Labor Market Outcomes During the Russian Transition

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EFI THE ECONOMIC RESEARCH INSTITUTE

Dissertation for the Degree of Doctor of Philosophy, Ph.D in Economics, Stockholm School of Economics 2009.

ISBN 978-91-7258-787-8

Keywords: regional labor markets, wages, employment, non-wage benefits, labor turnover, labor attachment, occupational change, health, migration, Russia

Printed by:
Elanders, Vällingby 2009

Distributed by:
EFI, The Economic Research Institute
Stockholm School of Economics
Box 6501, SE-113 83 Stockholm, Sweden
www.hhs.se/efi

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Acknowledgements

Throughout my PhD studies at the Stockholm School of Economics I received help and support from many people. I thank my advisor Magnus Johannesson who was always there to answer my questions and to give a valuable feedback on my work. I also thank my co-author Tuuli Juurikkala for the very productive and exciting work on the two papers included in this thesis. Our joint papers have resulted from the Helsinki School of Economics project *"Infrastructure and Welfare Services in Russia: Enterprises as Beneficiaries and Service Providers",* financed by the Academy of Finland (project number 200936), the World Bank, and the Yrjö Jahnsson Foundation. I am indebted to the Stockholm Institute of Transition Economies at SSE - both its previous team headed by Erik Berglof and the current team headed by Torbjorn Becker – for the financial, intellectual, administrative and friendly support during my studies. Finally, my colleagues at the Centre for Economic and Financial Research in Moscow have provided continuous support and encouragement and have formed an excellent research environment for my work on this thesis.

Contents

Introduction

Transition from planned to market economy is a profound change in all aspects of life of the country and its citizens. Transformation of the labor market is only one but very important part of transition which touched upon the life of each and every person in Russia. Structural reforms, which included opening of international trade, removing price controls, privatization of state-owned enterprises, lead to the massive shifts in the structure of labor demand. Declining wages and lost jobs in many industrial sectors, new job and entrepreneurship opportunities in the emerging trade and services sectors, changing structure of compensation, rapid devaluation of accumulated human capital and the need to acquire new skills – all these changes were tough and stressful for many people. Yet these transformations are exciting for a researcher as they represent a huge natural experiment where external shocks affected different economic agents (firms and individuals) differently and changed their incentives. Labor economists can learn a great deal from studying the ways in which individuals and firms adjust to these challenges.

This thesis includes four papers (four chapters) that study only some aspects of the labor market transformation during the transition in Russia. First two papers are co-authored with Tuuli Juurikkala and based on the data from the survey of Russian firms carried out in 2003 within the project headed by the team of researchers from Helsinki School of Economics. These papers study the role of non-wage part of compensation provided by firms to their workers. Non-wage benefits in the form of in-kind services (housing, medical care, day care) to the employees were often provided by enterprises in the planned economy. During the transition the legal status and the role of these benefits in the employee compensation was changing.

The first paper looks at the outcomes of the reform introduced in the early 1990ies during which formerly state-owned enterprises were obliged to transfer their "social assets" (in particular, housing for the employees) to the municipalities. We show that the firms were bargaining for various forms of support from local authorities in return for keeping the burdensome asset longer, and the outcome of this bargaining process was affected by the fiscal incentives of municipalities and the lobbying power of firms. In the second paper we study the ways in which firms use non-wage benefits in the form of in-kind services to attach employees in the tight labor market in order to reduce their costs of labor turnover. Their ability to follow this strategy crucially depends on the level of development of the housing, medical services and other services markets in the region.

The third chapter of the thesis is devoted to the study of labor market outcomes for the Russian migrants to Russia. This empirical work uses individual level data from the Russian Longitudinal Monitoring Survey. The collapse of the Soviet Union has given rise to the large

cross-border migration movements among its former republics. The largest of these movements was the move of about five million Russian and Russian-speaking people from all former Soviet Union countries to Russia. Russian migration to Russia is a unique phenomenon that has the features of both internal and international migration and allows us to study the location choices of migrants in the conditions of segmented regional labor markets. I test whether migrants sorted across locations according to the relative demand for their skills and show that labor market position of migrants relative to locals depends on the number of other migrants in the location, i.e. migrants compete for the jobs with fellow migrants rather than with locals.

