finally, among additional controls, occupation dummies are significant determinants of leaving state jobs. In fact, in the last panel controlling for occupation greatly reduces the negative effect for those with a university education and supervisory responsibility. Somewhat surprisingly, firm size dummies do not have a significant effect.

3.4.3 Multinomial logit results of leaving state jobs

The characteristics of those leaving state jobs to private employment are likely to be very different from those leaving to nonemployment. The logit model does not capture this difference. Thus, I continue the analysis by estimating multinomial logit models with three destination states: state employment, nonstate employment and nonemployment, using the same model specifications as above. The results for the first panel are presented in Table 6. The results confirm that higher education and supervisory responsibility have a negative effect on the probability to leave state employment irrespective of the destination state. Education continues to have a unified negative effect on the probability to leave for those that leave to nonemployment. The education effects are very large, they vary from a decrease in probability of 35% for those with a general secondary education to 45% for those with a special secondary education. In contrast, the effect of education

is restricted to university education for those that leave to nonstate employment.[12] In contrast, the negative coefficients of supervisory responsibility are not significantly different from each other. Finally, hourly wage, although statistically insignificant, seems to have a more negative effect on transitions to nonstate employment rather than on transitions to nonemployment.

The effects of skill proxies are more limited in the second panel. The results are presented in Table 7. Higher education continues to have a negative effect on transitions to nonstate employment. Having university education reduces the probability of leaving to nonstate employment by 35% (compared to 15% in the first period). In contrast to the results of the first period, education does not seem to matter at all for transitions to nonemployment. Supervisory responsibility has a weak negative effect for transition to nonemployment, but has no effect on transition to nonstate employment. Instead those with white-collar occupation are unlikely to leave state jobs to nonstate employment. The effect is relatively large, a reduction of 34% in the probability to leave state employment to the nonstate employment. The effect is different from that of white-collar occupation on transition to nonemployment. Contrary to the previous results, but consistent with logit results for the second period hourly wage is never significant.

The strong negative effect of leaving state jobs found in the logit results for the last period extends to the results from the multinomial logit model. The results for the last period are shown in Table 8. The negative effect of university education remains strong for transitions to nonstate employment. The negative coefficient is statistically different from coefficients of

[12]Throughout the analysis, I test for the differences between coefficients of education categories within and across multinomial logit equations using the pairwise Wald test for equality. In this case, all three education effects are statistically different across nonstate and nonemployment equations. In all cases, statistical significance is measured at the 10 per cent level or less.

other education categories, as well as across equations. In contrast to results in the second panel supervisory responsibility has a negative effect on the probability to leave state jobs to both nonstate employment and nonemployment. White-collar skills reduce the probability to leave to nonstate employment by more than 45% and to nonemployment by more than 60%. For all skill proxies, the probability to leave to nonemployment is reduced considerably by higher skills. Again the results change over time. There is no statistically significant difference between coefficients in the first two panels. However, comparing the results from the first two panels to those from the last panel show a change towards a stronger negative effect of university education on the probability to leave to nonemployment. Also, the negative effect of a white collar occupation is stronger in the last panel.[13]

Consistent with logit results, control variables that are important determinants of leaving state jobs include age, sex, regions, non-normal compensation and outside activity (not shown). The strong age effect in the logit results remains valid for those leaving to nonemployment only. There is no evidence that those leaving to nonstate employment are more likely to be young and adaptable. Instead the young are more likely to experience nonemployment. In contrast, being female reduces the probability of transition to nonstate employment only. Again however, controlling for occupation influences the female coefficient. Regions matter during the first period and to transitions to nonstate employment only. As expected, failing to report positive working hours and, consistent with the increasing trend of arrears, not being paid in the previous month increase the probability of moving to nonemployment. In addition, being engaged in individual economic activity has a positive effect on the probability to move to nonstate employment.

[13]Again, I use the pooled regression test to formally evaluate the differences. Likelihood ratio tests reject stability of the results over time, suggesting that the pooled results themselves are not valid.

Having an additional job does not have any effect on the probability to leave. In all, engaging in outside activity does not seem to reduce the probability to leave state jobs. Finally, controlling for occupation reduces the significance of education in the nonstate equation. Both occupation and firm size dummies are important in the nonemployment equation.

As discussed above, the transitions to nonstate employment consist of both privatizations and true job moves from state to nonstate employment. It is thus possible that the results are driven entirely by the structure of privatization. Unfortunately it is not possible to control for privatization in the first panel. However, during the first panel privatization was at an early stage and the results are unlikely to have been greatly influenced by the privatization process. In contrast, the mass privatization program resulted in a rapid privatization after 1993. Indeed, in the second panel a majority of transitions to nonstate employment are privatizations that do not involve a job change. In order to evaluate the importance of privatization, I re-estimate the multinomial logit models using a separate state for privatized firms. The results are presented in Tables 9 and 10. The results show that the skill effect is partly due to the structure of privatization. In the second panel those with a university or special secondary education are less likely to work in firms that are privatized. The changes in probability are relatively large and significant. These results are confirmed by the large marginal effect of white-collar occupation for those in privatized firms. White-collar occupation reduces the probability of being in a firm that was privatized by 40%. In contrast to the results in the second panel, the negative effect of higher skill re-emerges for all destination states in the third panel. University education, supervisory responsibility and white collar occupation, all have a negative effect on the probability to leave state jobs to any other employment state. The negative effect of skills on the probability to be in a privatized job ranges from 10% for university education to 45% for those with white

collar skills. In summary, the results suggest that those with higher education or in white-collar occupations are more likely to stay in state firms partly because their firm is less likely to be privatized. Assuming that privatization results in restructuring, the weight on those with lower skills among the privatized movers suggests that the structure of the privatization process has contributed to the instability of low skill employment. However, for those that are making a real job move from state to nonstate jobs, university education reduces the probability of leaving state jobs by 38% in the second panel and 25% in the third panel. This confirms that while the effect of privatization appears to dominate the results, university education and other skills matter for job moves as well. As expected the change over time in the coefficients is confirmed for the university educated leaving to nonemployment and those with white-collar skills making a job move to the nonstate sector and leaving to nonemployment.

In addition to skill effects, various control variables have different effects on privatized and nonstate employment (not shown). As expected neither age nor sex matter for those in privatized firms. In addition, some regional differences persist in the structure of privatization. Those who make a real job move to nonstate employment are less likely to be female. This suggests that the negative female effect is driven by lack of mobility towards the nonstate sector rather than the structure of privatization or resistance to moves to nonemployment. After separating out those in privatized firms, a weak quadratic age effect re-emerges. These results suggest that in addition to those with higher skills, females and those in their middle age are less likely to make a true job move to the nonstate sector.

3.5 Discussion

The results presented in the previous section show that the reallocation of labor from state to private jobs in Russia varies for different human capital and skill groups. Together with those in white-collar occupations and those with supervisory responsibility, the highly educated are also less likely to leave state jobs. The results have direct implications for the growth of the private sector, economic performance and loss of human capital during transition. Their importance, however, depend on the interpretation of the results. The results are potentially consistent with several stories of the reallocation of labor. Four stories seem particularly relevant: attachment, bad jobs, skill mismatch and privatization.

3.5.1 Excess attachment

First, the results could be interpreted in terms of an attachment story. The attachment story is a favorite explanation of labor hoarding in general in Russia. In the context of this study, according to this interpretations workers with higher skills are for some reason more attached to state jobs than those with poorer skills. There are various potential reasons for attachment. One apparent reason is given by human capital theory that predicts that those with higher job-specific skills are less likely to separate in general. By definition such human capital is not transferable and is lost in the case of separation. Lehmann and Wadsworth (2000) find some evidence of the negative effect of job-specific capital on the probability of separation in Russia. They find that low tenure has a positive effect on the probability to leave from both state and private jobs to new jobs. However, the skill proxies used in this study are mostly measures of general rather than job-specific human capital. Further, job-specific human capital without some level of sector-

specificity does not explain the results across employment states by ownership. Second potential reason for attachment is a higher level of nonpecuniary benefits in the state firm for those with higher skills. A significant share of Russian state firms provided social benefits such as housing, medical and childcare to their workers, while most private firms were unable to provide similar benefits. It has been argued that provision of social benefits has been used as a method to increase attachment and there is evidence that they are provided mostly to those at the top of the wage distribution (Kolev, 1998). Thus, social benefits may have contributed to attachment. However, their importance is clearly decreasing as transition proceeds (see Commander and Schankerman, 1997). Finally, higher attachment to state firms could be explained by socio-cultural factors. Those with higher skills may be more likely to have socio-cultural reasons for higher attachment to the state job. These include ideology, socialist work ethic and job status.

3.5.2 Bad jobs

Second, the results are potentially consistent with a bad jobs story. The bad jobs story implies that available nonstate sector jobs are predominantly low skill jobs and, as a result, there is a lack of demand for skilled labor in the nonstate sector. Indeed, because of overinvestment in heavy manufacturing during the socialist era, the transition to market involved a sectoral shift from manufacturing to services. Thus, the nonstate jobs are proportionally more likely to be in service and craft occupations that are typical low-skill occupations. In addition, the prevalence of short time horizons is likely to result in small private R&D investment during transition, thus exacerbating the lack of demand for highly educated workers. However, the classification to good and bad jobs is not self-evident. Indeed, some new services such financial services, require relatively high skills. Unfortunately, there is little evidence about the quality of jobs across the

two sectors. Two additional pieces of evidence based on wage evidence suggest that although nonstate jobs are predominantly low skill jobs they are not necessarily "bad" jobs. First, based on a ranking of occupations by earnings, monthly or hourly wages, the nonstate jobs are not only in the lower ranks. On the contrary, there are proportionally more senior managers, the highest earnings category, and less those in elementary occupations, the lowest earnings category, in the nonstate sector than in the state sector. Second, the earnings of those with higher education are relatively higher in the nonstate sector than in the state sector (Brainerd, 1998).

3.5.3 Skill mismatch across sectors

The third potential interpretation, skill mismatch, is closely linked to previous interpretations. However, instead of lack of supply or demand, the skill mismatch story implies a fundamental incompatibility of skills that exist in state jobs and skills that are demanded in nonstate jobs. In terms of human capital theory the mismatch story is an extension of specificity to sector-specific skills. It has been argued that narrow skills learned in the old educational system, in particular in vocational education, are poorly transferable to the new private environment (Boeri *et al.* 1998). In addition, the incompatibility of skills is likely to be a more serious impediment of mobility for high skill groups. An obvious example of such skill mismatch are market skills, such as modern management techniques. Indeed, skill mismatch in this category of workers was recognized early and training programs were designed to specifically target those with potential to fill the gap for management skills (OECD, 1995). Unfortunately, it is not possible to directly measure the extent of skill mismatch. However, the mismatch story seems to be roughly consistent with the wage evidence presented above.

3.5.4 Blue collar bias in privatization

Finally, the results show that there is a blue-collar bias in the structure of privatization. Firms with a high share of blue-collar jobs are more likely to be privatized. Explaining this bias would require a study of corporate governance issues that are beyond the scope of this study. However, the bias towards firms with blue-collar jobs in privatization could be partly explained by the industry structure of state jobs. The state sector includes education, health care and government administration sectors, which are likely to have a higher proportion of well-educated workers. In effect these sectors represent the portion of employment that is likely to remain state owned. However, the skill bias may also be a result of selective privatizations of production sectors with high skilled labor. Examples would include strategic energy industries, and industries that continue to supply the military.

3.5.5 Conclusion

The relative importance of each of these interpretations is unclear. However, it is clear that the blue-collar bias in the structure of privatization constitutes a partial interpretation, particularly as transition proceeds. The remaining negative effect to be explained is concentrated to those with a university education. While the attachment story is important in general, it is less relevant for those with high levels of education. Thus, the remaining stories, bad jobs and skill mismatch, are the most likely explanations of the results.

In light of this interpretation the implications of the results seem particularly troubling. First, a direct implication is that the growth potential of the private sector is limited. It suggests that not enough emphasis has been put on policies that contribute to the quality of private

employment. In addition, depending on the extent of skill mismatch, it may take some time before appropriate market skills are available. Second, the predominance of low skill jobs in the private sector is bad news for economic performance. Assuming that the nonstate sector jobs are more productive and allocate skills more efficiently, slow reallocation of human capital will results in lower labor productivity and output during transition. Indeed, it is plausible that slow reallocation of human capital has already contributed to the poor output performance in Russia. In addition, to the extent that the private sector represents the future growth potential of the economy, the growth base of the Russian economy is limited by lack of appropriate human capital. Third consequence of the results is that an important resource, those with high general human capital, is not contributing to the transition. It also suggests that those with low skills end up shouldering most of short run microeconomic costs during transition. However, some of them are also more likely to reap the benefits of moving.

3.6 Summary

In this study, I have examined the determinants of leaving state jobs in Russia using representative household data, the RLMS. The results from various discrete choice models show that those with higher skills are less likely to leave state jobs. The negative effects are relatively large in some cases. In particular, having university education reduces the probability to leave state jobs to nonstate jobs by 15 to 40%. Further, the negative effects depend both on the destination state and the time period. During the first years of transition, those with higher education and supervisory responsibility are less likely to leave state jobs. Later, those with higher education or in white-collar occupations are less likely to leave state jobs and particularly less likely to leave to

nonstate employment. As transition proceeds, most of the negative effect seems to be driven by a blue-collar bias in the structure of privatization. The results have implications for the growth of the private sector, economic performance and loss of human capital during transition. Given an interpretation based on bad jobs in the private sector, and skill mismatch the results have troubling implications for the Russian economy.

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Table 1. Sample characteristics.

Variable	1992	1994	1995
University	.20	.22	.21
Special secondary	.41	.40	.39
General secondary	.24	.23	.25
Primary	.15	.15	.15
Supervisory responsibility	.24	.23	.23
White-collar occupation	-	.45	.46
Hourly wage (th R)	.02	1.34	3.38
	(.04)	(2.69)	(4.45)
Age	39.09	38.61	38.00
	(9.66)	(9.72)	(9.91)
Female	.52	.52	.54
Has an additional job	.04	.04	.04
Engaged in IEA	.02	.06	.13
No wage arrears	.91	.75	.67
Nonzero hours	.87	.90	.83
Regions:			
Moscow/St. Petersburg	.11	.07	.07
North/North East	.11	.08	.08
Central	.13	.17	.18
Volga	.11	.20	.20
North Caucasia	.17	.11	.12
Ural	.21	.16	.15
West Siberia	.05	.10	.10
East Siberia	.11	.10	.09

Notes:

1. Author's calculations.
2. Means, standard deviations in parenthesis.

Table 2. Sample transition probabilities.

Sample	Destination states			
	State	Nonstate	Nonemployment	All
1992 to 1993	.727	.198	.076	1.00
	3,224	877	335	4,436
1994 to 1995:	.661	.257	.082	1.00
	1,317	513	164	1,994
1995 to 1996	.714	.205	.080	1.00
	1,375	395	155	1,925

Notes:

1. Author's calculations.
2. Sample frequencies and number of observations.

Table 3. Leaving state jobs to other employment states, 1992 to 1993.

	(1)	(2)
University	**−0.078**	
	(−3.24)	
Special secondary	**−0.054**	
	(−2.65)	
General secondary	−0.028	
	(−1.28)	
Supervisory responsibility		**−0.042**
		(−2.62)
Hourly wage (th R)	**−0.476**	**−0.497**
	(−1.75)	**(−1.82)**
Summary statistics:		
N	4,436	4,436
Wald χ^2	228.83	220.34
(df)	(20)	(18)
Pseudo R^2	0.05	0.05

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.

4. All characteristics are measured in the base year, 1992.

Table 4. Leaving state jobs to other employment states, 1994 to 1995.

	(1)	(2)	(3)
University	**−0.117**		
	(−2.99)		
Special secondary	−0.039		
	(−1.12)		
General secondary	−0.012		
	(−0.33)		
Supervisory responsibility		−0.034	
		(−1.28)	
White-collar occupation			**−0.098**
			(−3.96)
Hourly wage (th R)	−0.000	−0.001	−0.001
	(−0.03)	(−0.31)	(−0.18)
Summary statistics:			
N	1,994	1,994	1,994
Wald χ^2	67.43	56.56	68.83
(df)	(20)	(18)	(18)
Pseudo R^2	0.03	0.02	0.03

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.

4. All characteristics are measured in the base year, 1994.

Table 5. Leaving state jobs to other employment states, 1995 to 1996.

	(1)	(2)	(3)
University	**−0.168**		
	(−4.99)		
Special secondary	−0.006		
	(−0.18)		
General secondary	−0.001		
	(0.04)		
Supervisory responsibility		**−0.079**	
		(−3.13)	
White-collar occupation			**−0.186**
			(−7.97)
Hourly wage (th R)	−0.003	−0.003	−0.003
	(−1.00)	(−1.17)	(−1.06)
Summary statistics:			
N	1,925	1,925	1,925
Wald χ^2	104.68	80.30	130.26
(df)	(18)	(16)	(16)
Pseudo R^2	0.05	0.04	0.06

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.

4. All characteristics are measured in the base year, 1995.

Table 6. Leaving state jobs to nonstate employment and nonemployment, 1992 to 1993.

	(1)		(2)	
	Nonstate	Nonempl.	Nonstate	Nonempl.
University	**−0.030**	**−0.034**		
	(−1.81)	**(−3.30)**		
Special secondary	−0.006	**−0.041**		
	(−0.78)	**(−3.97)**		
General secondary	0.006	**−0.028**		
	(0.03)	**(−2.54)**		
Supervisory responsibility			**−0.023**	**−0.018**
			(−1.98)	**(−2.13)**
Hourly wage (th R)	−0.232	−0.300	−0.228	−0.339
	(−1.51)	(−1.03)	(−1.54)	(−1.19)
Summary statistics:				
N	4,436		4,436	
Wald χ^2	391.97		376.45	
(df)	(40)		(36)	
Pseudo R^2	0.07		0.07	

Notes:

1. The results are marginal effects calculated from multinomial logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.

4. All characteristics are measured in the base year, 1992.

Table 7. Leaving state jobs to nonstate employment and nonemployment, 1994 to 1995.

	(1)		(2)		(3)	
	Nonstate	Nonempl.	Nonstate	Nonempl.	Nonstate	Nonempl.
University	**−0.099**	−0.008				
	(−3.11)	(−0.84)				
Special secondary	−0.049	0.012				
	(−1.49)	(0.38)				
General secondary	−0.038	0.029				
	(−0.95)	(1.18)				
Supervisory responsibility			−0.010	**−0.023**		
			(−0.68)	**(−1.69)**		
White-collar occupation					**−0.106**	0.007
					(−4.60)	(−0.24)
Hourly wage (th R)	0.001	−0.002	0.003	−0.016	0.001	−0.002
	(0.15)	(−0.65)	(−0.12)	(−0.74)	(0.08)	(−0.68)
Summary statistics:						
N	1,994		1,994		1,994	
Wald χ^2	121.94		106.39		123.85	
(df)	(40)		(36)		(36)	
Pseudo R^2	0.04		0.04		0.04	

Notes:

1. The results are marginal effects calculated from multinomial logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.

4. All characteristics are measured in the base year, 1994.

Table 8. Leaving state jobs to nonstate employment and nonemployment, 1995 to 1996.

	(1)		(2)		(3)	
	Nonstate	Nonempl.	Nonstate	Nonempl.	Nonstate	Nonempl.
University	**−0.071**	**−0.086**				
	(−2.97)	**(−4.66)**				
Special secondary	0.033	−0.033				
	(0.83)	(−1.52)				
General secondary	0.038	−0.031				
	(0.98)	(−1.26)				
Supervisory responsibility			**−0.042**	**−0.034**		
			(−2.21)	**(−2.82)**		
White-collar occupation					**−0.118**	**−0.061**
					(−6.35)	**(−5.88)**
Hourly wage (th R)	−0.001	−0.003	−0.001	−0.003	−0.001	−0.003
	(−0.81)	(−1.25)	(−0.88)	(−1.35)	(−0.78)	(−1.31)
Summary statistics:						
N	1,925		1,925		1,925	
Wald χ^2	196.87		161.24		205.10	
(df)	(36)		(32)		(32)	
Pseudo R^2	0.07		0.05		0.07	

Notes:

1. The results are marginal effects calculated from multinomial logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.

4. All characteristics are measured in the base year, 1995.

Table 9. Leaving state jobs to nonstate employment via privatization or job move, and nonemployment, 1994 to 1995.

	(1)			(2)			(3)		
	Privatized	Job move	Nonempl.	Privatized	Job move	Nonempl.	Privatized	Job move	Nonempl.
University	**−0.070**	**−0.027**	−0.008						
	(−2.74)	**(−1.96)**	(−0.83)						
Special secondary	**−0.063**	0.010	0.012						
	(−2.16)	(0.41)	(0.39)						
General secondary	−0.013	−0.024	0.029						
	(−0.43)	(−1.39)	(1.19)						
Supervisory resp.				0.004	−0.013	**−0.024**			
				(−0.17)	(−1.14)	**(−1.70)**			
White-collar occ.							**−0.096**	−0.007	0.007
							(−4.79)	(−1.22)	(−0.24)
Hourly wage (th R)	0.001	0.001	−0.002	−0.001	0.001	−0.003	0.001	0.001	−0.003
	(0.10)	(0.25)	(−0.65)	(−0.34)	(0.37)	(−0.74)	(−0.05)	(0.37)	(−0.78)
Summary statistics:									
N		1,994			1,994			1,994	
Wald χ^2		173.32			146.68			164.43	
(df)		(60)			(54)			(54)	
Pseudo R^2		0.05			0.04			0.05	

Notes:

1. Author's calculations.
2. The results are marginal effects calculated from multinomial logit coefficients. Robust t-statistics of coefficients in parenthesis.
3. The omitted education category is primary education.
4. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.
5. All characteristics are measured in the base year, 1994.

Table 10. Leaving state jobs to nonstate employment via privatization or job move and nonemployment, 1995 to 1996.

	(1)			(2)			(3)		
	Privatized	Job move	Nonempl.	Privatized	Job move	Nonempl.	Privatized	Job move	Nonempl.
University	**−0.042**	**−0.025**	**−0.087**						
	(−2.24)	**(−2.34)**	**(−4.66)**						
Special secondary	0.034	0.002	−0.034						
	(1.03)	(−0.12)	(−1.51)						
General secondary	0.054	−0.013	−0.032						
	(1.56)	(−1.01)	(−1.27)						
Supervisory resp.				**−0.026**	**−0.016**	**−0.035**			
				(−1.71)	**(−1.89)**	**(−2.82)**			
White-collar occ.							**−0.093**	**−0.022**	**−0.062**
							(−5.66)	**(−3.40)**	**(−5.88)**
Hourly wage (th R)	−0.001	−0.001	−0.003	−0.001	−0.000	−0.003	−0.001	−0.000	−0.003
	(−0.95)	(−0.07)	(−1.25)	(−1.04)	(−0.10)	(−1.35)	(−0.89)	(−0.13)	(−1.31)
Summary statistics:									
N		1,925			1,925			1,925	
Wald χ^2		249.32			214.17			254.27	
(df)		(54)			(48)			(48)	
Pseudo R^2		0.07			0.06			0.07	

Notes:

1. Author's calculations.
2. The results are marginal effects calculated from multinomial logit coefficients. Robust t-statistics of coefficients in parenthesis.
3. The omitted education category is primary education.
4. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job, nonmissing wage, nonzero hours, region (7) dummies and a constant.
5. All characteristics are measured in the base year, 1995.

Chapter 4: Leaving Public Employment in East Germany

May 2002

Abstract

In order to provide a comparison for the results in Russia, I analyze the reallocation of labor and human capital from public employment to private employment and nonemployment in East Germany. I use a nationally representative household data set, the GSOEP, to study determinants of sectoral mobility over time using multivariate discrete choice models. The results indicate that those in white-collar occupations are less likely to leave public employment to private employment or nonemployment and receiving a higher hourly wage reduces the probability to leave public employment. There is no evidence of a negative effect of higher education on the probability to leave public employment. The results reflect differences in labor market institutions between Russia and East Germany.

4.1 Introduction

The results in Chapter 3 indicate that workers with higher skills, as measured by educational attainment, supervisory responsibility and occupation, are less likely to leave state jobs in Russia. The result is driven by a blue collar bias in the structure of privatization and the poor quality of private sector jobs. This explanation allows for the possibility that the results are not restricted to Russia, but may reflect a more general transition experience. In order to evaluate this aspect and to provide comparative evidence of leaving public employment, I replicate the analysis in Chapter 3 using data from public sector workers in East Germany.

The East German experience provides a useful benchmark for the Russian results. In contrast to the experience in other transition economies East Germany enjoyed instant institution building and support from West Germany. West German labor market institutions that were applied in former East Germany include the labor law, social safety net and public service legislation. In addition, East German enterprises were privatized relatively quickly through sales of state firms via a holding company, the Treuhandanstald. As a result, while the instant adoption of western institutions and the fast privatization were not unproblematic, East German transition had a clear "jumpstart" (Sinn and Sinn, 1992). The jumpstart resulted in a steep but short transition slump, and supported by large-scale fiscal stimulus from West Germany, economic growth resumed already in 1992. However, despite the short transition slump unemployment increased rapidly in the East German *lander* and has persisted throughout the recovery.[14] The causes for the persistently high unemployment rate include high cost of labor, due to a high

[14] Extensive use of training programs and subsidized jobs reduced the official number of unemployed significantly (OECD, 1998). Including these aspects of hidden unemployment results in an unemployment rate of nearly 30 per cent in East German *lander* in 1997.

wage level relative to productivity and indirect wage costs, as well as labor and product market regulation (OECD, 1994). Meanwhile, the integration of the East German public sector has resulted in an increase in the share of public employment in Germany as a whole. The East German public sector was downsized relatively quickly, with an initial "purge" of administrators from the socialist era. During this process many public sector jobs, particularly in education, were filled with professionals from West Germany (Derlien, 1999).

There is relatively little evidence of worker mobility across employment states in East Germany. Instead, the emphasis has been on regional mobility and on workers that commute to West Germany. Various articles in Swarze *et al.* (1994) present early evidence of labor mobility in Eastern Germany. In particular, Parmetier and Tessaring (1994) present results of transition probabilities between employment states by individual characteristics, including educational attainment. They find that initially job losses were concentrated among unskilled workers and females, while males and those with a university education were less likely to experience job losses. In general, they find that those with a university education are less likely to leave employment to unemployment (Parmetier and Tessaring, 1994). In contrast, using data form the first two waves of the GSOEP and estimating multinomial logit models of probability of leaving employment, Licki and Stenier (1994) find no effect of education on the probability to leave employment to unemployment. Thus, existing evidence on the role of education in worker mobility is inconclusive.

In this paper, I evaluate the determinants of worker mobility across employment states by ownership in East Germany. The main purpose of the study is to provide a comparison of the results obtained for Russia. I use a representative household survey, the GSOEP, to evaluate worker mobility in East Germany. Various features of the GSOEP facilitate the analysis. First,

the structure of the original data allows a comparison of mobility over an extended period of East German transition. Second, in comparison to other transition economies, the GSOEP is a source of relatively reliable and well-administered longitudinal data. In particular, the data contains information on industries for the whole sample period. Finally, from the GSOEP it is possible to construct samples and variables that are comparable to those from the RLMS for Russia. Using samples from the GSOEP, I estimate discrete choice models to evaluate the characteristics of those that leave public employment within a year. The results indicate that workers in white-collar occupations are less likely to leave public employment to private employment or nonemployment and that a higher wage in the public job reduces the probability to leave. However, compared to the results for Russia, the negative skill effect on mobility in East Germany is less robust across specifications and over time. There is no evidence that education has a negative effect on the probability to leave.

The rest of the paper is organized as follows. In Section 4.2, I present the data, definitions and methods used. In Section 4.3, I present the results of the empirical analysis. I discuss these results in Section 4.4 with an emphasis on understanding the differences between worker mobility in Russia and East Germany. Finally, I summarize the study in Section 4.5.

4.2 Data, definitions and methods

I use data from the GSOEP to evaluate the role of skills in mobility of workers across employment states. Appendix A. includes details of the original dataset, construction of the sample and definitions used to build employment states, the skill proxies and control variables. In this analysis, I use the restricted sample of those in public employment in the base year of each

panel. The skill proxies that are available are comparable to those used for Russia, with the exception that information on supervisory responsibility is not available. In addition, I use information about completed apprenticeship to evaluate the importance of practical training. Thus, the skill proxies that I use include four education categories: university, special secondary, general secondary and primary education, as well as apprenticeship, white-collar occupation and the hourly wage. Because of the lack of measurement problems related to missing wages and hours, the hourly wage is a more reliable measure of productivity in East Germany than in Russia. As a result, I exclude those that report missing wages or hours from the sample. The results are not altered by this choice.

The employment state by ownership in East Germany refers to public employment, not the ownership of the enterprise. As a result, the definition is not directly comparable to the definition for Russia (see Chapter 2 for a discussion). All multivariate models include a set of control variables: age, age squared, female dummy, engaged in individual economic activity dummy, has an additional job dummy and five regional dummies. As an additional check of robustness, I estimate all models including two firm size dummies and eight industry dummies. All individual and firm characteristics are measured in the base year, i.e. in 1990, 1992, 1994 and 1996. The only information from the following year is the destination state by ownership. In the analysis, I use various discrete choice models to estimate the probability to leave public employment. The methods are described in Appendix B.

4.3 Results

4.3.1 Composition of public employment

The composition of those in public employment in East Germany changes over time. The characteristics of those in public employment in the samples from 1990 to 1996 are shown in Table 1. In terms of skill categories the changes in composition seem somewhat contradictory. In particular, while the share of those with a university education increases, the share of those in white-collar occupations and with apprenticeships decreases. In terms of the gender breakdown, the share of females public employment increases. The sample characteristics by industry reveal the structure of public employment in East Germany. It is noticeable that there are almost no public workers in production sectors such as mining, manufacturing and construction and that the majority of public workers are in services with a significant share of workers in transportation. Over time there is a clear decline in the share of workers in transportation and an increase in workers in services. Additional employment and engaging in individual economic activity are a temporary phenomena that appear only directly following unification. This results reflects the relative stability of employment and earnings in East Germany compared to Russia.[15] The increase in stability of public employment is also evident when looking at the share of stayers and movers in public employment as shown in Table 2. A relatively large number of workers leave public employment to private employment in the first years of transition. However, after the initial large outflow, the share of those that leave to both private employment and nonemployment decreases.

[15]In all cases changes in the composition of those in public employment over time are confirmed by two-sample tests at the 10% level or less.

4.3.2 Logit results of leaving public employment

The main part of the study consists of multivariate analysis of the determinants of leaving public employment. Following the structure of the analysis for Russia, I begin with an analysis of leaving public employment using the logit model. The logit results for leaving public employment to other employment states are shown in Table 3. Overall, skill measures, such as education, seem to have no impact on the probability to leave public employment at the beginning of transition. For those in white-collar occupations a negative effect emerges in the last three periods. The size of the negative marginal effect for those with white-collar skills is between 15-40%. Consistent with previous results, an apprenticeship does not seem to have a significant effect on the probability to leave. Finally, any education above primary education seems to have a negative effect on leaving public employment in the last period reducing the probability to leave by as much as 40-50%.[16] Compared to other skill measures, the negative effect of the hourly wage is strong in all specifications and through the whole transition period. This would seem to suggest that productivity or the quality of the worker-job match matter more than formal skill measures for the probability to leave public employment in East Germany. Another possible explanation for the result is that workers in public jobs search for private opportunities while on the job and the current wage proxies the relative value of alternative opportunities.

Only a few control variables have consistent significant effects. Compatible with the results for Russia, females have a lower probability to leave public employment at the beginning of transition. The affect of age is ambiguous. In some specifications age has a negative quadratic

[16] I test for the differences between coefficients of education categories within and across equations in the multinomial logit model using a pairwise Wald test for equality. Statistical significance is measured at the 10% level or less.

effect on the probability to leave indicating that the middle aged are less likely to leave public employment than young and older workers. Again, this effect is comparable to that found for Russia. Compared to the RLMS, additional control variables are available in the GSOEP. In particular, to evaluate the robustness of the results, I include industry and firm size dummies as additional control variables in all models. Controlling for industry and firm size changes some of the results (not shown). In particular, white-collar occupation becomes significantly negative in the first period and the positive effect of an apprenticeship in the second period disappears. In the last period the negative effect of education, white-collar skills and hourly wage on the probability to leave are weaker but remain significant when industry controls are included. The industry dummies themselves are not consistently significant across specifications and time. While controlling for industry and firm size has an effect on the results, the effect varies by specification and time period. It is possible that this high variation is a result of the reduced sample size when industry dummies are included. Nevertheless, the negative effect of white-collar education and hourly wages are robust across specifications with and without industry controls and over time. In contrast, the marginal effects of education and apprenticeship do not have a consistent sign.

4.3.3 Multinomial logit results of leaving public employment

In order to evaluate the determinants of leaving public employment to private employment and nonemployment separately, I continue by estimating multinomial logit models with three employment states. The multinomial logit results for the first panel are shown in Table 4. While there is no clear education effect, white-collar occupation has a negative effect on the probability to leave to private employment. This effect is relatively large, those in a white-collar occupations

are roughly 30% less likely to leave to private employment than those in blue-collar occupations. Hourly wages have a negative effect for transitions to nonemployment only. The negative effect of white-collar occupation and the hourly wage extend to those leaving to nonemployment in the second period. The results are presented in Table 5. Again, there is no sign of a negative education effect. Instead, working in a white-collar occupation has a relatively strong negative effect on the probability to leave public employment, reducing the probability to leave to private employment by 20% and to nonemployment by 45%. However, the marginal effects in the two equations are not significantly different from each other. Hourly wages have a significant negative effect in all specifications and almost all destination states. Where significant, the wage effect is the same for both private employment and nonemployment.

There seems to be a switch towards a stronger negative skill effect for those leaving to nonemployment in the last two periods. The results are presented in Tables 7 and 8. Finally there is weak evidence of a negative education effect. University education has a negative effect on the probability to leave to private employment in the last period. The effect is relatively large, reducing the probability to leave by almost 50%. In addition, in the last two periods those with a special secondary education are less likely to leave to nonemployment. In both periods the negative effect of those with a special secondary education is statistically different from the effect of other education categories and from the effect for those leaving to private employment. The negative effect of white-collar occupation remains significant but small in size in both periods. The hourly wage has a negative effect on the probability to leave that is significantly different for those leaving to private employment and to nonemployment in the third period, but not distinguishable in the last period.

Similarly to the logit results, few control variables have significant effects throughout the

transition period. Females have a lower probability to move to private employment at the beginning of transition. Age has a negative, quadratic effect on the probability to move to nonemployment at the beginning of transition, suggesting that the young and the old are more likely to move to nonemployment. These patterns are comparable to the results for Russia. Adding controls for industries and firm size has some effect on the results (not shown). However, the changes in the marginal effects do not seem to have a systematic pattern. Some evidence of a positive education effect appears. In particular, a positive effect for those with a special secondary education appears in the first period and for those with a university education or special secondary education leaving to private employment in the third period. In addition, the negative effect of university education in the last period disappears. These results confirm that the effect of education is not robust in East Germany. The effects of white-collar occupation and hourly wage remain the same when industry controls are included.

In summary, the results indicate that there is some evidence of a negative skill effect on the probability to leave public employment in East Germany. However, this effect is limited to workers in white-collar occupations and to the effect of productivity or alternative opportunities via the hourly wage. In contrast to the results from Russia, there is almost no evidence of a negative effect of education on the probability to leave public employment. The inclusion of industry and firm size controls results in changes in the, initially negative sign of education effects, suggesting that the relationship is not robust.

4.4 Discussion

4.4.1 Explaining the hourly wage effect

Compared to Russia, the results for East Germany indicate that the level of general human capital, proxied by education does not seem to determine the probability to leave public jobs. Instead, other skill measures and in particular, the hourly wage matter. The potential explanations for this result are related to the wage setting system in East German *lander* after unification. First, given the relatively rigid structure of base wages in Germany, the hourly wage effect is likely to be related to returns to tenure in the public sector. Thus, the result would indicate that those with more tenure, or in a more senior position in the public system are less likely to leave during transition. To some extent this explanation contradicts the evidence of a purge of indoctrinated socialist-era bureaucrats from the East German public system (Derlien, 1999). Second, wages also include a flexible component that more closely reflects performance on the job. In this case, the hourly wage is directly related to productivity of the worker-job match. As a result, those with better performance or a better worker-job match are less likely to leave public jobs. These two explanations of the wage effect suggest that the negative skill effect in East Germany is related to job-specific experience and performance rather than formal education. However, during the transition period wages in East Germany were artificially inflated by bargaining arrangements resulting in wages that were to a large extent set as a proportion of wages in the West (Bonin and Zimmerman, 2000). Thus, wages were unlikely to accurately reflect labor productivity. The third explanation is consistent with the Russian bad jobs story in East Germany. It is possible that the negative effect of the current wage on the probability to leave reflects the value of alternative job opportunities through search on-the-job. In this case,

the negative marginal effect of hourly wages reflects poor alternative opportunities in the private sector. Finally, the different effect of wages in East Germany and Russia may be explained by measurement difficulties. As discussed in Chapter 3 hourly wages in Russia are measured with considerable error, both because of missing wages and hours and the importance of nonwage benefits These features were not present in East Germany.

4.4.2 Comparing Russia and East Germany

The main motivation of this study is to evaluate whether the Russian experience extends to other transition economies. As discussed in Chapter 3, the potential explanations for the Russian results include excess attachment, bad jobs, skill mismatch and privatization. For comparison, it is useful to evaluate these potential explanations in the East German context. First, attachment to public employment can be motivated by specific human capital, social benefits provided by the firm and socio-cultural factors. The East German results are consistent with the human capital theory that would predict that job-specific human capital results in lower mobility. As discussed above, relative to the other skill measures, the hourly wage controlling for education reflects job-specific human capital. The other sources of excess attachment, social benefits and socio-cultural reasons do not apply in East Germany given the transformation of the public sector. However, other institutional features are likely to contribute to a higher level of attachment in East Germany. These features include employment protection regulation, such as credible firing costs. For those in the civil service the employment protection regulations provides full job security. The sample of public workers includes but is not limited to those in civil service contracts.

Second, low demand for skilled workers in the private sector, or the bad jobs story is a likely

explanation for the results in Russia. In East Germany, the opportunity to work in the West reduces the potential effect of low quality private jobs on worker mobility. Indeed, there is evidence that many skilled workers have found employment in West Germany (OECD, 1993). However, for those that remain in East Germany, the bad jobs story remains a potential explanation of the results. Contrary to Russia, public sector wages in East Germany are indeed higher than wages in the private sector. In all, East German labor productivity has been slow to catch up with the West suggesting that a significant share of employment in East Germany is in relatively bad quality jobs with low human capital requirements (Bonin and Zimmerman, 2000). This explanation is consistent with the hourly wage effect discussed above.

The third potential explanation relates to skill mismatch across sectors. There is some anecdotal evidence of skill mismatch or lack of skills slowing down private sector growth in East Germany. OECD reports that lack of skills has been an obstacle for restructuring and job creation in new firms during early transition and that management skills in particular have been in scarce supply in the East (OECD, 1993). Finally, given that privatization was completed rapidly in East Germany the blue-collar bias in privatization explanation does not apply.

4.4.3 Conclusion

The relative importance of these interpretations is unclear. There is some evidence that a variation of the bad jobs story applies in East Germany. However, it is clear that differences in the economic environment and institutional features of labor markets are likely to contribute to the explanation of different results for Russia and East Germany. Relevant institutions include the bargaining structure, unemployment benefits and employment protection legislation. To some extent Russia and East Germany represent the extremes of a flexible and a rigid labor market

regime. Rigidities in the East German labor market may have contributed to the lack of differentiation between skill groups. In particular, the relatively generous unemployment benefit regime and wage bargaining introduces a higher floor for wages in the private sector, thus contributing to less low productivity jobs and higher unemployment during transition. Employment protection legislation in the public sector provides some protection also to those with weak performance on the job.

4.5 Summary

In this study, I have examined the determinants of leaving public jobs in East Germany using a representative household dataset, the GSOEP. The main purpose of the study is to provide a comparison of the results for Russia in Chapter 2. The results from various discrete choice models show that compared to Russia, the role of skills as a determinant of worker mobility is weaker in East Germany. Those in white-collar education and those that get a higher hourly wage are less likely to leave public jobs in East Germany. In contrast to Russia, there is no consistent negative education effect. Finally, practical training via an apprenticeship does not seem to have an effect on the probability to leave public employment. The East German results suggest a different experience in reallocation of workers and skills in transition. Compared to Russia, the lack of differentiation by skills in East Germany is likely to reflect the effect of institutional features of the labor market such as the unemployment benefit regime.

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Table 1. Sample characteristics.

Variable	1990	1992	1994	1996
University	.16	.17	.19	.20
Special secondary	.31	.30	.33	.33
General secondary	.35	.35	.36	.37
Primary	.19	.20	.13	.13
White collar occupation	.72	.67	.69	.64
Apprenticeship	.53	.52	.47	.48
Hourly wage (DM)	5.87	3.66	5.18	5.65
	(2.14)	(1.31)	(2.06)	(2.32)
Age	37.59	38.25	38.56	38.70
	(10.14)	(9.96)	(9.79)	(9.62)
Female	.59	.60	.61	.63
Has an additional job	.06	.03	.04	.03
Engaged in IEA	.03	.01	.01	.01
East Berlin	-	.08	.07	.08
Mecklenburg-Vorpommern	-	.13	.14	.12
Brandenburg	-	.16	.18	.15
Sachsen-Anhalt	-	.20	.18	.19
Thueringen	-	.16	.16	.14
Saxony	-	.27	.27	.32
Agriculture	.02	.01	.01	.01
Energy	.02	.02	.03	.03
Mining	.00	.00	.00	.00
Manufacturing	.04	.01	.01	.01
Construction	.01	.00	.01	.01
Trade	.02	.01	.01	.00
Transport	.20	.18	.16	.13
Bank, insurance	.02	.04	.04	.04
Services	.68	.75	.73	.76

Notes:

1. Author's calculations. The sample sizes are smaller for industries due to additional missing observations.

2. Means, standard deviations in parenthesis.

3. Regional category Sachsen-Anhalt includes a region from neighboring Niedersachsen.

Table 2. Sample transition probabilities.

Year	Destination states			
	Public	Private	Nonemployment	All
1990 to 1991	.697	.199	.104	1.00
	530	131	79	760
1992 to 1993	.788	.102	.110	1.00
	543	70	76	689
1994 to 1995	.821	.123	.056	1.00
	423	68	31	552
1996 to 1997	.818	.105	.076	1.00
	396	51	37	484

Notes:

1. Author's calculations.
2. Sample frequencies and number of observations.

Table 3. Leaving public employment to other employment states.