The last chapter of the thesis presents the study of the health effects of occupational change in Russia. It is also based on the data from the Russian Longitudinal Monitoring Survey. The major structural shifts in the Russian economy during 1990ies, when production in some sectors has collapsed almost to zero while other sectors were created from scratch, has given rise to the massive occupational switches. Almost half of working age population in Russia has changed their occupations during 1990ies and many of these changes were unexpected, undesired and involved major shifts in skills requirements. Going from the successful electrical engineer with 20 years of experience in a research institute to the entrepreneur and business owner in the personal services sector (like my mother) or going from the high-rank engineer in the nuclear fuel plant to the banking sector specialist (like my father) is a dramatic change of career that is stressful for a person in many ways. In the last paper I estimate the effect of the forced occupational change on the individual health level, alcohol consumption and smoking, adjusting for endogeneity problem. I show that people who had to change an occupation have worse health, smoke and drink more compared to people who stayed in the same occupation throughout the transition years. The negative effect on health is prolonged in time and non-negligible in economic terms.

The implications of these studies are not limited to the transition economies. They help to better understand how the firms and individuals in the labor market adjust to the large-scale structural changes that can be brought about by technological progress or by growing openness of economies to the international competition in the globalizing world.

Chapter 1. Weak Fiscal Incentives and Bargaining between Firms and Municipalities: Evidence from Housing Divestment in Russia

with Tuuli Juurikkala

In the planned economy firms were made responsible for providing their workers with social services, such as housing, day care and medical care. In the transforming Russia of the 1990s, social assets were to be transferred from industrial enterprises to the public sector. The conditions of transfer were subject to bargaining between local authorities and firms. We utilize unique survey data from 404 industrial enterprises in 40 Russian regions to explore the divestiture process of housing assets from firms to municipalities. Our results show that in municipalities with weaker fiscal incentives firms used housing as a leverage to extract budget assistance and other forms of preferential treatment from local authorities.

1. Introduction

Of the reforms that Russia has undergone during the transition period, the municipalization of social assets has been perhaps undeservedly neglected in the past few years. By the end of the Soviet era some 40% of total housing stock was held by industrial enterprises. The situation was similar for day care, medical care, recreation facilities and other social assets.[1] Despite formally belonging to the state, these assets were in fact operated by firms and in this sense were in firms' ownership, *de facto* if not *de jure*.

From the beginning of the 1990s, the Russian Federation government has been three-tiered, with federal, regional and municipal layers. In principle, the social service provision is delegated to the local level. During the mass privatization of industrial enterprises (1991-1994), the major part of social assets operated by enterprises should have been transferred to municipal ownership. The institution of municipal ownership itself was created at the same time. Federal legislation on the municipalization of social assets provided only general principles and much was left for local authorities to decide. Thus, for a period of several years, property rights concerning the major part of social assets, most notably housing, were not properly defined. Previous literature emphasizes the importance of property rights for economic development and growth (Libecap 1989, Murphy et al. 1993).

[1] See Leksin and Shvetsov (1999)

In this paper we use data from a unique survey of 404 medium and large Russian industrial enterprises to study the transfer of housing from firms to municipalities. The data shows that there is much variation across firms in the timing of transfer to municipalities, which started already in 1991 and for some firms continued even into 2003 and beyond. According to the survey results, even within a single municipality, the timing of divestment can vary considerably. We exploit this variation to study the interaction of firms and local governments in a weak institutional environment.

The focus of our analysis is thus on the political economy of reform. In particular we test the effect of fiscal incentives of local authorities, or lack thereof, on the timing of housing divestment. Firms and local authorities are often involved in bilateral bargaining over the distribution of benefits such as budget subsidies and tax cuts. This is especially true for the transition environment with poorly defined property rights (see e.g. Shleifer and Vishny 1994, Sonin 2003, Slinko et al. 2005). We argue that the timing of housing divestiture in part depends on the ability of firms to use assets under their control as leverage in bargaining with municipalities. This ability arises from the fact that social assets are a financial burden to the municipality just as they are to the firm, since housing and utilities, and other social services, were and still are heavily subsidized for Russian consumers[2]. The municipality has a choice whether to accept the housing assets and cover all the costs or to bear the risk that the firm will under-finance the assets or abandon them altogether, which would have grave social and political consequences at the local level.

In return for holding social assets longer, Russian firms have in many occasions received various kinds of state budget support ranging from restructuring of tax arrears to direct subsidies to favorable prices on inputs or purchases. It has been argued that the most common way to compensate firms for holding assets is preferential restructurings of tax arrears and that more than half of the firms that were allowed to restructure their tax arrears were not formally eligible for that. Although there are examples of firms and municipalities achieving formal agreements on the use and joint financing of social assets, a significant share of these issues has been governed by informal relations.