	1990 to 1991			1992 to 1993		
	(1)	(2)	(3)	(1)	(2)	(3)
University	0.04			−0.02		
	(0.49)			(−0.19)		
Special secondary	0.04			−0.05		
	(0.64)			(−0.76)		
General secondary	0.06			0.03		
	(1.08)			(0.49)		
White-collar occupation		−0.06			**−0.19**	
		(−1.32)			**(−3.53)**	
Apprenticeship			0.02			0.11
			(0.42)			(2.08)
Hourly wage (DM)	**−0.03**	**−0.03**	**−0.03**	**−0.07**	**−0.05**	**−0.06**
	(−2.69)	**(−2.57)**	**(−2.82)**	**(−3.45)**	**(−2.97)**	**(−3.48)**
Summary statistics:						
N	760	760	760	689	689	689
Wald χ^2	34.51	35.07	33.51	42.85	53.55	45.49
(df)	(9)	(7)	(7)	(14)	(12)	(12)
Pseudo R^2	0.04	0.04	0.04	0.06	0.08	0.06

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job dummies, and a constant. For 1992 to 1993 region dummies (5) are added.

4. All characteristics are measured in the base year.

Table 3. Leaving public employment to other employment states (continued).

	1994 to 1995			1996 to 1997		
	(1)	(2)	(3)	(1)	(2)	(3)
University	0.04 (0.83)			**−0.15** **(−1.79)**		
Special secondary	0.01 (−0.24)			**−0.17** **(−2.45)**		
General secondary	0.01 (0.31)			**−0.14** **(−1.83)**		
White-collar occupation		**−0.06** **(−2.16)**			**−0.13** **(−2.51)**	
Apprenticeship			0.02 (0.40)			0.05 (0.85)
Hourly wage (DM)	**−0.05** **(−3.64)**	**−0.04** **(−2.87)**	**−0.03** **(−3.53)**	**−0.03** **(−2.42)**	**−0.03** **(−2.78)**	**−0.04** **(−3.05)**
Summary statistics:						
N	552	552	552	484	484	484
Wald χ^2	32.45	35.81	31.33	32.89	32.46	26.87
(df)	(13)	(11)	(11)	(14)	(12)	(12)
Pseudo R^2	0.06	0.07	0.06	0.07	0.07	0.06

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job dummies, region dummies (5) and a constant.

4. All characteristics are measured in the base year.

Table 4. Leaving public employment to private employment and nonemployment, 1990 to 1991.

	(1)		(2)		(3)	
	Private	Nonempl.	Private	Nonempl.	Private	Nonempl.
University	0.01	0.02				
	(0.43)	(0.58)				
Special secondary	0.02	0.03				
	(0.60)	(0.84)				
General secondary	**0.07**	−0.02				
	(1.65)	(−0.44)				
White-collar occupation			**−0.07**	0.02		
			(−2.00)	(0.60)		
Apprenticeship					0.03	−0.02
					(1.04)	(−0.90)
Hourly wage (DM)	−0.01	**−0.02**	−0.01	**−0.02**	−0.01	**−0.02**
	(−1.49)	**(−2.87)**	(−1.33)	**(−2.78)**	(−1.59)	**(−2.86)**
Summary statistics:						
N	760		760		760	
Wald χ^2	89.19		88.17		85.59	
(df)	(18)		(14)		(14)	
Pseudo R^2	0.07		0.07		0.07	

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job dummies, and a constant.

4. All characteristics are measured in the base year, 1990.

Table 5. Leaving public employment to private employment and nonemployment, 1992 to 1993.

	(1)		(2)		(3)	
	Private	Nonempl.	Private	Nonempl.	Private	Nonempl.
University	−0.03	0.01				
	(−0.39)	(0.06)				
Special secondary	0.02	−0.06				
	(0.05)	(−1.12)				
General secondary	0.03	0.00				
	(0.55)	(0.19)				
White-collar occupation			**−0.06**	**−0.13**		
			(−2.01)	**(−3.32)**		
Apprenticeship					0.07	0.04
					(1.62)	(1.48)
Hourly wage (DM)	**−0.04**	**−0.03**	**−0.04**	−0.02	**−0.04**	**−0.02**
	(−2.99)	**(−2.20)**	**(−2.83)**	**(−1.60)**	**(−3.00)**	**(−2.20)**
Summary statistics:						
N	689		689		689	
Wald χ^2	58.26		68.77		59.72	
(df)	(28)		(24)		(24)	
Pseudo R^2	0.06		0.08		0.07	

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.
2. The omitted education category is primary education.
3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job and region (5) dummies, and a constant.
4. All characteristics are measured in the base year, 1992.

Table 6. Leaving public employment to private employment and nonemployment, 1994 to 1995.

	(1)		(2)		(3)	
	Private	Nonempl.	Private	Nonempl.	Private	Nonempl.
University	0.04	0.00				
	(1.13)	(−0.29)				
Special secondary	0.06	**0.00**				
	(1.31)	**(−2.37)**				
General secondary	0.05	0.00				
	(1.08)	(−1.11)				
White-collar occupation			−0.05	**0.00**		
			(−1.26)	**(−2.07)**		
Apprenticeship					0.02	**0.00**
					(−0.73)	**(1.87)**
Hourly wage (DM)	**−0.02**	**−0.06**	−0.02	**−0.01**	**−0.02**	**−0.01**
	(−2.18)	**(−3.41)**	(−1.60)	**(−3.05)**	(−2.10)	**(−3.65)**
Summary statistics:						
N	552		552		552	
Wald χ^2	61.62		56.74		55.85	
(df)	(26)		(22)		(22)	
Pseudo R^2	0.10		0.08		0.09	

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job and region (5) dummies, and a constant.

4. All characteristics are measured in the base year, 1994.

Table 7. Leaving public employment to private employment and nonemployment, 1996 to 1997.

	(1)		(2)		(3)	
	Private	Nonempl.	Private	Nonempl.	Private	Nonempl.
University	−0.25	0.00				
	(−1.81)	(−0.72)				
Special secondary	−0.11	−0.00				
	(−1.30)	(−2.43)				
General secondary	−0.12	0.00				
	(−1.52)	(−1.08)				
White-collar occupation			−0.11	−0.00		
			(−1.29)	(−2.54)		
Apprenticeship					0.02	0.00
					(0.21)	(1.12)
Hourly wage (DM)	−0.02	−0.00	−0.02	−0.00	−0.03	−0.00
	(−2.07)	(−1.44)	(−2.48)	(−1.55)	(−2.65)	(−1.82)
Summary statistics:						
N	484		484		484	
Wald χ^2	46.60		43.69		37.36	
(df)	(28)		(24)		(24)	
Pseudo R^2	0.08		0.08		0.06	

Notes:

1. The results are marginal effects calculated from logit coefficients. Robust t-statistics of coefficients in parenthesis.

2. The omitted education category is primary education.

3. The control variables included in each model are age, age squared, female, engaged in individual economic activity, has an additional job and region (5) dummies, and a constant.

4. All characteristics are measured in the base year, 1996.

Chapter 5: Equilibrium Labor Market Transition with Skill Heterogeneity

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Abstract

The process of reallocation of workers from state to private jobs during transition has been heterogeneous, both across transition economies and within countries for workers with different skill levels. In particular, empirical evidence suggests that those with higher levels of human capital are slower to move from state to private jobs. In order to evaluate the reallocation of skills during transition, I build an equilibrium model of labor market transition that includes skill heterogeneity, endogeneous job destruction and various policy parameters. The main basic result is that the reallocation of high skill workers is slower than reallocation of low skill workers. As a result, those with higher skills experience less unemployment during and after transition. The result is driven by lower relative value of nonemployment for high skill workers. I use a numerical solution of the model to illustrate this point and to perform policy experiments. Policy experiments suggest that changes in the policy regime can have a significant impact on the reallocation of skills. In particular, higher unemployment benefits result in a larger increase in the speed reallocation of low skill workers relative to high skill workers, and thus an increase in low skill unemployment during and after transition. In contrast, employment subsidies in state firms slow down reallocation of low skill workers relative to high skill workers. Finally, active labor market policies such as employment and hiring subsidies can be used to speed up reallocation of skills.

5.1 Introduction

Labor market transition has proven to be heterogeneous. The heterogeneity is evident across countries, as well as, within countries for workers with different skills. First, the overall labor market outcomes across countries, such as Russia and Central and East European (CEE) countries, have been diverse. The key differences are the speed of reallocation of workers and unemployment during transition. While the unemployment rate quickly soared to above ten per cent in most CEE countries, unemployment in Russia increased only incrementally. The low unemployment rate in Russia has been mostly attributed to slow progress in reallocation of workers from the state to the nonstate sector. Second, recent evidence has shown that underlying the differences in the aggregate unemployment rate across countries are differences in the skill composition of unemployment and worker flows within countries. In general, those with low skills are more likely to become unemployed or inactive during transition (EBRD, 2000). In addition, in some countries reallocation of high skill workers to jobs in the private sector has been slow. In particular, evidence from individual level data in Russia suggests that workers with high skills have been less mobile and less likely to leave state jobs to nonemployment and to nonstate jobs, and that white-collar jobs are less likely to be destroyed during transition (Grosfeldt *et al.*, 1999, Turunen, 2001). As a result, the private sector in Russia consists mostly of workers who are younger, have less education and blue-collar skills (Gimpelson and Lippoldt, 1999).

Various authors have attempted to explain heterogeneity in labor market outcomes across countries (Aghion and Blanchard, 1994, Brixiova and Garibaldi, 1998, Commander and Tolstopiatenko, 1998, and Boeri, 2000). The emphasis has been on explaining diversity across transition economies by differences in policy regimes. The main result suggests that higher unemployment

benefits can speed up reallocation of workers and thus increase unemployment during transition. Thus, differences in the level of unemployment benefits can contribute towards an explanation of cross-country differences in dynamics of unemployment. However, in all these studies workers are assumed to be homogeneous. As a result, they can not explain the observed heterogeneity within countries across workers with different skills.

In an effort to extend the existing literature towards an explanation of heterogeneity within countries across skills, I build an equilibrium model of labor market transition with heterogeneous workers. The model is based on the matching framework of Mortensen and Pissarides (1999). The main contribution of the model is to include realistic skill differences. In terms of the modelling framework, the model is closest to Brixiova and Garibaldi (1998) model that is based on matching with homogeneous workers. Two other studies discuss skill heterogeneity using constructs that differ from the present study. First, with an emphasis on labor supply factors, Boeri (2000) discusses skill mismatch across sectors. He incorporates an exogenous mismatch parameter to evaluate the effect of difficulty in matching workers across sectors. Grosfeldt *et al.* (1999) construct a model with skill heterogeneity and risk aversion that is motivated by different speeds of reallocation of skills in Russia In their model differences across skills arise from differences in access to social benefits. In contrast to both Boeri and Grosfeldt *et al.* there is no skill mismatch nor risk in the model I evaluate, but skill differences arise from differences in human capital that are inherent to the worker and the same across sectors of the economy. In addition to skill heterogeneity, I include various features of labor market transition such as endogenous job destruction and policy parameters in the model. With the exception of Brixiova and Garibaldi (1998), all of the above studies postulate an exogenous rate of job destruction in both sectors. Introducing endogenous destruction in both sectors allows for an analysis of

the effect of policy on the destruction rates of both state and nonstate jobs. In addition to discussing the role of unemployment benefits, I discuss policies that have not been previously analyzed, including active labor market policies such as wage/employment and hiring subsidies. Finally, I evaluate the model and the role of policy using numerical values based on the actual transition experience in Russia.

The results obtained from the numerical model illustrate the potential effects of labor market policy on the speed of reallocation of skills. The model has standard implications for the *average* worker. However, a basic feature of the model is that high skilled workers experience less job destruction and more job creation, at a given level of unemployment, and thus less unemployment during and after transition. This feature follows from the assumption that the value of leisure does not depend on skills. Thus, the relative value of nonemployment is lower for workers with higher skills. In addition, unemployment benefits, and other policy parameters that are not proportional to skills influence the relative value of nonemployment. Despite more job creation for high skill workers in equilibrium, because of higher inflow to unemployment from the state sector during transition, job creation in the private sector is faster for those with low skills. The numerical model provides benchmark results of reallocation of skills. In particular, the baseline model suggests that the destruction rate of high skill state jobs is roughly two thirds of the destruction rate of low skill state jobs. As a result, low skill unemployment during transition is 3.6 percentage points higher than high skill unemployment. Policy experiments suggest that small changes in the policy regime can have large effects on the speed of reallocation of skills. For example, an introduction of higher unemployment benefits results in a large increase in low skill unemployment. Also, an employment subsidy qualitatively similar to the social benefits provided by state firms in Russia results in a drastic slowdown in reallocation of labor and low

skill workers in particular. Finally, hiring and employment subsidies can be used to increase the speed of reallocation of skills without high unemployment.

The rest of the paper is organized as follows. In Section 5.2, I survey existing theoretical literature that is relevant for this study. In Section 5.3, I present the model. In Section 5.4, I evaluate the model numerically using data from Russia, and discuss both reallocation of skills and policy experiments. In the last Section 5.5, I summarize the results and provide conclusions.

5.2 Literature

The relevant literature includes theoretical models of labor market transition, and models of traditional labor markets.[17] Pioneering theoretical work on unemployment and labor market policy in transition was done by Aghion and Blanchard (1994).[18] The Aghion and Blanchard model is a benchmark model of labor market transition based on reallocation of labor from the declining state sector to the growing private sector. It incorporates both wage setting and restructuring decisions in a forward-looking setting. In addition to providing a benchmark model of labor market transition, the main contribution of Aghion and Blanchard was to discuss the role of labor market policy in transition. Specifically, they discuss a trade-off between the efficiency-enhancing role and the costs of unemployment benefits. The efficiency argument is based on the proposition that more generous unemployment benefits make workers more willing to leave the declining state sector for jobs in the more productive private sector. Since both private

[17] I will discuss only the most relevant studies in both categories. An alternative review of models of labor market transition is provided by Boeri (2000). Two recent papers by Mortensen and Pissarides provide reviews of advanced models of traditional labor markets (Mortensen and Pissarides 2000a and 2000b).

[18] Burda (1993) also discussed labor market transition using the Pissarides (1990) matching model. Without developing new theory, he discussed many of the same issues as Aghion and Blanchard.

job creation and wages in the model are a function of labor market tightness, more quits from the state sector result in higher unemployment, lower wages and consequently in more private job creation during transition. However, Aghion and Blanchard note that high costs of financing unemployment benefits reduce job creation via an increased tax burden, slowing down transition. Despite its considerable merits, the Aghion and Blanchard model lacks in microfoundations of the labor market in transition. In particular, job destruction in the state sector is deterministic and hiring in the private sector is based on an *ad hoc* hiring function.

As transition progressed, the differences in labor market outcomes between the CEE countries and Russia became evident. Commander and Tolstopiatenko (1998) were the first to explicitly introduce the possibility that differences in labor market policy could explain differences in outcomes. In an extension of the Aghion and Blanchard (1994) model, they argue that differences in policies that affect the restructuring decision, such as stringency of bankruptcy laws, and the level of unemployment benefits can explain differences in the dynamics of unemployment. Their calculations support the view that the more generous unemployment benefit system in the CEE countries has contributed to higher unemployment. Unfortunately, the Commander and Tolstopiatenko study suffers from the same lack of microfoundations as the underlying Aghion and Blanchard model. In addition, policies that affect the restructuring decision are introduced as different exogenously set probabilities for closure and restructuring.

Brixiova and Garibaldi (1998) build a model of transition based on the Mortensen and Pissarides (1994) matching model. The model includes microfoundations for job matching, wage determination, and as a result, job creation and destruction. Brixiova and Garibaldi also introduce stochastic shocks to productivity in the state sector. Job destruction in the state sector then endogenously depends on the various labor market policies. In the context of their model,

Brixiova and Garibaldi confirm the basic finding that more generous unemployment benefits speed up closure of state jobs and increase unemployment. In addition they note that unemployment benefits reduce the fall in real wages during transition. Brixiova and Garibaldi also discuss various other labor market policies. In particular, they find that minimum wages speed up closure of the state sector and that firing costs increase labor hoarding in the state sector and the fall in real wages. While the Brixiova and Garibaldi model is the benchmark matching model of labor market transition they do not discuss worker heterogeneity.

The models reviewed above do not allow for on-the-job search nor changes in labor supply during transition. In an extension of the Brixiova and Garibaldi model, Brixiova and Yousef (2000) evaluate the impact of allowing on-the-job search. As expected, they find that on-the-job search results in the possibility of coexistence of faster growth of the private sector and longer unemployment duration. The result stems from the larger hiring pool and the resulting competition between those searching on-the-job and those searching while unemployed.

Boeri (2000) relaxes the fixed labor supply assumption. He allows for both job-to-job moves and exit from the labor force, adding realistic labor supply features to the model. Specifically, he assumes that employers can choose where to employ from: either directly from the state sector or from the pool of unemployed. Workers without a job can decide not to search. By not searching, the nonemployed enjoy the nonemployment benefit and an additional reservation utility. In the discussion of the numerical model, Boeri emphasizes the actual sequence of unemployment benefits as a locking-in feature. He suggests that the initially generous but declining level of unemployment benefits in many transition economies resulted in lock-in of workers to inactivity and thus persistency in unemployment. In an extension of the model, Boeri introduces worker heterogeneity. He assumes that the probability of layoffs in the new sector is a function of

skills and that the reservation utility is different across skills. Boeri uses the extended model to discuss differences between Russia and CEE countries, and argues that lower and more disperse nonemployment benefits explain higher earnings inequality in Russia. Unfortunately, adding realism in the model comes at a cost of several simplifying assumptions. In particular, the state sector is exceedingly simple: all state jobs are the same, they are destroyed at an exogenous rate and workers fully appropriate all output. The introduction of skills in the extended model is somewhat arbitrary. First, skills matter only in the new private sector and second, fixed productivity in the new sector does not depend on skills. Also, while job destruction in the private sector depends on the level of skills, it is not fully endogenous. Finally, the fungibility parameter that determines usefulness of skill is in fact just a standard shift parameter in the matching function. In addition, Boeri chooses not to discuss the role of other labor market policies, such as wage/employment subsidies or hiring and firing costs.

Three additional papers discuss the role of skills and inequality in transition. First, Brixiova *et al.* (1999) build an equilibrium model to discuss skill acquisition and job creation in the private sector. They point to emerging evidence about a shortage of skills and mismatch between existing skills and those required in the new private sector. The Brixiova *et al.* model differs from those discussed above in that it does not discuss job destruction, but focuses on the decision of the entrepreneurs to begin new firms and workers to train. They show that a lack of skilled workers can depress job creation. This occurs as the low supply of skills pushes up competitive wages and reduces profits in the jobs that require skilled workers. Also, higher wage taxes and higher cost of training result in less skilled workers and firms. Further, policies that encourage skill acquisition either via a subsidy to education or wages in skilled jobs improve job creation. Second, Aghion and Commander (1999) build on the Commander and Tolstopiatenko (1998) model to discuss

inequality in transition. There is no skill heterogeneity *per se* in the model, but differences in inequality are driven by differences in the exogenous job destruction and restructuring rates. This follows from the assumption that workers in state firms appropriate all rents, workers in private firms receive competitive wages and those in privatized/restructured firms fall somewhere in between. Finally, Grosfeldt *et al* (1999) build a model of segmented labor markets that is intended to explain specific features of the Russian labor market. The results of the model are based on uncertainty, worker heterogeneity and risk aversion. The results suggest *ex post* segmentation, i.e. the most productive workers leave, while less productive workers remain. Less productive workers in the primary segment have less demanded qualifications and receive lower wages than workers in the high skill secondary segment.

Various studies discussed above rely on the standard Pissarides (1990) and/or features of the Mortensen and Pissarides (1994) matching model. However, the literature on matching models has evolved to include various extensions of these basic models. The most important extension of the basic models is the inclusion of quality differences between workers, jobs or worker-job matches. The use of the extended models is typically motivated by the differences in labor market outcomes between the US and Europe, specifically, the increase in inequality in the US and rise in unemployment in continental Europe. In particular, they suggest that interaction of labor market policy and skill biased technological change that favors those with high skills can explain the differences in labor market outcomes.

In a series of studies, Mortensen and Pissarides extend their model to include differences in worker skills (Mortensen and Pissarides, 1998, 2001). The Mortensen and Pissarides setup provides the benchmark model for this study. In addition to the features of the basic models, such as endogenous job destruction, wage bargaining and labor market policies, the model includes

differences in the productivity of workers. The productivity difference is interpreted as different skills that individuals possess irrespective of the job match or their job market status. The skill differences are interpreted as between groups of workers with different educational qualifications. As a result, labor markets are fully segmented, and workers with a particular skill level match with jobs that require those skills only via a matching process that is specific to the skill group. The main results of the paper follow from the fact that nonemployment income is assumed to be independent of skills, while hiring costs are proportional to skills. This results in a relatively lower value of nonemployment for those with higher skills (Mortensen and Pissarides, 1999).[19]

5.3 Model

5.3.1 The economy

The economy consists of two sectors: state and private. In both sectors the producing unit is a worker-job match. The individuals in the economy are risk neutral expected wealth maximizers. Each individual has an efficiency unit measure of skill η, where $\eta \in R$ represents existing skill types and $G : \eta \rightarrow [0,1]$ denotes the distribution of the labor force over types. In the state sector workers are matched to jobs according to skills. In the private sector, when opening a vacancy, firms specify a skill requirement q for a job. If $\eta \geq q$ the job produces q and 0 otherwise. In addition to the skill measure, the value of a match includes an additional stochastic component. Thus, the value of the product of each match is qx, where $\{x(t)\}$ is a random Markov jump process with an arrival frequency λ and a distribution $F : [\underline{x}, \overline{x}] \rightarrow [0,1]$. The Markov process

[19]Various studies discuss other dimensions of quality differences. In particular, Marimon and Zilibotti (1999) build a model where productivity differences are specific to the worker-job match. Acemoglu (1999) builds a model with homogenous workers, but heterogenous jobs.

drives match destruction in both sectors. In the derivation of the model I allow for different values for the shock arrival rate and the overall distribution for the two sectors. In particular, in the numerical solution, I assume that the upper support of the distribution is lower in the state sector than in the private sector.

The destruction process is central to transition. The transition literature includes various motivations for job destruction in the state sector. The prevailing view is that job destruction is driven by "disorganization" (Blanchard, 1997). According to this view, price liberalization and removal of subsidies led to the destruction of the pre-transition plan that determined relations between suppliers. The destruction of the plan resulted in disorganization in the supply chain and the failure of enterprises. Disorganization, together with an increase in private opportunities, then led to reallocation of workers from state to private employment. The stochastic job destruction process with a lower upper support for state productivity is consistent with the disorganization view of job destruction.

Only the private sector creates new matches by hiring from the unemployment pool. Search on the job is not allowed in this model. This is a simplifying assumption that in general does not correspond to the reality of transition economies. The main implication of this assumption is to make the difference in the speed of reallocation between skilled and unskilled stronger. In particular, allowing search on the job would result in a faster reallocation of skilled workers to the private sector.[20] Hiring is determined by a matching function: $m(v(\eta), u(\eta)) = m(\theta(\eta))u(\eta) = q(\theta(\eta))$, where, $v(\eta)$ denotes vacancies, $u(\eta)$ the unemployed, and $\theta(\eta) = \frac{v(\eta)}{u(\eta)}$ is market tightness. Given the definition of matching, the unemployed find jobs at a rate $\theta q(\theta)$. The duration of

[20] In addition, I do not evaluate the impact of changes in the labor force. See the discussion under the literature section for implications of these assumptions.

unemployment is the inverse of the hazard: $\frac{1}{\theta q(\theta)}$. Matching of skills is an essential element of worker reallocation. Here, I assume that matching is determined by a well-defined constant returns to scale matching function. This assumption is controversial in the transition context. Matching assumes that an open labor market exists, while creating one was indeed one of the challenges of transition. Thus, it is likely that mismatch of workers, both across regions and skills, persisted during transition. Nevertheless, the matching function remains a useful instrument for approximating worker matching. Similarly, the assumption of constant returns to scale is potentially controversial. Studies of vacancy and unemployment data have found both increasing and diminishing returns to matching (see Boeri, 2000 for a review). It is important to notice that both vacancies and unemployed, and consequently, market tightness are functions of individual skill types. As a result, the aggregate labor market is perfectly segmented by skill and workers with different skills match with firms that require their type of skill only.

In addition to the job destruction process and matching, worker reallocation is determined by various labor market policies. These include various benefits, subsidies and costs to workers and firms. First, the unemployed receive a flat rate unemployment benefit b. The unemployment benefit is assumed to be independent of skill, which implies that the opportunity cost of employment is the same for all skill types. This feature reflects the fact that in reality the value of unemployment compensation varies little with skill. In particular, while only Poland had an explicit flat rate benefit during transition, the de facto benefit was flat rate in many transition countries due to lack of indexation and payment difficulties. This is particularly true in Russia. Second, the government has at its disposal a full wage/employment subsidy and tax schedule. The schedule is linear: $a + tw$ and consists of a pure employment tax component a and a proportional wage tax component t. A negative value for a corresponds to a lumpsum

employment subsidy, and combined with positive values of t corresponds to a progressive tax on employment. The subsidy and tax schedule allows for two different ways to proxy the effect of soft budget constraints. First, the lumpsum employment subsidy resembles the various social benefits provided by Russian state firms. In practice, the employment subsidy was typically *de facto* financed by state or local governments via nonpayment of taxes, such as the wage tax t. Second, given that nonpayment of taxes was common, allowing the level of wage taxes to vary between sectors can approximate the effect of arrears on reallocation. Third, there are potential costs and subsidies associated with hiring and firing. In particular, when laying off workers firms in both sectors pay a firing cost ηT. When hiring a new worker, the private firms may receive a hiring subsidy ηH. Notice, that both the hiring and firing costs/subsidies are assumed to be proportional to skill. This reflects the realistic assumption that is it relatively more expensive to fire and hire workers with high skill types.

5.3.2 Private sector

For each skill group, the asset value equations of a vacancy, an existing job to the employer and the worker, and unemployment in the private sector are, respectively:[21]

$$rV = -\eta c + q(\theta)\left[J_0^p - V - \eta(C-H)\right] \tag{3}$$

$$rJ^p(x^p) = \eta x^p - (1+t^p)w^p(x^p) + \lambda\int_{R^p}^{1}\left[J^p(z) - J^p(x^p)\right]dF(z) + \lambda F(R^p)\left[V - \eta T - J^p(x^p)\right] \tag{4}$$

$$rW^p(x^p) = w^p(x^p) + \lambda\int_{R^p}^{1}\left[W^p(z) - W^p(x)\right]dF(z) + \lambda F(R^p)\left[U - W^p(x^p)\right] \tag{5}$$

$$rU = l + b + \theta q(\theta)\left[W^p(x^p) - U\right] \tag{6}$$

Where c is the vacancy creation cost, l is the value of leisure and R is the endogenous reservation value. Notice that the value of leisure l is not proportional to skills. This assumption is important for the results obtained from the model. The value of leisure depends on activities such as home production and farming plots for own consumption. These activities have been common coping mechanisms in Russia. Productivity in such activity is unlikely to vary with skills.

As discussed in Mortensen and Pissarides (1999) because of the introduction of costs related to job creation and destruction the surplus values of a match differ for new and continuing matches. When new matches are formed job creation and hiring costs are included in the initial bargain, while they are sunk for a continuing match. Similarly termination costs are relevant only for matches that are created. By setting the initial productivity of matches in the private

[21] In what follows, I superscript parameters in the state sector with s and those in the private sector with p. For notational simplicity, I omit the skill type notation where possible.

sector equal to 1, the initial asset value equations are:

$$rJ_0^p = \eta - (1+t^p)w_0^p + \lambda \int_{R^p}^{1} [J^p(z) - J_0^p]\, dF(z) + \lambda F(R^p)\,(V - \eta T^p - J_0^p) \quad (7)$$

$$rW_0^p = w_0 + \lambda \int_{R^p}^{1} [W^p(z) - W_0^p]\, dF(z) + \lambda F(R^p)\,(U - W_0^p) \quad (8)$$

Following the previous argument, the surplus values of new and continuing matches are, respectively:

$$S_0 = J_0^p - V - \eta(C-H) + W_0^p - U \quad (9)$$

$$S(x^p) = J^p(x^p) - V + \eta T^p + W^p(x^p) - U \quad (10)$$

The strategy of arriving at a solution is to first solve for wages in both initial and continuing jobs, insert them into the respective asset value equations, and then solve for equilibrium conditions using joint optimality of the worker-job match. In standard fashion, wages are determined as a results of a bargaining process. For simplicity, I assume that the surplus of the match is divided between the worker and the firm via Nash bargaining. Then the initial and continuing wages are found by maximizing, respectively:

$$w_0^p = argmax \left[(W_0^p - U)^{\beta} \left(S_0 - (W_0^p - U)\right)^{1-\beta} \right] \quad (11)$$

$$w^p(x^p) = argmax \left[(W^p(x^p) - U)^{\beta} \left(S^p(x^p) - (W^p(x^p) - U)\right)^{1-\beta} \right] \quad (12)$$

Where β is the bargaining power of the worker and $0 < \beta < 1$.

Wages for new matches in the private sector are derived as follows. First, rearrange terms in (7) and in (8):

$$(r+\lambda)\,[J_0 - V] = \eta - (1+t)w_0^p + \lambda \int_{R}^{1} (J(z) - V)\, dF(z) - rV \quad (13)$$

$$(r+\lambda)\,[W_0^p - U] = w_0^p + \lambda \int_{R}^{1} (W^p(z) - U)\, dF(z) - rU \quad (14)$$

The solution to the bargaining problem is the sharing rule:

$$(1+t^p)\,(W_0^p - U) = \frac{\beta}{1-\beta}\,(J_0^p - V - \eta(C-H)) \tag{15}$$

Use the sharing rule and $V = 0$ to rearrange to find the implied wage in new matches:

$$w_0^p = (1-\beta)rU + \frac{\beta}{(1+t)}(\eta - (r+\lambda)\eta(C-H) - \lambda\eta T) \tag{16}$$

Finally, use (3) with $V = 0$, (6) and the sharing rule to find the wage for new matches:

$$w_0^p = (1-\beta)\,(l+b) + \frac{\beta}{1+t}(\eta(1-\theta c - (r+\lambda)(C-H) - \lambda T)) \tag{17}$$

The derivation of the wage in continuing matches follows the same steps. First, rearrange terms in (4) and in (5):

$$(r+\lambda)\,[J(x) - V] = \eta x^p - (1+t)w^p(x) + \lambda\int_R^1 (J(z) - V)\,dF(z) - rV \tag{18}$$

$$(r+\lambda)\,[W^p(x) - U] = w^p(x) + \lambda\int_R^1 (W^p(z) - U)\,dF(z) - rU \tag{19}$$

The solution to the continuous bargaining problem is a sharing rule:

$$(1+t^p)\,(W^p(x) - U) = \frac{\beta}{1-\beta}\,(J^p(x^p) - V + \eta T^p) \tag{20}$$

Use the sharing rule and rearrange to derive the implied wage in continuing jobs:

$$w^p = (1-\beta)rU + \frac{\beta(\eta x + r\eta T)}{(1+t)} \tag{21}$$

Finally, use (3) with $V = 0$, (6) and the sharing rule to find the wage for continuing jobs:

$$w^p(x^p) = (1-\beta)\,(l+b) + \frac{\beta}{(1+t)}(\eta(x + rT + \theta c)) \tag{22}$$

In order to derive equilibrium conditions, I substitute initial and continuing wages in the respective asset value equations:

$$(r+\lambda)J(x) = (1-\beta)\,(\eta x^p - (1+t)\,(l+b)) - \beta(r\eta T + \eta\theta c) + \lambda\int_R^1 J(z)dF(z) - \lambda^p F(R)\eta T \tag{23}$$

$$(r+\lambda)J_0 = (1-\beta)(\eta-(1+t)(l+b))-\beta(\eta\theta c+(r+\lambda)\eta(C-H)+\lambda\eta T) \quad (24)$$
$$+\lambda\int_R^1 J(z)dF(z)-\lambda^p F(R)\eta T$$

Finally, use the surplus value equations and the asset value equation for a vacancy when $V=0$ to rearrange and find the job creation condition:

$$\frac{c}{q(\theta)} = (1-\beta)\left(\frac{(1-R^p)}{r+\lambda}-T-C+H\right) \quad (25)$$

The left hand side of (25) is the recruiting cost, while the right hand side is the firms share of expected surplus from the new match. Higher reservation value reduces the net surplus via shortening the expected duration of a match, and thus reduces market tightness.

Jobs are destroyed when $J^p(R)+\eta T=0$. The job destruction condition is:

$$R^p+\frac{\lambda}{r+\lambda}\int_{R^p}^1 [z-R^p]\,dF(z) = \frac{a^p+(1+t^p)(l+b)}{\eta}+\frac{\beta}{1-\beta}c\theta-rT \quad (26)$$

The left hand side of (26) is the reservation value plus the option value of continuing. The right hand side is the opportunity cost of continuing the match. Higher market tightness increases the opportunity cost via improved outside opportunities, and thus increases the reservation value. Equations (25) and (26) are the key equations for the private sector.

5.3.3 State sector

The asset value equations of worker-job matches in the state sector, for employers and workers, respectively, are similar to those of continuing jobs in the private sector:

$$\begin{aligned} rJ^s(x^s) &= \eta x^s - a^s - (1+t^s)w^s(x^s) + \lambda \int_{R^s}^{\zeta_u^s} [J^s(z) - J^s(x^s)]\, dF(z) \\ &\quad -\lambda F(R^s)\,[J^s(x^s) + \eta T] \end{aligned} \tag{27}$$

$$rW^s(x^s) = w^s(x^s) + \lambda \int_{R^s}^{\zeta_u^s} [W^s(z) - W^s(x^s)]\, dF(z) + \lambda F(R^s)\,[U - W^s(x^s)] \tag{28}$$

Where ζ_u^s is the upper support of the productivity distribution. For the state sector the upper support does not necessarily equal 1. I assume that the state sector does not create new jobs. Thus, for state jobs, the alternative to production is remaining idle or opening a vacancy in the private sector. Notice that initial job creation costs are sunk to the decisionmaking in the state sector. Again, wages are determined via a Nash bargain over the surplus value of a match. The surplus value of a state job is:

$$S(x^s) = J^s(x^s) + \eta T^s + W^s(x^s) - U \tag{29}$$

Consequently, the wage is found by maximizing:

$$w^s(x^s) = argmax\,(W^s(x^s) - U)^{\beta}\,(S^s(x^s) - (W^s(x^s) - U))^{1-\beta} \tag{30}$$

The derivation of the job destruction condition in the state sector follows the step for the corresponding condition in the private sector. First, rearrange (27) and (28):

$$(r+\lambda)\,J^s(x^s) = \eta x^s - a - (1+t)\,w^s(x^s) + \lambda \int_{R}^{\zeta_l^s} (J_S(z))\, dF(z) \tag{31}$$

$$(r+\lambda)\,(W^s(x^s) - U) = w^s(x^s) + \lambda \int_{R}^{\zeta_l^s} [W^s(x^s) - U]\, dF(z) - rU \tag{32}$$

The outcome of maximization in the state sector is the following sharing rule:

$$(1+t^s)\left(W^s(x^s)-U\right)=\frac{\beta}{(1-\beta)}\left(J^s(x^s)+\eta T^s\right) \tag{33}$$

Substitute in the sharing rule to find the implied wage:

$$w^s(x^s)=(1-\beta)rU+\frac{\beta(\eta x^s-a+r\eta T)}{1+t} \tag{34}$$

Finally use (3) when $V=0$, (6) and the sharing rule to find the wage in state jobs:

$$w^s(x^s)=(1-\beta)(l+b)+\frac{1}{1+t^s}\beta(\eta x^s-a+r\eta T)+\frac{1}{1+t^p}\beta\theta\eta c \tag{35}$$

Notice that similarly to the wage in the private sector, the state wage depends on the relative bargaining power in the state sector, the unemployment benefit, the tax/subsidy schedule, skills and the stochastic productivity. However, the state wage also depends on the relative bargaining power and the tax rate in the private sector.

The wage is used to determine job destruction in the state sector. First, substitute wage into asset value equation for state jobs:

$$\begin{aligned}(r+\lambda)J^s(x^s) &= (1-\beta)(\eta x^s-a^s)-(1+t^s)(1-\beta)(l+b)-\beta r\eta T-\left(\frac{1+t^s}{1+t^p}\right)\beta\eta\theta c \\ &\quad +\lambda\int_R^{\zeta_l^s}J^s(z)dF(z)-\lambda F(R^s)\eta T\end{aligned}$$

State jobs are destroyed when $J(R^s)+\eta T^s=0$. Inserting the wage into this condition results in the job destruction condition in the state sector is:

$$R^s+\frac{\lambda}{r+\lambda}\int_{R^s}^{\zeta_u^s}(z-R^s)dF(z)=\frac{a^s+(1+t^s)(l+b)}{\eta}+\left(\frac{1+t^s}{1+t^p}\right)\frac{\beta}{(1-\beta)}\theta c-rT \tag{36}$$

Equation (36) determines the reservation product in the state sector, and consequently the destruction of state jobs. The basic interpretation of the state job destruction condition is identical

to the interpretation of the private job destruction condition. However, also the relative tax rate between the two sectors has an effect on the reservation value. In particular, a higher wage tax rate in the private sector lowers the reservation value in the state sector, thus reducing job destruction. Notice that bargaining power in the state sector does not influence the reservation product in the state sector, since it determines the relative distribution of the surplus only. Rather the bargaining parameter β that enters equation (19) reflects the bargaining power in the private sector that has an effect on the state reservation value via its effect on the opportunity cost. For simplicity, bargaining power is here assumed to be equal in both sectors.

5.3.4 Equilibrium and transition

The job destruction conditions (26) and (36), and the job creation condition (25) in the private sector determine equilibrium values of (R^s, R^p, θ).[22] The three equilibrium values then determine employment in state and private sectors and unemployment via job destruction and creation.

The equilibrium conditions have various implications for the aggregate economy. In particular, in standard fashion higher unemployment benefits b result in higher job destruction in both sectors via an increase in reservation values. Higher reservation values in turn result in lower market tightness and an increase in unemployment. During transition higher unemployment benefits speed up labor reallocation by increasing job destruction in the state sector and via higher unemployment, increase job creation in the private sector. In similar fashion, both wage and employment taxes increase reservation values in each sector and result in more job destruction, unemployment and faster reallocation. However, the effect of an increase in private

[22]The equilibrium solution is recursive, i.e. (26) and (25) determine the pair (R^p, θ), and R^s is found by substituting θ in (36).

taxes reduces the reservation value and thus job destruction in the state sector, decreasing unemployment during transition. Overall the effect of an increase in private taxes has an ambiguous effect on unemployment during transition. Employment subsidies, similar to social benefits in Russian state firms, also reduce the reservation value and job destruction in the state sector. Finally, an increase in the firing tax, results in a decrease in both reservation values and market tightness. While the firing tax decreases job destruction during transition, the overall effect on unemployment is ambiguous. Higher net hiring cost reduces market tightness and as a result, the reservation values.

Evaluating the labor market implications of policy in the presence of skill heterogeneity is the main contribution of this model. Skill heterogeneity adds a number of implications. First, as in Mortensen and Pissarides (1999) the equilibrium conditions imply that high skill workers have a lower reservation value and as a result a higher market tightness than low skill workers. As noted above, this results in a lower job destruction rate and a higher job creation rate for those with high skills, at a given level of unemployment. The difference between job destruction and creation rates for high and low skill workers stems from the lower relative value of non-employment for high skill workers. As a result, in addition to influencing the average speed or labor reallocation, nonproportional unemployment benefits also result in a differential speed of transition for different skill groups. Second, the gap between skill groups is further influenced by other nonproportional policies, such as employment and wage taxes. Thus, for example, an increase in employment subsidies provided by the firm or a decrease in wage taxes paid because of arrears, lowers the destruction of low skill jobs more than high skill jobs. Third, policies that are proportional to skills, such as firing and hiring costs do not create differential effects for different skill types.

The main focus of this paper is on the dynamics of employment by sectors and unemployment during transition. Given the equilibrium values, unemployment evolves over time according to the following differential equation:

$$\frac{du}{dt} = (\lambda_s F(R_s) + \lambda_p F(R_p))(1-u) - \theta^{1-\alpha} u \tag{37}$$

Modelling dynamics requires additional assumptions about the initial conditions of the economy. I assume that initially all employment is in the state sector and both unemployment and private employment are zero. The initial transition shock occurs, reducing productivity in the state sector and allowing the creation of private jobs. Following the initial transition shock the economy moves towards a new equilibrium. Finally, towards the end of transition state employment approaches zero and all employment is in the private sector. Unemployment is determined by structural frictions and labor market policy that governs private job destruction and creation.

5.4 Discussion

5.4.1 Numerical solution

In order to evaluate the model and discuss its implications and policy experiments, I obtain a numerical solution to the model. The numerical solution requires two additional assumptions about functional forms. First, I assume that matching technology is constant returns to scale and given by the matching function: $q(\theta) = \theta^{-\alpha}$, where α is the elasticity of matching. Second, following Mortensen and Pissarides (1999), I assume that the distribution of the idiosyncratic shock to match productivity is uniform over the interval $[\zeta_l, \zeta_h]$, i.e. $F(x) = \frac{x-\zeta_l}{\zeta_h-\zeta_l}$. Both the upper and the lower support of the distribution is allowed to vary in state and private sectors. In particular, I assume that the upper support of the distribution is lower for the state sector. The

values that I assign to the upper supports are 0.9 and 1 for state and private sectors, respectively. This assumption implies that new jobs in the private sector have a higher productivity than any state sector jobs.[23]

In addition, I set a number of parameter values to arrive at a consistent numerical solution. The baseline parameter values used are set to reflect values consistent with the Russian economy during transition. The time period is interpreted as a quarter. The quarterly risk-free interest rate of 0.08 gives a yearly interest rate of approximately 36%. The discount rate represents a relatively conservative value in relation to the literature. Boeri and Flinn (1999) contend that agents are relatively short-sighted during transition because of high uncertainty concerning the future suggesting that the discount rate is high. Available empirical evidence from transition economies suggest a matching elasticity of 0.7 (Boeri, 2000). However, there is scarce reliable evidence about actual matching elasticities in transition. Studies of empirical matching functions suffer from poor data quality and difficulties with assumptions regarding the correct functional form. Following previous studies I set the baseline worker bargaining power at 0.4. The Nash bargaining setup of the model is flexible enough to approximate various bargaining structures. The chosen bargaining value lies between the extremes of the monopoly union case and an approximation of fully competitive labor markets (Pissarides, 1990).[24] Consistent with estimates

[23]This assumption also ensures that it is not profitable to open new vacancies in the state sector, as a result jobs are created only in the new private sector.

[24]Based on estimates of the labor share in CEE and OECD countries, both Boeri (2000) and Brixiova and Garibaldi (1997) set worker bargaining power at 0.4. Notice that it is possible that worker bargaining power differs across sectors. For example, Commander and Tolstopiatenko (1998) assume state workers fully appropriate all match rents, similar to the insider model, while private workers have zero bargaining power. In contrast, Brainerd (2000) argues that wages in the state firms in Russia are determined according to the right-to-manage model and

from mature economies, I set the cost of vacancy c and the cost of hiring C equal to a roughly third of the yearly wage in the private sector (Millard and Mortensen, 1997). Finally, I set the shock arrival rates in both sectors at twice the estimated values in mature economies to reflect the tumultuous conditions in transition economies.