The results of our empirical analysis confirm that firms which still held housing in 2003 were receiving more in terms of budget assistance, were more likely to have their tax arrears restructured, and were more involved in trade with the public sector (presumably on favorable terms).

[2] E.g. for housing and communal services the federal standard for the percentage of costs covered by users was 90% in 2003, while the actual average rate was around 60%, with substantial variation across regions.

In our analysis we draw on the recent literature on fiscal incentives at regional and municipal levels of government.[3] Zhuravskaya (2000) has shown that the fiscal incentives of municipalities in Russia were quite weak during the 1990s, which had an adverse effect on public service provision and the development of local businesses. Further, Makrushin et al. (2003) have shown that weaker fiscal incentives are found in larger and richer municipalities which are able to collect more own incomes, as any additional income they collect is taxed away by regional governments in the form of reduced budget transfers. Consequently, such municipalities have no interest in developing their tax base. Instead, they may allow large local firms to divert taxes from upper level budgets in return for certain favors to the local authorities (Sonin 2003), in our case upkeep of housing.

Our results corroborate previous findings. In municipalities with weaker fiscal incentives (i.e. those with higher shares of own budget revenues, which are, mostly larger cities) firms divested their housing assets later. Moreover, within these municipalities, firms having greater political power (i.e. ability to influence laws and regulations) were also holding on to housing for a longer time. We also find that firms facing more competition in product markets divested later, which may indicate that social assets are used by uncompetitive firms to lobby for protection by the authorities. Thus the presence of housing or other social assets, for some firms, turned out to be a special kind of soft budget constraint that should have a negative effect on their performance and restructuring.

In the following, we first describe the housing divestment process in Russia and touch briefly on the state of housing and other social service provision by firms as revealed by our survey results. We then draw our testable hypotheses from the theoretical literature on sub-national level fiscal incentives and from previous empirical literature on fiscal incentives in Russia, to which we also aim to contribute. The empirical sections include a description of the data and methodology and the discussion of our findings. The last section concludes.

2. Housing divestment in the 1990s

In this section we describe the setup of the reform, and the process and results of housing divestiture, based on the existing literature and statistics as well as using the data from our survey. The divestiture reform involved not only housing but also other types of social assets in firms, such as medical facilities, day care and recreational facilities. We will, however, focus only on housing as it was by far the largest and most important part of social services kept by

[3] For a more general description of regional patterns of economic change in Post-Soviet Russia, see e.g. Hanson (2000) in Murakami and Tabata (eds), or Hanson and Bradshaw (2000). By 2000 the role of the federal government in equalizing intra- or inter-regional income differences had been small, regional development programs were underfunded, and central government in general had little credibility among regional leaders.

industrial enterprises at the start of the transition. Housing is the most burdensome of the social assets – maintenance costs of housing stock were the largest item of firms' social service expenditures in 2003. Besides, housing is arguably more important for the local community from a social point of view than are other types of assets, making it a powerful bargaining tool.

2.1 Setup for the divestment of housing

According to Leksin and Shvetsov (1998, 1999), by 1992 not more than a third of the total housing stock in Russia was privately owned (mostly individual houses in rural areas). The rest was public, i.e. state-owned, housing and included municipal housing (25.7 percent of total housing stock) and departmental (*vedomstvennoe*) housing that existed within branch ministries and was managed by the enterprises (41 percent of total housing stock). In 1994, a third of the firms with fewer than 500 employees provided housing, while all enterprises with more than 10 000 employees did so. It is important to note that the housing assets within firms were never legally in these firms' ownership: at the time of mass privatization in the early 1990s, they were in federal state ownership and were to be transferred to municipal ownership.

In fact, by the start of the transition period, the social infrastructure within firms had already long ago become semi-municipal (Leksin and Shvetsov, 1998). Up to 50% of those who consumed these social services were not employees of the enterprise in question. Thus firms partly financed the municipal social infrastructure. The quality of the services provided by the enterprise sector was generally better than that provided by municipal sector. The amount of social spending by enterprises in 1992 was the equivalent of almost 4% of GDP.