In the presentation below I contrast results for two skill types: high and low skills. I use data from the Russian Longitudinal Monitoring Survey (RLMS) to determine reasonable values for low and high skill workers in Russia. Education is used as a proxy for skills and differences in wages are assumed to accurately capture productivity differences. Note that the assumption that wages accurately reflect productivity may not always hold, particularly in the context of Russian transition. However, wages provide the best available proxy for productivity. With this caveat in mind, the distribution of relative earnings by educational attainment in Russia during transition is described in Table 1. The results are ratios of the group mean wage to the overall mean for two educational categories: those with a primary education or less and those with completed university education. For added reliability, I calculate the ratios using both monthly and hourly wages (where hourly wages equal the monthly wage divided by monthly hours). Based on the data in Table 1. I choose low and high values of 0.75 and 1.3, respectively.

The Russian policy regime is roughly summarized by three main policy parameters. First, the unemployment benefit parameter b is set to approximately reflect actual unemployment benefit payments in Russia. In principle, replacement ratios range from 45% to 75% depending on duration of unemployment. However, in practice the average replacement ration has been as low as 20% and most workers received the minimum benefit. As a result, the de facto unemployment benefit has been approximately a flat rate benefit equal to the minimum. In addition to the low

privatization actually increases worker bargaining power. However, this issue is not pursued in the model.

level of the average benefit, the probability of being eligible for unemployment benefits is low (Denisova, 1998). Thus, I set the baseline unemployment benefit at 0.1.[25] Second, the unemployment benefits are mostly financed by payroll taxes. The payroll tax paid by the employer rate is a low 1.5% (Denisova, 1998). Notice that the solution does not explicitly balance the government budget. Imposing budget balance would suggest a dynamic rule for payroll taxes, whereby an increase in the number of unemployed would results in larger payroll tax rates. Third, there is a firing cost that equals two to three months pay depending on whether the worker registers as unemployed or not. If the worker registers the third month (under some conditions) is paid by the state. Finally, other policy parameters, such as the employment and hiring subsidies are set to zero for the baseline solution.

Given the values motivated above, I set the remaining parameter values, the value of leisure and the lower supports of the productivity distributions, to reflect data from the Russian economy. In particular, I use information about actual separation rates from the state and private sectors calculated from the RLMS. Yearly separation rates calculated from the RLMS between 1994 to 1995 indicate that approximately 35% of those in state employment leave to nonstate employment or nonemployment within a year. The respective separation rate from private employment is approximately 40%. Using these separation rates and the previously motivated parameter values, the lower support for the match productivity distribution in the state sector is set to 0.515 and in the private sector to 0.5. These values for the distribution of productivity imply that productivity in the state sector has both a lower mean and less dispersion. This is

[25]Note that since wages are endogenous and the unemployment benefit enters as a flat rate benefit, the unemployment benefit parameter does not necessarily equal the average replacement ratio. The chosen parameter value is assumed to approximate the level of the average benefit.

consistent with wage evidence that suggests that wages are more compressed in the state sector. Finally, the value of leisure that is consistent with this solution is 0.328. The baseline parameter values discussed above are summarized in Table 2.

5.4.2 Reallocation of skills

Reallocation of skills from the state to the private sectors is the key process of transition. As discussed above, the model predicts that the speed of reallocation is different for different skills and in particular, slower for those with higher skills. I use the baseline solution of the model to illustrate this result. In general, transition is characterized by a decrease in state employment, an increase in private employment from the beginning of transition that combine to form a hump-shaped unemployment profile.

The dynamics of state and private employment, and unemployment derived from the baseline solution are shown in Figures 1 and 2. The figures illustrate the difference in speed of reallocation between skill types. In particular, workers with less skills experience both a steeper decrease in state employment and initially more job creation than those with high skills. In fact, the destruction rate of high skill state jobs implied by the baseline solution is less than two thirds of the destruction rate of low skill state jobs. The difference in destruction rates is consistent with estimated transition probabilities in Russia. Similarly the destruction rate of high skill private jobs is roughly half the destruction rate of low skill private jobs, again comparable to available evidence from Russia (Turunen, 2000). However, as the economy continues to adjust, high skill employment in the private sector rises above low skill employment. This effect is driven by the higher market tightness for high skill workers, implied by a lower reservation value in private employment. Similarly to state jobs, high skill private jobs are less likely to be destroyed than

low skill private jobs. Although reallocation of workers is almost complete after ten years of transition, the difference in the speed of reallocation of skills is still obvious. While roughly the same percentage of workers in both skill types are in private employment, state employment is much more common for those with higher skills.

This pattern of reallocation results in both higher transitional and structural unemployment for those with less skills. Transitional unemployment is driven by the rate of job destruction in the state sector. Higher transitional unemployment is manifest in the rapid increase in unemployment at the beginning of transition that results in the hump-shape of the unemployment profile. Structural unemployment emerges at the onset of transition with the new labor market and frictions associated with it. As a result, as transition proceeds unemployment decreases adjusting towards its structural value. The difference between the peaks of unemployment for the two skill types is significant at 3.6 percentage points. The difference persists resulting in higher structural unemployment for those with less skills.

Contrary to actual experience, the baseline solution indicates a relatively fast transition. Figures 3 and 4 illustrate the actual shares of private and state employment for those with a primary education or less and those with completed university education over time in Russia. The figures show that the difference in the actual speed of transition between the two skill groups follows the prediction of the model. However, actual transition is much slower. For those with a primary education only, the share of nonstate employment exceeds the share of state employment after more than five years of transition. In contrast, the baseline solution of the model predicts that this occurs after two years of transition. In particular, unemployment reaches its peak almost immediately after transition begins and decreases only gradually thereafter towards its structural value. Except for the familiar hump-shape, the simulated unemployment profile is not directly

comparable to the actual experience. In all transition countries, and Russia in particular, unemployment increased at a slower pace and peaked after several years of transition. In addition, the suggested peak of unemployment is well below the actual peak. The slower speed of reallocation and the higher peak of unemployment suggested by the actual experience are probably due to a combination factors, ranging from political economy to exogenous macroeconomic shocks (such as the Russian crises of 1998). Thus, the faster speed of transition and lower unemployment peak reflect the effectiveness of the simulated reallocation process relative to the actual experience. As a result, the model and the results derived from it provide a benchmark results for the lower bound, or an efficient transition.

The different speeds of reallocation of skills suggest an additional dimension to the debate over labor market policy in transition. The results suggest that with the existing policy regime, most initial private sectors jobs are low skill, or so-called "bad jobs". Creation of a high skill private sector takes more time. Notice that this results is derived only from the incentives to labor reallocation and abstracts from issues related to capital costs or financing constraints. To the extent that growth is driven by human capital and/or innovation, the slow creation of high skill jobs in the private sector is problematic for growth during and after transition. At the same time, those with less skill are more likely to bear the costs of unemployment during transition.

5.4.3 Policy experiments

Results from the baseline solution show that the model can perform as a benchmark for the reallocation of skills in transition. Thus, I continue with evaluating the role of policy parameters on the process of reallocating skills. Various policy parameters affect the outcome of the calibrated model. The most relevant parameters are the wage and employment tax/subsidy

schedule, unemployment benefits and potential active policies, such as a hiring and employment subsidies.

First, many state firms in Russia continued to provide access to services such as child and medical care and housing during the transition. The debate over the extent and role of these social benefits has been extensive. In general it is acknowledged that provision of social benefits "...creates attachment of workers, retards labor mobility and slows restructuring." (p 2., Commander and Schankerman, 1997). I evaluate the role of social benefits by introducing an employment subsidy to state workers. Notice that the subsidy is not proportional to skills or productivity. While there is some evidence that those with higher wages were more likely to receive benefits, there is no indication that the benefits were directly linked or proportional to skills (Kolev, 1998). Thus, similar to the effect of unemployment benefits and wage taxes, the effect of the nonproportional employment introduces a differential effect for different skill types. The effect of an introduction of a relatively small employment subsidy in the state sector is illustrated in Figures 5 and 6. In general, the result is to slow down the destruction of state jobs and flatten the unemployment profile. In fact, the employment subsidy slows down destruction to the extent that very little of the transitional unemployment hump survives and state employment remains pervasive well into the first ten years of transition. The employment subsidy is particularly effective in slowing down transition of low skill workers. The share of skilled workers in state employment after ten years roughly doubles, while the equivalent share for low skilled worker more than triples. Overall, the outcome of the experiment resembles the Russian experience of a gradual reallocation, and thus suggest that subsidies to employment may have contributed to reallocation of skills in Russia.

Second, a distinct feature of the Russian labor market has been a high level of tax arrears

and the growing employment share of the gray/black market. Consequently, Commander and Tolstopiatenko (1998) claim that, as a result, the tax burden has fallen mostly on the state sector. Thus, in their simulated model the lower tax rate on the private sector induces faster destruction of the state sector via a higher job creation in the private sector. In the following experiment, I lower the payroll tax rate on private jobs to take into account this effect. As noted by Mortensen and Pissarides (2001) the lower wage tax is similar to the wage subsidy suggested by Phelps to improve wages of the working poor in the US. The lower payroll tax rate of 0.005 in the experiment corresponds to a wage subsidy of 0.01. The employment and unemployment profiles generated as a result of a significant reduction in the private sector payroll tax rate is shown in Figures 7 and 8. Overall, the effect is to increase the speed of transition somewhat. As a result, the peak of the unemployment profile is indeed higher than in the baseline solution. The increased job creation in the private sector is particularly beneficial to high skill workers during transition, increasing employment during transition and speeding up destruction of state jobs. However, the quantitative effects of the reduction in taxes are minimal. The actual payroll tax is low in the first place and even a decrease of the magnitude introduced here has only a relatively small effect. To the extent that tax arrears have been significantly more common in the private sector, the effect on reallocation has probably been minute.

Third, the generosity of the unemployment benefit regime has a major impact on unemployment during transition. As reviewed above, various theoretical studies of labor markets in transition have concentrated on the role of unemployment benefits (Aghion and Blanchard, 1994, Brixiova and Garibaldi, 1997, Commander and Tolstopiatenko, 1998, and Boeri, 2000). The emphasis has been on the result that unemployment benefits speed up reallocation of labor *on average*. However, none of the above studies have considered the possibility that the unem-

ployment benefit regime can have a substantial effect on the speed of reallocation of different skills. Since unemployment benefits have been minimal in Russia, the relevant policy experiment is to study the effect of increasing unemployment benefits. I consider an increase in b to 0.25, i.e. more than doubling the actual flat rate benefit. The higher unemployment benefit regime is chosen to approximate the lower limit of the actual policy regimes in CEE countries, where the average benefit levels have been between 25% and 36% of the average wage. In addition, since the duration of entitlement for unemployment benefits is short, what the unemployed workers receive after benefit exhaustion matters. In most CEE countries some system of means-tested and indefinite social assistance is in place. In contrast, in Russia there is no social assistance scheme, which further weakens the outside option of the workers (Boeri and Scott, 1998). To reflect the increased financing requirements of the higher unemployment benefits, I also increase the level of payroll taxes in both sectors. The experiment thus provides an illustration of the effect of unemployment benefits on the speed of reallocation of skills, as well as a step towards evaluating the difference in labor market experience between Russia and the CEE countries.

Figures 9 and 10 illustrate the effect of the experiment on state and private employment and unemployment for both high and low skill types during transition. Increasing unemployment benefits and payroll taxes clearly speeds up destruction of state jobs.[26] As expected, this is particularly true for low skill state jobs. The increase in unemployment benefits increases the

[26] As mentioned above, note that the solution does not explicitly balance the government budget. The parameter values are chosen to approximate the effect of increased financing. The main results are not affected by the omittion of the government budget. In particular, since payroll taxes are proportional to wages, the result concerning the effect of higher unemployment benefits on the different development of skilled and unskilled employment does not depend on this assumption.

value of nonemployment relatively more to those with less skills. Job creation is also much faster initially, but for the low skill workers it stagnates soon after the beginning of transition. As a result, the share of high skill private jobs surpasses the share of low skilled private jobs roughly after 6 years of transition. As a consequence of the faster transition and the larger negative incentive effects of higher unemployment benefits unemployment is higher during and after transition. Again, the overall change in the unemployment profile is consistent with results from earlier studies. However, the increase in unemployment is much more pronounced for those with lower skills. The peak unemployment rate for those with low skills roughly doubles to 16.6% while for those with high skills it increases by a mere third to 6.2%. The double digit unemployment figures during transition are close to the actual unemployment rates experienced in many CEE countries with higher unemployment benefits. A higher unemployment benefit results in an increase in the ratio if unskilled to skilled unemployment both during and after transition. As a summary, the increased speed of transition with higher unemployment benefits is achieved at the cost of a higher structural unemployment rate especially for those with lower skills. Note that this result would remain, albeit it would be weaker, if unemployment benefits were proportional to productivity.

The baseline solution, as well as the various experiments have shown that the reallocation of skills can be slow. In particular, high skill state jobs are less likely to be destroyed, and creation of a high skill private sector takes time. Given the importance of human capital in the private sector in generating growth during and after transition, this result is somewhat troubling. While some of the suggested policy experiments, such as a higher unemployment benefit result in speeding up reallocation of skills, they incur high costs in the form of high transitional and structural unemployment for those with less skills. Alternative active labor market policy instruments that

increase the speed of reallocation for the skilled workers are a hiring and employment subsidies in the private sector.

Thus, as the final experiment I contrast these two measures. First, I introduce a hiring subsidy that is equivalent to half the hiring cost. Recall that both hiring costs and the hiring subsidy are introduced in the model as proportional to skill. The hiring cost acts as a proxy for various costs associated with match specific investment, such as training and financing costs. Thus, the effect of a subsidy to hiring would alleviate difficulties in creating high skill jobs. The effect of a reduction in the net hiring cost is illustrated in Figures 11 and 12. The overall result is to speed up reallocation. In particular, the share of skilled workers in state employment decreases and consequently the share of skilled workers in private employment increases. Unemployment increases both during and after transition, but less than in other equivalent experiments. However, again in relation to the size of the subsidy the quantitative effects are relatively modest. The effect of an introduction of an employment subsidy in the private sectors is illustrated in Figures 13 and 14. The employment subsidy is more successful in speeding up transition without a persistent increase in unemployment. In relation to the hiring subsidy, job destruction rates in the state sector are slightly lower, particularly for the high skill jobs. However, after ten years of transition, the structural effect of the subsidy is to increase private employment more. In addition, the costs related to the employment subsidy both in terms of lost employment and financing are likely to be smaller. Finally, in relation to the baseline solution, the employment subsidy is successful in speeding up transition, increasing employment with only a relatively small increase in unemployment.

5.5 Conclusion

I have evaluated the role of labor market policy in transition in the presence of skill heterogeneity. Following a brief review of the theoretical literature of labor markets in transition, I build an equilibrium labor market model of transition with skills. The model includes various aspects of transition, including reallocation of labor from state employment to the nonstate employment via nonemployment. The model improves on previous theory by including worker heterogeneity, endogenous destruction of state and private jobs and various additional policy instruments. I use data from Russia to evaluate a numerical version of the model.

Using the numerical model as a benchmark model of reallocation of skills, I discuss the interaction of policy and the reallocation of skills. First, I illustrate that existing labor market policy results in different rates of reallocation for different skills. In particular, those with higher skills are less likely to leave state employment to nonstate employment via nonemployment. The difference in the speed of reallocation of skills is substantial. In the baseline solution, the job destruction rate of high skill jobs is only two thirds of the equivalent rate for low skill jobs. Consequently, the share of high skill jobs in the state sector remains substantial even after 10 years of transition. Second, I perform policy experiments that evaluate the effects of various alternative policy regime. The results indicate that even small changes in the policy regime can have substantial effects on the speed of reallocation of skills. In particular, increasing unemployment benefits results in a significant increase in low skill unemployment during transition. In terms of policy recommendations concerning unemployment benefits, note that this result would be somewhat weaker if unemployment benefits were proportional to productivity rather than flat-rate. Also, subsidies to employment in the state sector can slow down reallocation of workers

considerable. Again the effect is more pronounced for those with less skills. Finally, subsidies to hiring or employment in the private sectors seem to dominate as effective ways to speed up reallocation of skills.

Given the complexity of the actual transition process, the model and the numerical results should be considered as a benchmark of a relatively efficient transition. However, as a benchmark, the results show that the policy regime can have a significant impact on the reallocation of skills. In particular, the reallocation of workers with high human capital levels is slow in the existing regime. This suggests that growth may be stalled as the initial private jobs consist mostly of low skill, low productivity jobs.

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Table 1. The distribution of relative earnings by educational attainment in Russia.

	1992	1993	1994	1995	1996	1998	1992-1998
Primary:							
monthly wage	0.85	0.72	0.80	0.80	0.75	0.86	0.79
hourly wage	0.75	0.71	0.81	0.72	0.85	0.87	0.78
University:							
monthly wage	1.17	1.34	1.33	1.25	1.24	1.36	1.28
hourly wage	1.30	1.35	1.28	1.28	1.23	1.36	1.30

Notes:

1. Author's' calculations from the RLMS.
2. Ratios of group means to overall mean.

Table 2. Baseline parameter values.

Parameter	Value
$\eta_l - \eta_h$	$0.75 - 1.3$
r	0.08
λ	0.2
ζ_l^p	0.5
ζ_l^s	0.515
ζ_u^s	0.9
l	0.328
α	0.7
β	0.4
c	0.3
C	0.3
b	0.1
$t^p = t^s$	0.015
T	0.3
$a^p = a^s$	0
H	0

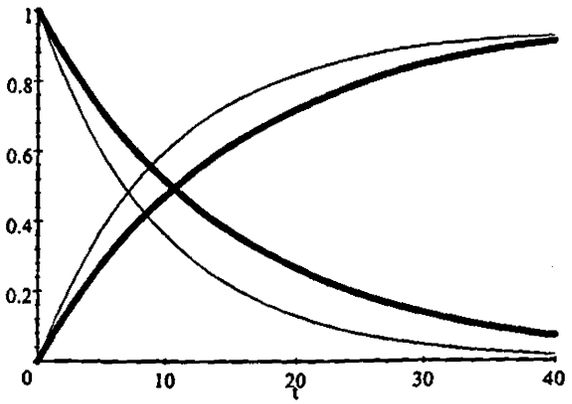

Figure 1. State and private employment in the baseline solution.Note: in all figures the thick line represents high ($\eta = 1.3$) and the thin line low ($\eta = 0.75$) skill workers.

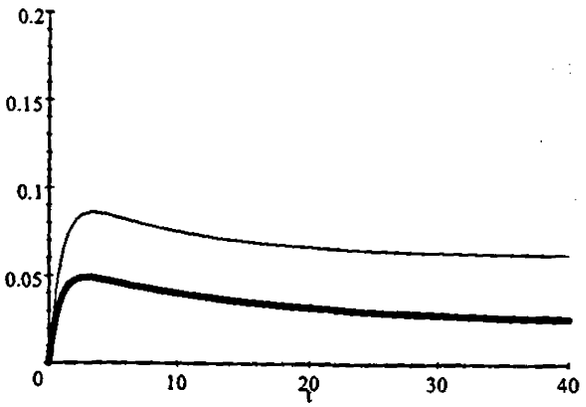

Figure 2. Unemployment in the baseline solution.

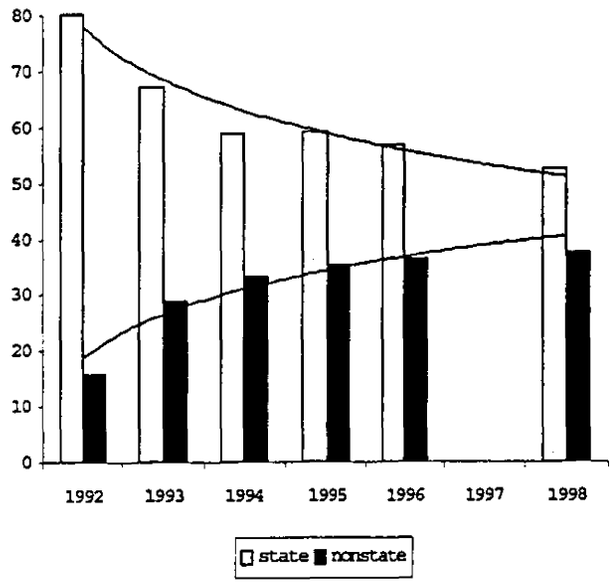

Figure 3. Employment shares, workers with university education.

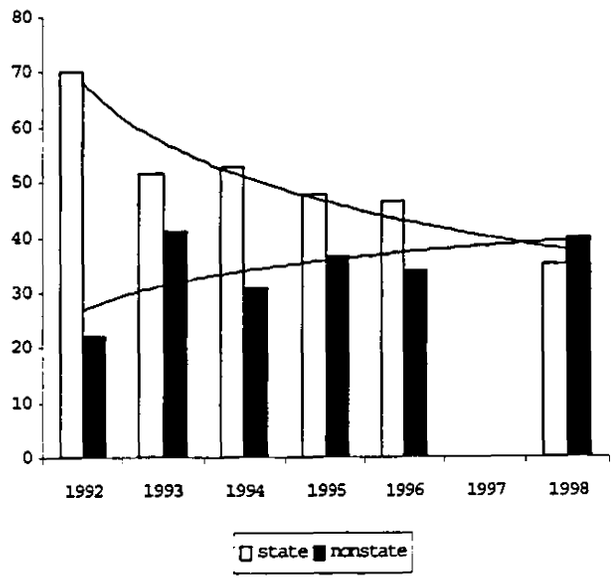

Figure 4. Employment shares, workers with primary education.

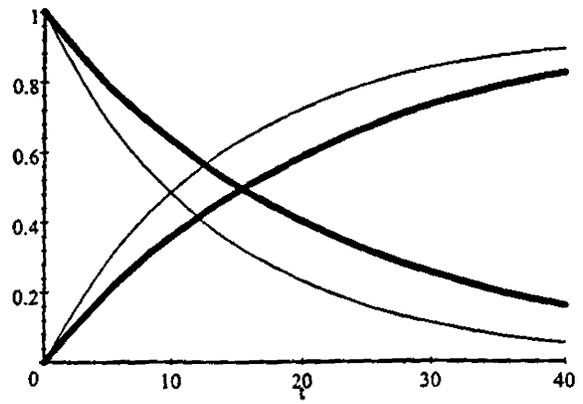

Figure 5. State and private employment with an employment subsidy ($a^s = -0.025$) in the state sector.

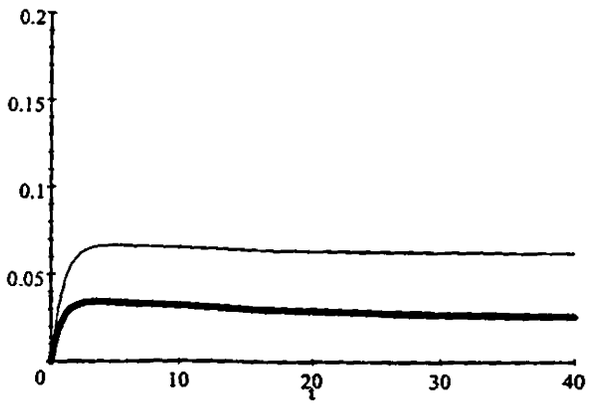

Figure 6. Unemployment with an employment subsidy in the state sector.

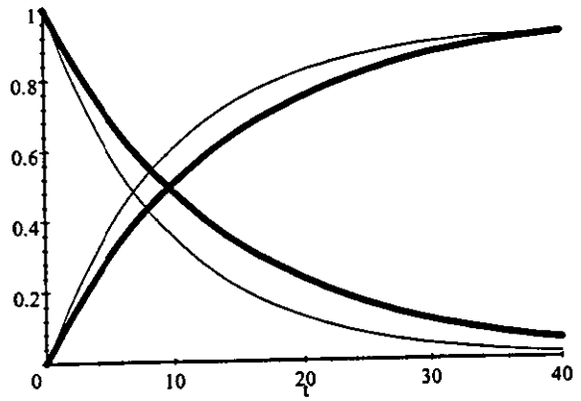

Figure 7. State and private employment with lower private payroll tax ($t^p = 0.005$).

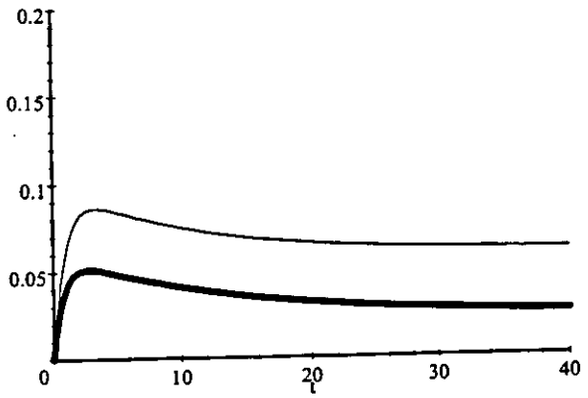

Figure 8. Unemployment with lower private payroll tax.

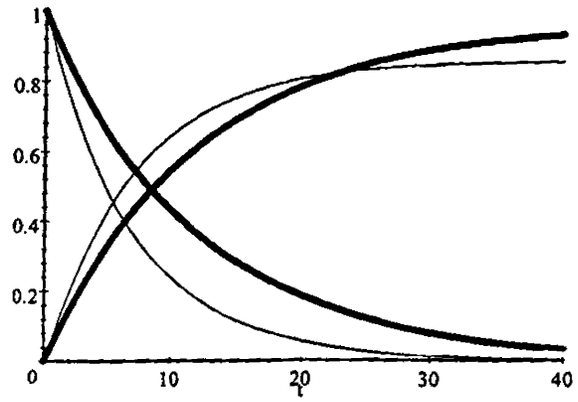

Figure 9. State and private employment with higher unemployment benefits and payroll taxes ($t^p = t^s = 0.045$).

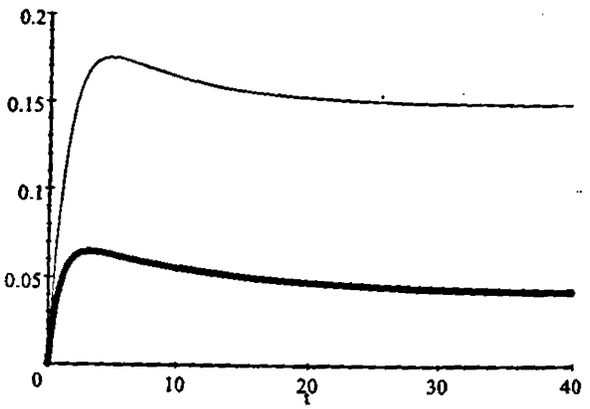

Figure 10. Unemployment with higher unemployment benefits and payroll taxes.

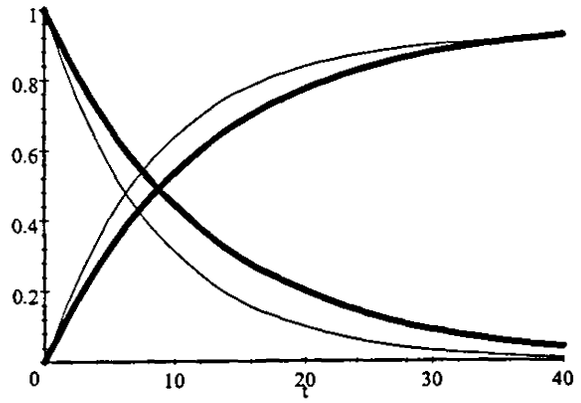

Figure 11. State and private employment with a hiring subsidy ($H = 0.15$).

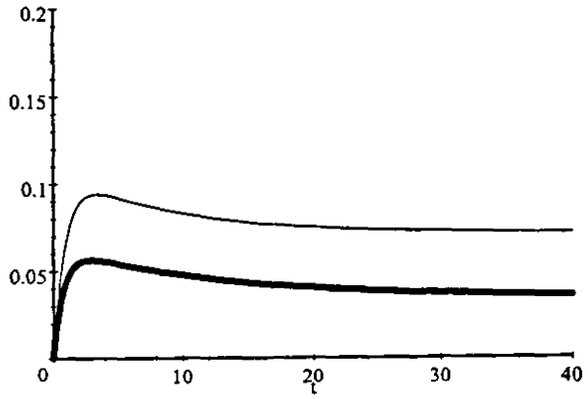

Figure 12. Unemployment with a hiring subsidy.

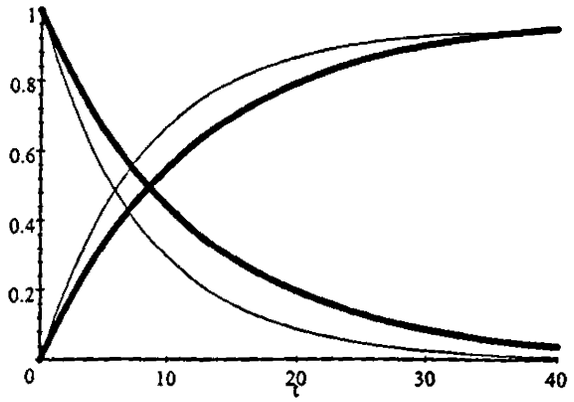

Figure 13. State and private employment with an employment subsidy in the private sector ($a^p = -0.025$).

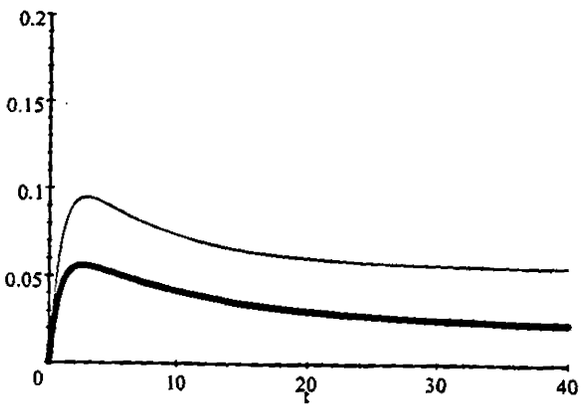

Figure 14. Unemployment with an employment subsidy in the private sector.

Appendix A: Data

May 2002

1 The Russian Longitudinal Monitoring Survey

The Russian Longitudinal Monitoring Survey (RLMS) is a nationally representative survey of Russian households. It consists of eight rounds of surveys between 1992 and 1998, with a missing year in 1997. As a result of changes in the sampling procedure in 1994 the data constitutes two separate longitudinal panels. While the number of sampling units was increased, the original sample size is smaller in the second panel. I use data from rounds 1, 3, and 5-7 to build three two year panels for 1992-1993, 1994-1995 and 1995-1996. This strategy allows me to have three comparable samples of the Russian population at different periods of transition. In order to construct the samples used in the study, I merge data on individuals from consecutive rounds. Note that the RLMS is a survey of addresses and thus does not follow the original household when it moves. This feature increases the number of individuals lost due to attrition. In addition, some observations are lost due missing data on variables used to construct employment states. Finally, I exclude those not in working age, i.e. younger than 18 and older than 54 for women and 59 for men. This full sample is used to calculate summary measures of mobility in Chapter 2. For the multivariate analysis of leaving state jobs, I further restrict the sample to those that are working in state jobs in the base year. Table A1. includes information on the structure of the RLMS data, data selection, and the samples constructed.

Comparing sample characteristics before and after eliminating data confirms that selection to the samples is approximately random except for the final exclusion of those in nonstate em-

ployment and nonemployment in the restricted sample. Those in state employment are different compared to those in other employment states. Relative to those in nonstate employment, state employed are somewhat more likely to be university educated, female and to work in white-collar occupations. Relative to the nonemployed, state employed are clearly more likely to be more educated. In general, these results confirm results documented in Gimpelson and Lippoldt (1999).

The employment state by ownership is constructed using information on the main occupation of the respondent and ownership status of the enterprise. The employment state is classified in three categories: state employment, nonstate employment and nonemployment. The employed include those employed in an enterprise, entrepreneurs and those involved in individual economic activity as main occupation. Those in state employment include those who report working in state owned enterprise and/or a public association in the first panel and those working in a government owned enterprise in the last two panels. Those in nonstate employment include those working in a privately owned, collectively owned (considered as privatized firms) and other firms in the first panel and those who report foreign or Russian individuals as the owner of the enterprise in the last two panels. In all panels those who report mixed ownership types are reported in the nonstate category. The nonstate employed include also entrepreneurs and those engaged in individual economic activity as main occupation. Finally, the nonemployed include the unemployed as well as those normally classified as out-of-the labor force.

The four skill proxies that are the main variables of interest are constructed as follows. First, I

construct four education categories, university, special secondary, general secondary and primary education. The main objective of the reclassification is to build education categories that are comparable across time periods and with the education categories for East Germany (see below). The original education categories are slightly different and were recoded as follows. University education includes those who completed university or graduate school. Special secondary education includes those who completed special secondary education, technical school or secondary vocational school and who have no university education. General secondary education includes those with 10 years or more at school and no university or special secondary education. Primary education includes those with less than 10 years of school and no other education. As a result of the recoding those with a special secondary education are the most heterogeneous group, including individuals with relatively low vocational education, as well as, those with specialist degrees. The constructed education categories roughly coincide with the national categories with the exception of the special secondary education category, which is slightly overrepresented. This reflects difficulties in reclassifying the original education categories in the survey. However, the reclassification is necessary to achieve comparability across time and with East German education categories.

Second, supervisory education includes those who report that they have supervising duties in their job. Third, white-collar occupation includes those in the first four ISCO categories: managers, professionals, technicians and associate professionals, and clerks. The rest are coded as blue-collar workers (i.e. service workers, skilled agricultural workers, craft and related trades

workers, plant and machine operators and elementary occupations). Fourth, the hourly wage is constructed by dividing after tax nominal wage of the previous month by hours worked in that month. Note that the hourly wage is potentially measured with error. This is particularly true in the presence of wage arrears, common in Russia during that later part of transition. Because of the growing importance of wage arrears and unpaid leave during the sample period, those who report either missing or zero wages and hours are not excluded from the final samples.

Finally, I use a set of control variables: age, age squared/100, female dummy, engaged in individual economic activity dummy, has an additional job dummy and seven region dummies. Unfortunately, information on industry is not available in the public use version of the RLMS. All individual characteristics of the individuals are measured in the base year, i.e. in 1992, 1994 and 1995.

2 The German Socio-Economic Panel

The German Socio-Economic Panel (GSOEP) is a representative longitudinal study of households in Germany. Since 1990, the GSOEP provides information on households in the eastern *lander* of unified Germany. I use the first eight post unification waves,G through N, of the public use files of the GSOEP to construct four two year panels spanning the time between 1990 and 1997. The primary aim in the construction of the East German sample is to achieve a high level of comparability between the Russian and East German samples. The final samples include those

in the East German subsample of the GSOEP in both years of the panel and those living in the eastern *lander* in the base year. Thus, migration to western *lander* is allowed during each two year panel. Again some data is lost due to attrition and missing data. The final samples include those in working age only, between 18-54 for women and 18-59 for men. Note that for comparability the Russian definition of the working age is used. This full data is used to analyze mobility in Chapter 2. Finally for the analysis of leaving public employment I further restrict the sample and exclude those that are not in public employment in the base year. Table A2. includes information on the structure of the GSOEP data, data selection, and the samples constructed.

The employment state by ownership is constructed using information on the main occupation of the respondent and sector of employment. However, ownership of firms is not consistently reported through the whole sample period and as a result, the employment state refers to public employment. This data feature results in poorer comparability of the East German and Russian results. In particular, those in public employment in East Germany are more likely to be concentrated in selected industries and the government sector. The employment state is classified in three categories: public employment, private employment and nonemployment. The employed include full-time and part-time employed. Public employment include those who report working in the public sector and private employment include the remaining workers. Finally, the nonemployed include the unemployed as well as those normally classified as out-of-the labor force.

The three skill proxies are constructed as follows. First, I construct four education categories

that are comparable to those for Russia: university, special secondary, general secondary and primary education. The education categories were recoded as follows. University education includes those who completed university or graduate school. Special secondary education includes those who completed special secondary education, other than apprenticeship and who have no university education. These categories include technical school or secondary vocational school. General secondary education includes those who completed 10th grade, obtained an *Abitur* or another leaving certificate and no university or special secondary education. Primary education includes those who did not complete 10th grade, or did not obtain a leaving certificate, and had no other education. I also create an additional variable that indicates an apprenticeship, regardless of other education. Note that those with an apprenticeship is a relatively heterogeneous group including individuals that have only primary education as well as those who have completed university education. Unfortunately no data on supervisory responsibility is available in the GSOEP. Second, white collar occupation is constructed to include all that report working in a white collar occupation. Third, similarly to Russia, the hourly wage is constructed by dividing the after tax nominal wage of the previous month by the hours worked in the previous month. Measurement problems are likely to be smaller in East Germany and as a result the hourly wage is a more reliable measure of productivity. As a result, I exclude those that report missing wages or hours. The results are not altered by this choice.

Finally, I construct a set of control variables: age, age squared/100, female dummy, engaged in individual economic activity dummy, has an additional job dummy and five regional dummies.

For East Germany data on industry is available. Thus, I also construct nine industry categories. All individual and firm characteristics are measured in the base year, i.e. in 1990, 1992, 1994 and 1996.

Table A1. Structure of RLMS data and samples.

	1992 to 1993	1994 to 1995	1995 to 1996
Timing:			
Base year	07-10/1992	11-12/1994	10-12/1995
Following year	07–09/1993	10-12/1995	10-12/1996
Total N:			
Base year	16,641	11,284	10,648
Following year	15,037	10,648	10,465
Data elimination:			
Attrition	3,110	2,430	1,917
Missing data	3,604	2,080	2,349
Not in working age	3,119	2,369	2,187
Sample N	6,808	4,405	4,195
Not in state employment	2,372	2,411	2,270
Sample N	4,436	1,994	1,925

Notes:
1. Author's calculations.
2. Information on RLMS data from www.cpc.unc.edu/projects/rlms

Table A2. Structure of GSOEP data and samples.

	1990 to 1991	1992 to 1993	1994 to 1995	1996 to 1997
Timing:				
Base year	1990	1992	1994	1996
Following year	1991	1993	1995	1997
Original N:				
Base year	4,453	4,092	3,945	3,882
Following year	4,202	3,973	3,892	3,884
Data elimination:				
Attrition	619	617	580	612
Missing data	227	74	151	138
Not in working age	759	799	829	866
Sample N	2,848	2,612	2,383	2,266
Not in public employment	1,970	1,883	1,783	1,744
Missing hourly wage	118	40	48	38
Sample N	760	689	552	484

Notes: .

1. Author's calculations.
2. Information on GSOEP from www.diw.de/english/sop/service/dtc.

Appendix B: Empirical Methodology

May 2002

1 Logit

I use discrete choice models, logit and multinomial logit models, to analyse transitions out of state employment. The methodology is well suited for this study. However, notice that the chosen methodology does not use information about time spent in each employment state. Time spent in each employment state is likely to influence the probability of a move to another employment state, and in particular the probability of leaving state jobs may decline with time spent working at state jobs. This aspect could in principle be analysed using duration models. Unfortunately, duration analysis is not possible using the RLMS data because of the limited panel dimension (see Appendix A. for details). In addition, there is no calendar of employment states in between the yearly interviews. Further, information on tenure is poor and missing data on tenure would further reduce the number of observations that are available.

The logit model is a standard tool in the estimation of models with a binary dependent variable. The basic difference to linear regression is a distributional assumption that results in predicted probabilities that lie between 0 and 1. As a result the model is estimated using the maximum likelihood method.

Specifically, the binary choice model is based on an underlying unobserved variable y_i^* that varies across individuals $i = \{1, 2, ..., N\}$. The underlying variable is defined as: $y_i^* = x_i'\beta + \varepsilon_i$. It consists of a systematic component $x_i'\beta$, where x_i are the characteristics of the individual, and a random component ε_i. The random component is assumed to be distributed logistically with

$E(\epsilon_i) = 0$.[1] The choice based on the underlying variable can be represented by a binary variable:

$$y_i = \begin{cases} 1 \quad if \quad y_i^* > 0 \\ 0 \quad if \quad y_i^* \leq 0 \end{cases} . \tag{1}$$

The probability of a move is given by: $P(y_i = 1) = P(y_i^* > 0) = \Lambda(x_i'\beta)$, where $\Lambda(.)$ is the logistic cumulative distribution function. The logit model is estimated by maximum likelihood. The log likelihood is:

$$\ln L = \sum_i [y_i \ln P_i + (1 - y_i) \ln P_i] \tag{2}$$

The first derivative is:

$$\frac{\partial ln L}{\partial \beta} = \sum_i [y_i - P_i] x_i, \quad \forall j = 1, 2, ..., J \tag{3}$$

The logit coefficient represents the effect of a change in the independent variable on the log-odds. The marginal effect is:

$$\frac{\partial E(y_i)}{\partial x_i} = [P_i(1 - P_i)] \beta \tag{4}$$

Notice that for dummy variables the marginal effect refers to an effect on the probability of a change from 0 to 1. The goodness of fit of the logit model is evaluated using the pseudo-R^2 derived from the likelihood ratio and the likelihood ratio test of restricting all slope coefficients to zero (Greene, 1998). The predicted probabilities reported in the study are calculated using

[1] It is possible to interpret the underlying variable as the unobserved utility of an employment state. The choice of employment state then is made based on utility maximization, and decision to leave is taken once a threshold for utility in the destination state is above the utility in the original state.

the method of recycled predictions. The method involves calculating the predicted probability for each subgroup using the whole sample instead of only the subsample in question. For example, in calculating the predicted probability for those with a university education, I use the characteristics of the whole sample instead of only those with a university education. The differences in predicted probabilities then give the difference due to university education holding other characteristics of the sample constant (for discussion see pp. 406-407 in Stata Corporation, 1999).

2 Multinomial logit

The multinomial logit model is a generalization of the logit model to multiple states with an additional assumption of independence between the states. The errors of the underlying variable are assumed to be independently and identically distributed with a Weibull distribution.[2] Then the probability of choice k for individual i and a set of choices $j+1 = \{0, 1, 2, ..., J\}$ is:

$$P(y_i = k) = \frac{e^{\beta_k' x_i}}{\sum_{j=0}^{J} e^{\beta_j' x_i}} \tag{5}$$

[2]The Weibull distribution is given by: $F(\varepsilon_{ij}) = \exp(e^{-\varepsilon_{ij}})$. The undesirable side-effect of the assumption is the irrelevance of the third choice when a choice between two states is made, the so-called Irrelevance of Independent Alternatives (IIA) assumption. Clearly, the IIA assumption is *a priori* unacceptable in the case of choice between employment states. However, since the multinomial logit method is here used for descriptive purposes only this problem is set aside.

In order to identify the coefficients a normalization is necessary. This is achieved by setting $\beta_0 = 0$, i.e. estimating probabilities with respect to a base category. With this normalization, the probabilities are:

$$P(y_i = k) = \frac{e^{\beta_k' x_i}}{1 + \sum_{j=1}^{J} e^{\beta_j' x_i}}, \quad \forall\, j = 1, 2, ..., J \tag{6}$$

$$P(y_i = 0) = \frac{1}{1 + \sum_{j=1}^{J} e^{\beta_j' x_i}} \tag{7}$$

The multinomial logit model is estimated by maximum likelihood. The log likelihood is:

$$\ln L = \sum_i \sum_{j=0}^{J} d_{ij} \ln P_{ij} \tag{8}$$

Where d_{ij} is an indicator that takes on values 1 or 0 if alternative j is chosen. The first derivative is:

$$\frac{\partial ln L}{\partial \beta_j} = \sum_i [d_{ij} - P_{ij}]\, x_i, \quad \forall\, j = 1, 2, ..., J \tag{9}$$

The estimation of an multinomial logit model results in coefficient estimates β_j for each choice relative to a base category. The marginal effects are given by:

$$\frac{\partial E(y_{ij})}{\partial x_i} = P_j \left(\beta_j - \sum_j P_j \beta_j \right) \tag{10}$$

Goodness of fit measures and the method of calculating predictions are the same as for the logit model above (Greene, 1998)

Appendix C: Full Estimation Results

May 2002

1 Chapter 3: Leaving State Jobs in Russia

Table C3

	(1)		(2)	
Variable	Coeff	t-value	Coeff	t-value
University	-0.41	(-3.24)		
Special secondary	-0.28	(-2.65)		
General secondary	-0.15	(-1.28)		
Supervisory responsibility			-0.22	(-2.62)
Hourly wage (th R)	-2.48	(-1.75)	-2.59	(-1.82)
No wage arrears	0.02	(0.16)	0.03	(0.18)
Nonzero hours	-0.13	(-1.08)	-0.11	(-0.90)
Age	-0.06	(-2.20)	-0.07	(-2.37)
Age squared/100	0.08	(2.08)	0.09	(2.38)
Female	-0.27	(-3.79)	-0.30	(-4.24)
Engaged in IEA	0.15	(0.54)	0.12	(0.45)
Has an additional job	-0.12	(-0.60)	-0.15	(-0.78)
North/North East	0.49	(3.33)	0.50	(3.41)
Central	0.35	(2.41)	0.37	(2.57)
Volga	-0.86	(-4.81)	-0.82	(-4.63)
North Caucasia	-0.26	(-1.78)	-0.24	(-1.65)
Ural	0.30	(2.20)	0.34	(2.51)
West Siberia	-0.24	(-1.12)	-0.21	(-0.98)
East Siberia	0.90	(6.15)	0.94	(6.45)
Constant	0.45	(0.87)	0.26	(0.51)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C4

	(1)		(2)		(3)	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.52	(-2.99)				
Special secondary	-0.17	(-1.12)				
General secondary	-0.05	(-0.33)				
Supervisory responsibility			-0.15	(-1.28)		
White-collar occupation					-0.44	(-3.96)
Hourly wage (th R)	0.00	(-0.03)	-0.01	(-0.31)	0.00	(-0.18)
No wage arrears	-0.23	(-1.90)	-0.23	(-1.95)	-0.20	(-1.69)
Nonzero hours	-0.16	(-0.89)	-0.14	(-0.80)	-0.16	(-0.89)
Age	-0.06	(-1.56)	-0.07	(-1.79)	-0.07	(-1.73)
Age squared/100	0.08	(1.52)	0.09	(1.77)	0.09	(1.71)
Female	-0.16	(-1.59)	-0.21	(-2.09)	-0.02	(-0.20)
Engaged in IEA	0.36	(1.77)	0.33	(1.68)	0.35	(1.74)
Has an additional job	0.08	(0.32)	0.02	(0.05)	0.08	(0.23)
North/North East	-0.50	(-1.88)	-0.44	(-1.67)	-0.46	(-1.73)
Central	0.10	(0.33)	0.14	(0.45)	0.16	(0.50)
Volga	-0.16	(-0.72)	-0.12	(-0.55)	-0.12	(-0.55)
North Caucasia	-0.11	(-0.43)	-0.11	(-0.43)	-0.06	(-0.25)
Ural	0.36	(1.62)	0.40	(1.80)	0.39	(1.76)
West Siberia	0.46	(1.88)	0.50	(2.04)	0.51	(2.09)
East Siberia	0.12	(0.35)	0.18	(0.51)	0.20	(0.56)
Constant	1.07	(1.46)	1.02	(1.41)	1.04	(1.43)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C5

	(1)		(2)		(3)	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.98	(-4.99)				
Special secondary	-0.03	(-0.18)				
General secondary	0.01	(0.04)				
Supervisory responsibility			-0.42	(-3.13)		
White-collar occupation					-0.97	(-7.97)
Hourly wage (th R)	-0.01	(-1.00)	-0.02	(-1.17)	-0.01	(-1.06)
No wage arrears	-0.24	(-1.95)	-0.26	(-2.18)	-0.20	(-1.61)
Nonzero hours	-0.27	(-1.78)	-0.23	(-1.51)	-0.24	(-1.58)
Age	-0.10	(-2.87)	-0.11	(-2.89)	-0.12	(-3.27)
Age squared/100	0.14	(2.84)	0.14	(2.86)	0.15	(3.26)
Female	-0.29	(-2.62)	-0.35	(-3.22)	0.05	(0.39)
Engaged in IEA	1.02	(2.43)	1.06	(2.53)	1.04	(2.35)
Has an additional job	-0.29	(-0.97)	-0.40	(-1.35)	-0.36	(-1.18)
North/North East	-0.66	(-2.24)	-0.50	(-1.73)	-0.62	(-2.13)
Central	-0.12	(-0.50)	-0.02	(-0.08)	-0.06	(-0.24)
Volga	-0.16	(-0.67)	-0.09	(-0.38)	-0.11	(-0.46)
North Caucasia	-0.06	(-0.23)	0.05	(0.20)	0.03	(0.13)
Ural	0.12	(0.48)	0.20	(0.86)	0.15	(0.60)
West Siberia	-0.21	(-0.77)	-0.11	(-0.41)	-0.16	(-0.60)
East Siberia	0.50	(1.94)	0.61	(2.39)	0.53	(2.03)
Constant .	1.76	(2.59)	1.62	(2.38)	1.98	(2.84)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C6.

	(1)				(2)			
	Nonstate		Nonempl.		Nonstate		Nonempl.	
	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.26	(-1.81)	-0.68	(-3.30)				
Special secondary	-0.10	(-0.78)	-0.69	(-3.97)				
General secondary	0.00	(0.03)	-0.49	(-2.54)				
Supervisory responsibility					-0.19	(-1.98)	-0.33	(-2.13)
Hourly wage (th R)	-2.02	(-1.51)	-5.18	(-1.03)	-2.04	(-1.54)	-5.74	(-1.19)
No wage arrears	0.08	(0.48)	-0.08	(-0.40)	0.09	(0.37)	-0.08	(-0.40)
Nonzero hours	0.05	(0.39)	-0.44	(-2.20)	0.07	(0.32)	-0.40	(-2.05)
Age	0.04	(1.29)	-0.26	(-5.97)	0.04	(1.31)	-0.28	(-6.32)
Age squared/100	-0.05	(-1.24)	0.33	(5.57)	-0.05	(-1.23)	0.36	(6.13)
Female	-0.48	(-5.85)	0.25	(1.92)	-0.50	(-6.14)	0.19	(1.52)
Engaged in IEA	-0.10	(-0.30)	0.48	(1.25)	-0.12	(-0.35)	0.41	(1.07)
Has an additional job	-0.04	(-0.21)	-0.30	(-0.81)	-0.07	(-0.31)	-0.36	(-0.99)
North/North East	0.55	(3.36)	0.24	(0.91)	0.57	(3.46)	0.24	(0.65)
Central	0.46	(2.81)	-0.01	(-0.03)	0.48	(2.94)	0.01	(0.04)
Volga	-1.10	(-4.87)	-0.49	(-1.77)	-1.07	(-4.78)	-0.44	(-1.58)
North Caucasia	-0.49	(-2.71)	0.13	(0.54)	-0.47	(-2.64)	0.15	(0.46)
Ural	0.28	(1.76)	0.35	(1.53)	0.30	(1.96)	0.41	(1.83)
West Siberia	-0.99	(-3.38)	0.71	(2.43)	-0.97	(-3.30)	0.76	(2.62)
East Siberia	1.12	(6.97)	0.03	(0.10)	1.15	(7.19)	0.08	(0.20)
Constant	-2.15	(-3.42)	3.39	(4.51)	-2.27	(-3.61)	3.02	(3.98)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C7. Models 1 and 2

	(1)				(2)			
	Nonstate		Nonempl		Nonstate		Nonempl	
	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.59	(-3.11)	-0.27	(-0.84)				
Special secondary	-0.25	(-1.49)	0.10	(0.38)				
General secondary	-0.17	(-0.95)	0.34	(1.18)				
Supervisory responsibility					-0.09	(-0.68)	-0.40	(-1.69)
White-collar occupation								
Hourly wage (th R)	0.00	(0.15)	-0.03	(-0.65)	0.00	(-0.12)	-0.04	(-0.74)
No wage arrears	-0.13	(-0.97)	-0.48	(-2.41)	-0.14	(-1.07)	-0.46	(-2.28)
Nonzero hours	0.02	(0.99)	-0.54	(-2.06)	0.04	(0.12)	-0.52	(-1.99)
Age	0.00	(0.90)	-0.24	(-3.81)	-0.01	(-0.20)	-0.23	(-3.73)
Age squared/100	0.00	(-0.07)	0.30	(3.67)	0.01	(0.17)	0.30	(3.58)
Female	-0.29	(-2.60)	0.25	(1.34)	-0.34	(-3.11)	0.21	(1.12)
Number of children	-0.06	(-1.01)	-0.12	(-0.12)	-0.06	(-0.97)	-0.12	(-0.12)
Engaged in IEA	0.37	(1.71)	0.33	(0.94)	0.34	(1.62)	0.32	(0.63)
Has an additional job	0.22	(0.89)	-0.71	(-1.18)	0.14	(0.41)	-0.71	(-1.17)
Rural	-0.07	(-0.55)	0.05	(0.17)	-0.01	(-0.05)	0.08	(0.26)
North/North East	-0.57	(-1.97)	-0.19	(-0.37)	-0.52	(-1.80)	-0.13	(-0.25)
Central	0.03	(0.11)	0.42	(0.68)	0.06	(0.19)	0.46	(1.08)
Volga	-0.28	(-1.19)	0.26	(0.42)	-0.25	(-1.05)	0.31	(0.52)
North Caucasia	-0.24	(-0.89)	0.35	(0.52)	-0.25	(-0.92)	0.38	(0.56)
Ural	0.37	(1.58)	0.30	(0.47)	0.42	(1.75)	0.35	(0.55)
West Siberia	0.41	(1.55)	0.69	(1.48)	0.44	(1.68)	0.74	(1.61)
East Siberia	0.13	(0.48)	0.18	(0.26)	0.19	(0.51)	0.22	(0.32)
Constant	-0.50	(-0.59)	2.75	(2.36)	-0.55	(-0.66)	2.76	(2.42)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C7. Model 3

	(3)			
	Nonstate		Nonempl	
	Coeff	t-value	Coeff	t-value
University				
Special secondary				
General secondary				
Supervisory responsibility				
White-collar occupation	-0.57	(-4.60)	-0.05	(-0.24)
Hourly wage (th R)	0.00	(0.08)	-0.04	(-0.68)
No wage arrears	-0.09	(-0.69)	-0.48	(-2.36)
Nonzero hours	0.02	(0.05)	-0.52	(-2.00)
Age	0.00	(-0.08)	-0.24	(-3.79)
Age squared/100	0.01	(0.09)	0.30	(3.63)
Female	-0.10	(-0.83)	0.23	(1.10)
Engaged in IEA	0.36	(1.67)	0.33	(0.65)
Has an additional job	0.26	(1.00)	-0.78	(-1.29)
North/North East	-0.55	(-1.87)	-0.11	(-0.22)
Central	0.08	(0.23)	0.47	(1.11)
Volga	-0.26	(-1.09)	0.33	(0.54)
North Caucasia	-0.20	(-0.75)	0.40	(0.60)
Ural	0.39	(1.65)	0.38	(0.59)
West Siberia	0.45	(1.70)	0.76	(1.66)
East Siberia	0.21	(0.54)	0.23	(0.34)
Constant	-0.57	(-0.68)	2.79	(2.43)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C8. Models 1 and 2

	(1)				(2)			
	Nonstate		Nonempl		Nonstate		Nonempl	
	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.65	(-2.97)	-1.88	(-4.66)				
Special secondary	0.15	(0.83)	-0.38	(-1.52)				
General secondary	0.19	(0.98)	-0.34	(-1.26)				
Supervisory responsibility					-0.32	(-2.21)	-0.72	(-2.82)
White-collar occupation								
Hourly wage (th R)	-0.01	(-0.81)	-0.05	(-1.25)	-0.01	(-0.88)	-0.06	(-1.35)
No wage arrears	-0.03	(-0.23)	-0.65	(-3.29)	-0.05	(-0.35)	-0.68	(-3.43)
Nonzero hours	-0.13	(-0.71)	-0.52	(-2.23)	-0.10	(-0.54)	-0.43	(-1.83)
Age	-0.02	(-0.48)	-0.29	(-4.90)	-0.01	(-0.31)	-0.31	(-5.34)
Age squared/100	0.03	(0.48)	0.38	(4.83)	0.01	(0.26)	0.40	(5.41)
Female	-0.44	(-3.59)	0.12	(0.61)	-0.48	(-4.02)	0.03	(0.15)
Engaged in IEA	1.26	(2.93)	0.09	(0.12)	1.29	(2.98)	0.23	(0.30)
Has an additional job	-0.43	(-1.27)	0.14	(0.28)	-0.52	(-1.52)	-0.10	(-0.21)
North/North East	-0.71	(-2.22)	-0.42	(-0.75)	-0.59	(-1.83)	-0.19	(-0.34)
Central	-0.23	(-0.88)	0.25	(0.53)	-0.15	(-0.56)	0.40	(0.86)
Volga	-0.27	(-1.03)	0.20	(0.43)	-0.21	(-0.81)	0.31	(0.66)
North Caucasia	-0.32	(-1.13)	0.56	(1.19)	-0.24	(-0.83)	0.75	(1.58)
Ural	0.16	(0.06)	0.44	(0.94)	0.09	(0.33)	0.60	(1.29)
West Siberia	-0.22	(0.74)	-0.12	(-0.22)	-0.14	(-0.48)	0.06	(0.12)
East Siberia	0.61	(2.21)	0.11	(0.21)	0.69	(2.52)	0.31	(0.61)
Constant	-0.36	(-0.44)	3.97	(3.75)	-0.44	(-0.54)	3.76	(3.50)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C8. Model 3

	(3)			
	Nonstate		Nonempl	
	Coeff	t-value	Coeff	t-value
University				
Special secondary				
General secondary				
Supervisory responsibility				
White-collar occupation	-0.86	(-6.35)	-1.26	(-5.88)
Hourly wage (th R)	-0.01	(-0.78)	-0.05	(-1.31)
No wage arrears	0.01	(0.10)	-0.64	(-3.23)
Nonzero hours	0.10	(-0.58)	-0.49	(-2.08)
Age	-0.03	(-0.62)	-0.33	(-5.62)
Age squared/100	0.03	(0.59)	0.43	(5.67)
Female	-0.13	(-0.96)	0.52	(2.46)
Engaged in IEA	1.29	(2.86)	0.07	(0.09)
Has an additional job	-0.48	(-1.39)	-0.03	(-0.06)
North/North East	-0.70	(-2.17)	-0.33	(-0.60)
Central	-0.17	(-0.66)	0.33	(0.71)
Volga	-0.22	(-0.85)	0.26	(0.57)
North Caucasia	-0.24	(-0.83)	0.70	(1.49)
Ural	0.03	(0.12)	0.53	(1.16)
West Siberia	-0.17	(-0.59)	-0.07	(-0.14)
East Siberia	0.62	(2.23)	0.19	(0.38)
Constant	-0.12	(-0.15)	4.33	(3.89)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C9. Model 1

	(1)					
	Privatized		Job move		Nonempl	
	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.59	(-2.74)	-0.65	(-1.96)	-0.27	(-0.83)
Special secondary	-0.42	(-2.16)	0.11	(0.41)	0.11	(0.39)
General secondary	-0.08	(-0.43)	-0.43	(-1.39)	0.34	(1.19)
Supervisory responsibility						
White-collar occupation						
Hourly wage (th R)	0.00	(0.10)	0.01	(0.25)	-0.03	(-0.65)
No wage arrears	-0.18	(-1.17)	-0.03	(-0.15)	-0.48	(-2.41)
Nonzero hours	0.28	(1.12)	-0.49	(-1.69)	-0.54	(-2.06)
Age	0.06	(1.20)	-0.12	(-1.63)	-0.24	(-3.82)
Age squared/100	-0.07	(-1.06)	0.13	(1.42)	0.30	(3.68)
Female	-0.04	(-0.29)	-0.95	(-4.86)	0.25	(1.33)
Engaged in IEA	0.48	(2.00)	0.08	(0.15)	0.33	(0.94)
Has an additional job	0.13	(0.31)	0.42	(1.11)	-0.70	(-1.17)
North/North East	-0.65	(-1.96)	-0.35	(-0.69)	-0.19	(-0.37)
Central	-0.19	(-0.71)	0.51	(1.26)	0.42	(0.99)
Volga	-0.32	(-1.22)	-0.13	(-0.32)	0.26	(0.61)
North Caucasia	-0.17	(-0.56)	-0.41	(-0.80)	0.35	(0.75)
Ural	0.30	(1.16)	0.57	(1.36)	0.30	(0.68)
West Siberia	0.39	(1.36)	0.47	(1.03)	0.69	(1.48)
East Siberia	0.21	(0.51)	-0.17	(-0.34)	0.18	(0.37)
Constant	-2.19	(-2.21)	0.85	(0.46)	2.75	(2.36)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthes

Table C9. Model 2

	(2)					
	Privatized		Job move		Nonempl	
	Coeff	t-value	Coeff	t-value	Coeff	t-value
University						
Special secondary						
General secondary						
Supervisory responsibility	-0.02	(-0.17)	-0.27	(-1.14)	-0.40	(-1.70)
White-collar occupation						
Hourly wage (th R)	-0.01	(-0.34)	0.01	(0.37)	-0.04	(-0.74)
No wage arrears	-0.18	(-1.21)	-0.06	(-0.26)	-0.46	(-2.28)
Nonzero hours	0.29	(1.14)	-0.44	(-1.54)	-0.53	(-2.00)
Age	0.05	(1.05)	-0.13	(-1.88)	-0.23	(-3.74)
Age squared/100	-0.06	(-0.88)	0.16	(1.66)	0.30	(3.59)
Female	-0.12	(-0.95)	-0.93	(-4.86)	0.20	(1.09)
Engaged in IEA	0.45	(1.93)	0.07	(0.14)	0.32	(0.90)
Has an additional job	0.03	(0.08)	0.41	(1.07)	-0.70	(-1.17)
North/North East	-0.60	(-1.80)	-0.31	(-0.62)	-0.13	(-0.25)
Central	-0.14	(-0.54)	0.53	(1.33)	0.46	(1.09)
Volga	-0.27	(-1.04)	-0.13	(-0.32)	0.31	(0.75)
North Caucasia	-0.17	(-0.58)	-0.43	(-0.84)	0.38	(0.81)
Ural	0.35	(1.33)	0.61	(1.45)	0.35	(0.79)
West Siberia	0.42	(1.47)	0.51	(1.11)	0.74	(1.61)
East Siberia .	0.29	(1.01)	-0.17	(-0.34)	0.22	(0.45)
Constant	-2.38	(-2.39)	1.01	(0.55)	2.77	(2.43)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C9. Model 3

	(3)					
	Privatized		Job Move		Nonempl.	
	Coeff	t-value	Coeff	t-value	Coeff	t-value
University						
Special secondary						
General secondary						
Supervisory responsibility						
White-collar occupation	-0.69	(-4.79)	-0.25	(-1.22)	-0.05	(-0.24)
Hourly wage (th R)	0.00	(-0.05)	0.01	(0.37)	-0.04	(-0.78)
No wage arrears	-0.12	(-0.80)	-0.05	(-0.24)	-0.48	(-2.35)
Nonzero hours	0.26	(1.03)	-0.45	(-1.56)	-0.53	(-2.00)
Age	0.06	(1.20)	-0.13	(-1.88)	-0.24	(-3.80)
Age squared/100	-0.07	(-1.00)	0.15	(1.65)	0.30	(3.63)
Female	0.17	(1.20)	-0.81	(-3.93)	0.22	(1.08)
Engaged in IEA	0.48	(2.00)	0.09	(0.16)	0.33	(0.93)
Has an additional job	0.19	(0.43)	0.40	(1.05)	-0.78	(-1.29)
North/North East	-0.63	(-1.87)	-0.32	(-0.63)	-0.11	(-0.21)
Central	-0.14	(-0.51)	0.55	(1.35)	0.48	(1.12)
Volga	-0.29	(-1.11)	-0.13	(-0.31)	0.33	(0.78)
North Caucasia	-0.12	(-0.41)	-0.40	(-0.78)	0.40	(0.86)
Ural	0.32	(1.21)	0.63	(1.49)	0.38	(0.84)
West Siberia	0.43	(1.50)	0.52	(1.13)	0.77	(1.66)
East Siberia	0.31	(1.08)	-0.15	(-0.29)	0.23	(0.49)
Constant	-2.40	(-2.43)	1.02	(0.56)	2.80	(2.44)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C10. Model 1

	(1)					
	Privatized		Job move		Nonempl	
	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.54	(-2.24)	-1.14	(-2.34)	-1.88	(-4.66)
Special secondary	0.21	(1.03)	-0.04	(-0.12)	-0.38	(-1.51)
General secondary	0.33	(1.56)	-0.38	(-1.01)	-0.34	(-1.27)
Supervisory responsibility						
White-collar occupation						
Hourly wage (th R)	-0.01	(-0.95)	-0.00	(-0.07)	-0.05	(-1.25)
No wage arrears	0.14	(0.90)	-0.66	(-2.42)	-0.66	(-3.31)
Nonzero hours	-0.20	(-1.07)	0.14	(0.36)	-0.52	(-2.20)
Age	0.02	(0.41)	-0.13	(-1.53)	-0.29	(-4.92)
Age squared/100	-0.01	(-0.21)	0.12	(1.11)	0.38	(4.85)
Female	-0.33	(-2.47)	-0.94	(-3.49)	0.11	(0.57)
Engaged in IEA	1.21	(2.61)	1.40	(1.95)	0.10	(0.13)
Has an additional job	-0.58	(-1.49)	0.09	(0.14)	0.15	(0.30)
North/North East	-0.58	(-1.70)	-1.47	(-1.74)	-0.42	(-0.76)
Central	-0.26	(-0.91)	-0.09	(-0.16)	0.25	(0.53)
Volga	-0.28	(-0.98)	-0.20	(-0.35)	0.20	(0.43)
North Caucasia	-0.36	(-1.17)	-0.18	(-0.31)	0.56	(1.20)
Ural	0.07	(0.24)	-0.18	(-0.32)	0.43	(0.93)
West Siberia	-0.06	(-0.18)	-1.01	(-1.49)	-0.12	(-0.24)
East Siberia	0.59	(1.96)	0.69	(1.22)	-0.11	(0.22)
Constant	-1.68	(-1.85)	1.19	(0.77)	4.01	(3.77)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthes

Table C10. Model 2

	(2)					
	Privatized		Job move		Nonempl	
	Coeff	t-value	Coeff	t-value	Coeff	t-value
University						
Special secondary						
General secondary						
Supervisory responsibility	-0.27	(-1.71)	-0.64	(-1.89)	-0.73	(-2.82)
White-collar occupation						
Hourly wage (th R)	-0.01	(-1.04)	-0.00	(-0.10)	-0.06	(-1.35)
No wage arrears	0.12	(-0.79)	-0.67	(-2.48)	-0.69	(-3.45)
Nonzero hours	-0.18	(-0.95)	0.19	(0.50)	-0.42	(-1.80)
Age	0.03	(0.62)	-0.13	(-1.58)	-0.31	(-5.36)
Age squared/100	-0.03	(-0.49	0.12	(1.19)	0.41	(5.42)
Female	-0.37	(-2.85)	-0.96	(-3.76)	0.02	(0.11)
Engaged in IEA	1.22	(2.64)	1.53	(2.11)	0.23	(0.30)
Has an additional job	-0.66	(-1.71)	-0.01	(-0.01)	-0.09	(-0.19)
North/North East	-0.46	(-1.35)	-1.37	(-1.63)	-0.20	(-0.36)
Central	-0.18	(-0.65)	-0.01	(-0.01)	0.41	(0.86)
Volga	-0.22	(-0.77)	-0.18	(-0.33)	0.31	(0.66)
North Caucasia	-0.29	(-0.93)	-0.11	(-0.19)	0.75	(1.58)
Ural	0.13	(0.47)	-0.11	(-0.20)	0.60	(1.28)
West Siberia	0.01	(0.04)	-0.96	(-1.43)	0.06	(0.11)
East Siberia	0.66	(2.21)	0.78	(1.40)	0.32	(0.62)
Constant	-1.72	(-1.91)	1.01	(0.65)	3.79	(3.53)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C10. Model 3

	(3)					
	Privatized		Job Move		Nonempl.	
	Coeff	t-value	Coeff	t-value	Coeff	t-value
University						
Special secondary						
General secondary						
Supervisory responsibility						
White-collar occupation	-0.84	(-5.66)	-0.98	(-3.40)	-1.27	(-5.88)
Hourly wage (th R)	-0.01	(-0.89)	-0.00	(-0.13)	-0.05	(-1.31)
No wage arrears	-0.18	(1.18)	-0.61	(-2.24)	-0.64	(-3.26)
Nonzero hours	-0.19	(-0.98)	0.17	(0.45)	-0.48	(-2.05)
Age	0.02	(0.36)	-0.15	(-1.81)	-0.33	(-5.63)
Age squared/100	-0.01	(-0.20)	0.15	(1.43)	0.43	(5.68)
Female	-0.03	(-0.18)	-0.57	(-2.11)	0.51	(2.43)
Engaged in IEA	1.23	(2.58)	1.49	(2.01)	0.07	(0.10)
Has an additional job	-0.62	(-1.58)	-0.01	(-0.01)	-0.02	(-0.03)
North/North East	-0.57	(-1.67)	-1.46	(-1.72)	-0.34	(-0.61)
Central	-0.21	(-0.74)	-0.04	(-0.07)	0.33	(0.71)
Volga	-0.23	(-0.81)	-0.20	(-0.35)	0.26	(0.57)
North Caucasia	-0.29	(-0.93)	-0.11	(-0.18)	0.70	(1.50)
Ural	0.08	(0.27)	-0.15	(-0.27)	0.53	(1.15)
West Siberia	-0.02	(-0.05)	-0.99	(-1.46)	-0.08	(-0.15)
East Siberia	0.59	(1.97)	0.69	(1.22)	0.19	(0.39)
Constant	-1.43	(-1.57)	1.43	(0.90)	4.38	(3.91)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

2 Chapter 4: Leaving Public Employment in East Germany

Table C3.

	1990 to 1991					
	(1)		(2)		(3)	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	0.15	(0.49)				
Special secondary	0.16	(0.64)				
General secondary	0.27	(1.08)				
White-collar occupation			-0.26	(-1.32)		
Apprenticeship					0.07	(0.42)
Hourly wage (DM)	-0.14	(-2.69)	-0.12	(-2.57)	-0.13	(-2.82)
Age	-0.06	(-1.00)	-0.06	(-0.96)	-0.07	(-1.09)
Age squared/100	0.07	(0.88)	0.06	(0.79)	0.07	(0.90)
Female	-0.66	(-3.79)	-0.57	(-3.14)	-0.65	(-3.78)
Engaged in IEA	0.81	(1.69)	0.84	(1.75)	0.82	(1.72)
Has an additional job	-0.29	(-0.79)	-0.32	(-0.87)	-0.30	(-0.80)
Constant	1.39	(1.31)	1.59	(1.54)	1.64	(0.11)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C3.

	1992 to 1993					
	(1)		(2)		(3)	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.07	(-0.19)				
Special secondary	-0.21	(-0.76)				
General secondary	0.13	(0.49)				
White-collar occupation			-0.80	(-3.53)		
Apprenticeship					0.44	(2.08)
Hourly wage (DM)	-0.42	(-3.45)	-0.34	(-2.97)	-0.40	(-3.48)
Age	-0.09	(-1.23)	-0.07	(-0.93)	-0.13	(-1.64)
Age squared/100	0.15	(1.61)	0.12	(1.29)	0.19	(1.97)
Female	-0.21	(-1.05)	0.07	(0.32)	-0.19	(-0.95)
Engaged in IEA	0.88	(0.94)	0.97	(1.04)	0.97	(1.04)
Has an additional job	0.27	(0.49)	0.33	(0.60)	0.32	(0.58)
Mecklenburg-Vorpommern	-0.28	(-0.66)	-0.37	(-0.85)	-0.26	(-0.60)
Brandenburg	-0.51	(-1.21)	-0.61	(-1.44)	-0.53	(-1.24)
Sachsen-Anhalt	-0.31	(-0.78)	-0.37	(-0.92)	-0.31	(-0.79)
Thueringen	0.01	(0.02)	-0.04	(-0.10)	-0.04	(-0.11)
Saxony	-0.29	(-0.77)	-0.35	(-0.93)	-0.30	(-0.79)
Constant	1.58	(1.22)	1.31	(1.00)	1.97	(1.50)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C3.

	1994 to 1995					
	(1)		(2)		(3)	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	0.32	(0.83)				
Special secondary	-0.08	(-0.24)				
General secondary	0.11	(0.31)				
White-collar occupation			-0.59	(-2.16)		
Apprenticeship					0.09	(0.40)
Hourly wage (DM)	-0.33	(-3.64)	-0.27	(-2.87)	-0.32	(-3.53)
Age	-0.04	(-0.46)	-0.03	(-0.35)	-0.05	(-0.53)
Age squared/100	0.07	(0.59)	0.05	(0.49)	0.07	(0.63)
Female	-0.47	(-1.96)	-0.28	(-1.07)	-0.49	(-2.03)
Engaged in IEA	0.80	(0.71)	0.85	(0.86)	0.82	(0.78)
Has an additional job	-0.15	(-0.22)	0.04	(0.06)	-0.05	(-0.08)
Mecklenburg-Vorpommern	0.50	(0.87)	0.43	(0.76)	0.49	(0.86)
Brandenburg	0.44	(0.79)	0.38	(0.69)	0.43	(0.77)
Sachsen-Anhalt	0.33	(0.60)	0.31	(0.56)	0.34	(0.61)
Thueringen	0.62	(1.12)	0.55	(0.98)	0.61	(1.10)
Saxony	-0.17	(-0.32)	-0.25	(-0.45)	-0.18	(-0.33)
Constant	0.55	(0.34)	-0.39	(0.25)	0.69	(0.43)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C3.

	1996 to 1997					
	(1)		(2)		(3)	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.80	(-1.79)				
Special secondary	-0.94	(-2.45)				
General secondary	-0.66	(-1.83)				
White-collar occupation			-0.72	(-2.51)		
Apprenticeship					0.23	(0.85)
Hourly wage (DM)	-0.09	(-2.42)	-0.10	(-2.78)	-0.11	(-3.05)
Age	-0.08	(-0.85)	-0.04	(-0.42)	-0.10	(-1.04)
Age squared/100	0.09	(0.78)	0.06	(0.50)	0.13	(1.07)
Female	-0.14	(-0.53)	0.03	(0.11)	-0.20	(-0.76)
Engaged in IEA	0.79	(0.69)	0.87	(0.76)	0.77	(0.67)
Has an additional job	-0.05	(-0.06)	-0.06	(-0.08)	-0.15	(-0.19)
Mecklenburg-Vorpommern	-0.50	(-0.85)	-0.57	(-0.98)	-0.54	(-0.92)
Brandenburg	-0.49	(-0.87)	-0.42	(-0.75)	-0.51	(-0.92)
Sachsen-Anhalt	0.02	(0.05)	-0.00	(-0.01)	0.01	(0.01)
Thueringen	-0.04	(-0.08)	0.02	(0.04)	-0.01	(-0.01)
Saxony	-0.28	(-0.56)	-0.27	(-0.56)	-0.29	(-0.60)
Constant	2.08	(1.29)	0.92	(0.56)	1.92	(1.19)

Note: Coefficients from logit models, robust t-statistics in parenthesis.

Table C4, Models 1 and 2.

	(1)				(2)			
	Private		Nonempl.		Private		Nonempl.	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	0.16	(0.43)	0.29	(0.58)				
Special secondary	0.18	(0.60)	0.30	(0.84)				
General secondary	0.49	(1.65)	-0.17	(-0.44)				
White-collar occupation					-0.44	(-2.00)	0.19	(0.60)
Apprenticeship								
Hourly wage (DM)	-0.09	(-1.49)	-0.25	(-2.87)	-0.07	(-1.33)	-0.22	(-2.78)
Age	0.09	(1.24)	-0.29	(-3.30)	0.10	(1.36)	-0.29	(-3.33)
Age squared/100	-0.16	(-1.58)	0.40	(3.56)	-0.18	(-1.79)	0.41	(3.60)
Female	-0.92	(-4.55)	0.02	(0.07)	-0.78	(-3.67)	-0.02	(-0.06)
Engaged in IEA	0.13	(0.20)	1.52	(2.66)	0.21	(0.30)	1.50	(-2/64)
Has an additional job	-0.00	(-0.01)	-1.54	(-1.48)	-0.06	(-0.15)	-1.49	(-1.44)
Constant	-1.66	(1.26)	4.13	(2.70)	-1.32	(-1.02)	3.86	(2.68)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C4, Model 3.

	(3)			
	Private		Nonempl.	
Variable	Coeff	t-value	Coeff	t-value
University				
Special secondary				
General secondary				
White-collar occupation				
Apprenticeship	0.21	(1.04)	-0.23	(-0.90)
Hourly wage (DM)	-0.09	(-1.59)	-0.21	(-2.86)
Age	0.08	(1.10)	-0.27	(-3.10)
Age squared/100	-0.15	(-1.54)	0.38	(3.38)
Female	-0.90	(-4.52)	0.03	(0.10)
Engaged in IEA	0.17	(0.25)	1.50	(2.62)
Has an additional job	-0.02	(-0.05)	-1.51	(-1.46)
Constant	-1.20	(-0.93)	3.71	(2.60)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C5, Models 1 and 2.

	(1)				(2)			
	Private		Nonempl.		Private		Nonempl	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-0.20	(-0.39)	0.03	(0.06)				
Special secondary	0.02	(0.05)	-0.41	(-1.12)				
General secondary	0.20	(0.55)	0.07	(0.19)				
White-collar occupation					-0.61	(-2.01)	-0.98	(-3.32)
Apprenticeship								
Hourly wage (DM)	-0.50	(-2.99)	-0.35	(-2.20)	-0.45	(-2.83)	-0.23	(-1.60)
Age	0.03	(0.32)	-0.20	(-2.07)	0.05	(0.48)	-0.17	(-1.85)
Age squared/100	-0.01	(-0.04)	0.29	(2.36)	-0.03	(-0.23)	0.26	(2.14)
Female	-0.36	(-1.33)	-0.05	(-0.21)	-0.13	(-0.44)	0.28	(0.98)
Engaged in IEA	0.92	(0.78)	0.84	(0.70)	1.03	(0.88)	0.92	(0.78)
Has an additional job	0.38	(0.55)	0.15	(0.19)	0.47	(0.69)	0.15	(0.19)
Mecklenburg-Vorpommern	-0.99	(-1.61)	0.28	(0.48)	-1.04	(-1.69)	0.17	(0.29)
Brandenburg	-0.56	(-1.06)	-0.41	(-0.67)	-0.61	(-1.16)	-0.56	(-0.91)
Sachsen-Anhalt	-0.64	(-1.26)	0.06	(0.11)	-0.66	(-1.30)	-0.04	(-0.07)
Thueringen	-0.47	(-0.91)	0.48	(0.86)	-0.50	(-0.97)	0.41	(0.74)
Saxony	-0.23	(-0.51)	-0.36	(-0.64)	-0.27	(-0.58)	-0.46	(-0.82)
Constant	-0.93	(-0.51)	2.26	(1.38)	-1.03	(-0.57)	1.92	(1.17)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C5, Model 3.

	(3)			
	Private		Nonempl.	
Variable	Coeff	t-value	Coeff	t-value
University				
Special secondary				
General secondary				
White-collar occupation				
Apprenticeship	0.47	(1.62)	0.41	(1.48)
Hourly wage (DM)	-0.47	(-3.00)	-0.33	(-2.20)
Age	-0.00	(-0.04)	-0.33	(-2.37)
Age squared/100	0.04	(0.27)	0.33	(2.63)
Female	-0.32	(-1.19)	-0.05	(-0.17)
Engaged in IEA	1.06	(0.91)	0.91	(0.77)
Has an additional job	0.47	(0.69)	0.17	(0.22)
Mecklenburg-Vorpommern	-0.95	(-1.54)	0.28	(0.49)
Brandenburg	-0.55	(-1.05)	-0.45	(-0.74)
Sachsen-Anhalt	-0.62	(-1.22)	0.03	(0.06)
Thueringen	-0.53	(-1.01)	0.42	(0.77)
Saxony	-0.23	(-0.51)	-0.38	(-0.69)
Constant	-0.50	(-0.27)	2.68	(1.61)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C6, Models 1 and 2.

	(1)				(2)			
	Private		Nonempl.		Private		Nonempl	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	0.51	(1.13)	-0.19	(-0.29)				
Special secondary	0.54	(1.31)	1.78	(-2.37)				
General secondary	0.49	(1.08)	-0.65	(-1.11)				
White-collar occupation					-0.40	(-1.26)	-0.95	(-2.07)
Apprenticeship								
Hourly wage (DM)	-0.23	(-2.18)	-0.58	(-3.41)	-0.16	(-1.60)	-0.53	(-3.05)
Age	-0.06	(-0.65)	0.08	(0.53)	-0.06	(-0.56)	0.05	(0.32)
Age squared/100	0.08	(0.63)	-0.07	(-0.33)	0.06	(0.51)	0.00	(0.02)
Female	-0.76	(-2.68)	-0.28	(-0.63)	-0.59	(-1.94)	0.47	(1.00)
Engaged in IEA	1.10	(1.01)	31.99	(0.00)	1.22	(1.13)	-34.20	(0.00)
Has an additional job	-0.11	(0.17)	-32.38	(0.00)	0.31	(0.47)	-34.29	(0.00)
Mecklenburg-Vorpommern	0.56	(0.89)	0.29	(0.24)	0.58	(0.92)	-0.05	(-0.04)
Brandenburg	0.29	(0.46)	0.74	(0.65)	0.32	(0.52)	0.53	(0.47)
Sachsen-Anhalt	-0.07	(-0.11)	1.10	(1.00)	-0.03	(-0.04)	0.91	(0.83)
Thueringen	0.66	(1.08)	0.43	(0.38)	0.54	(1.06)	0.30	(0.26)
Saxony	-0.32	(-0.52)	0.20	(0.18)	-0.34	(-0.56)	-0.01	(-0.01)
Constant	0.21	(0.11)	-2.10	(-0.76)	0.40	(0.23)	-2.17	(-0.81)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C6, Model 3.

	(3)			
	Private		Nonempl.	
Variable	Coeff	t-value	Coeff	t-value
University				
Special secondary				
General secondary				
White-collar occupation				
Apprenticeship	-0.21	(-0.73)	0.79	(1.87)
Hourly wage (DM)	-0.21	(-2.10)	-0.62	(-3.65)
Age	-0.04	(-0.41)	-0.03	(-0.20)
Age squared/100	0.04	(0.34)	0.09	(0.48)
Female	-0.77	(-2.75)	0.19	(0.45)
Engaged in IEA	1.15	(1.02)	-42.54	(0.00)
Has an additional job	0.22	(0.34)	-43.34	(0.00)
Mecklenburg-Vorpommern	0.62	(1.00)	0.14	(0.12)
Brandenburg	0.34	(0.54)	0.72	(0.64)
Sachsen-Anhalt	-0.02	(-0.03)	1.00	(0.90)
Thueringen	0.69	(1.14)	0.43	(0.38)
Saxony	-0.30	(-0.48)	0.15	(0.13)
Constant	0.37	(0.20)	-1.20	(-0.44)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C7, Models 1 and 2.

	(1)				(2)			
	Private		Nonempl.		Private		Nonempl	
Variable	Coeff	t-value	Coeff	t-value	Coeff	t-value	Coeff	t-value
University	-1.07	(-1.81)	-0.45	(-0.72)				
Special secondary	-0.61	(-1.30)	-1.50	(-2.43)				
General secondary	-0.68	(-1.52)	-0.55	(-1.08)				
White-collar occupation					-0.47	(-1.29)	-1.07	(-2.54)
Apprenticeship								
Hourly wage (DM)	-0.10	(-2.07)	-0.07	(-1.44)	-0.11	(-2.48)	-0.08	(-1.55)
Age	-0.02	(-0.18)	-0.14	(-1.12)	0.00	(0.03)	-0.09	(-0.72)
Age squared/100	0.01	(0.04)	0.20	(1.19)	-0.01	(-0.07)	0.15	(0.89)
Female	-0.26	(-0.78)	0.04	(0.10)	-0.12	(-0.36)	0.27	(0.65)
Engaged in IEA	1.25	(1.15)	-32.25	(0.00)	1.46	(1.25)	-34.26	(0.00)
Has an additional job	0.51	(0.63)	-32.65	(0.00)	0.48	(0.60)	-34.63	(0.00)
Mecklenburg-Vorpommern	-1.06	(-1.35)	0.15	(0.17)	-1.15	(-1.47)	0.13	(0.15)
Brandenburg	-0.43	(-0.66)	-0.58	(-0.60)	-0.43	(-0.67)	-0.37	(-0.38)
Sachsen-Anhalt	-0.40	(-0.64)	0.61	(0.74)	-0.45	(-0.73)	0.65	(0.79)
Thueringen	-0.20	(-0.32)	0.25	(0.29)	-0.18	(-0.28)	0.41	(0.48)
Saxony	-0.30	(-0.54)	-0.22	(-0.27)	-0.35	(-0.62)	-0.11	(-0.13)
Constant	1.02	(0.51)	1.56	(0.69)	0.17	(0.08)	0.11	(0.05)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.

Table C7, Model 3.

	(3)			
	Private		Nonempl.	
Variable	Coeff	t-value	Coeff	t-value
University				
Special secondary				
General secondary				
White-collar occupation				
Apprenticeship	0.07	(0.21)	0.43	(1.12)
Hourly wage (DM)	-0.12	(-2.65)	-0.09	(-1.82)
Age	-0.03	(-0.22)	-0.19	(-1.41)
Age squared/100	0.03	(0.16)	0.26	(1.53)
Female	-0.29	(-0.88)	-0.07	(-0.17)
Engaged in IEA	1.39	(1.18)	-32.40	(-0.00)
Has an additional job	0.41	(-0.52)	-32.73	(-0.00)
Mecklenburg-Vorpommern	-1.13	(-1.45)	-0.18	(0.20)
Brandenburg	-0.49	(-0.77)	-0.52	(-0.54)
Sachsen-Anhalt	-0.45	(-0.73)	0.67	(0.82)
Thueringen	-0.19	(-0.32)	0.34	(0.40)
Saxony	-0.36	(-0.65)	-0.14	(-0.17)
Constant	0.71	(0.35)	1.73	(0.76)

Note: Coefficients from multinomial logit models, robust t-statistics in parenthesis.