Basic legal documents requiring divestiture of housing and the bulk of social assets within six months after the enterprise was privatized were adopted in 1992-1993. A gradualist approach was taken in the sense that, instead of privatization, the assets were to be divested to local authorities, which were made responsible for the provision of the services[4]. Local authorities had considerable discretion over the organization of the divestiture process.

In spite of the obvious importance of large scale transfer of social assets by enterprises to municipality ownership, there was never a federal law regulating this process. Instead, the reform was regulated by a series of legal acts, enactments, and decrees at all levels of government. Many important acts were introduced with delays, sometimes only several years after the start of the actual process of transfer, when the most acute problems had surfaced.

[4] Most of the housing to be transferred to municipalities consisted of apartment buildings. Individual apartments in these buildings could have been privatized by people living there and most of them were privatized during the 1990s. However the building itself and its common facilities were transferred to municipal ownership and municipality had the responsibility to manage these facilities, provide maintenance, repair and other services.

The formation of municipal ownership of social and infrastructure assets started before mass privatization in 1991-1992. *Enactment by Higher Council of Russian Federation № 3020-1 on December 27, 1991* established the division of state ownership into federal ownership, ownership of subjects of federation and municipal ownership. This act defined the categories of assets which should be transferred to municipal ownership irrespective of who owned them or had them on their balance sheets previously. They were:

- housing and other buildings
- enterprises servicing housing and other social assets
- infrastructure objects, city transport etc

Another *Enactment by President № 114-RP on March 18, 1992* established the procedures for the transfer of social and infrastructure assets, according to which the municipal level property committee compiled a list of objects to be included in municipal ownership, and a higher level government confirmed the list.

As for the social assets held by enterprises, enterprises never owned them during the Soviet era, as all assets were state owned, but they kept assets on their balance sheets. With the start of the mass privatization of enterprises, these assets should have been either privatized or transferred to municipalities. *Presidential Decree № 8 on January 10, 1993* listed the objects which could be included in the privatized assets of the firm with the requirement of keeping their profile. These included social and cultural objects (health, education, culture and sports facilities), consumer services (laundry, hairdressers etc.). Decree also listed the assets that could not be privatized by firms:

- Buildings occupied by trading, catering, consumer services establishments, organizations of social security for children, elderly and disabled
- Day care and children's summer facilities
- Regional transport and electricity infrastructure
- Medical facilities servicing population of city/region
- Housing and related service facilities

All these assets were defined to be under federal state ownership and should have been transferred to municipal ownership. Further, several legal acts of the State Property Committee were issued to clarify the procedures for transferring the assets listed above from firms to municipalities (again, municipalities were responsible for compiling the list of objects to be transferred to municipal ownership). The Decree and further acts also enabled agreements between municipality and firm on the joint usage and financing of transferred assets. There were other provisions concerning the means of financing transferred objects. *The State Privatization Program* introduced at the end of 1993 did not add anything new to the previous legal acts

except that it set the time limit: the municipality was obliged to accept non-privatized social assets during the six months following acceptance of the firm's privatization plan. The adoption of a firm's privatization plan then in practice initiated the process of the transfer of these assets to municipal ownership. Further problems and questions arising during the process of municipalization of social assets were solved through multiple minor acts issued by different government bodies at all levels of government and in some cases through the courts.

2.2 The divestment process and its results

The transfer of social assets was supposed to be completed by the end of 1997 and indeed the majority of assets were transferred by then (Leksin and Shvetsov 1998, Commander and Schankerman 1997). Roughly 80% of the housing stock became municipally owned during 1993-1997.

Starodubrovskaya (2002) accredits the perceived success in asset transfer to a large extent to the 1.5% local turnover tax introduced in 1995-1996 to finance housing and social facilities. As long as enterprises continued to hold the social assets, they could deduct their social expenditures from this tax. Before its abolishment in the 2000 tax reform, the turnover tax provided a mechanism allowing municipalities to receive additional funding after the transfer with no mediation by regional or federal governments, and was actually the "only serious local tax in the Russian tax system". After the tax reform, federal subsidies remained the only source of financing the housing that was transferred to municipal ownership. Municipalities could also make formal agreements with firms for the joint financing of transferred assets.

Of the 404 firms that we surveyed [5], over 90% report having at least some kind of social assets in 1990, and over 90% still provided or supported at least one service in 2003, though the scale of firms' participation in social service provision has diminished significantly during the last decade (see Table 1). In general, there has been a switch from holding assets to other forms of support, such as direct subsidies to employees. Larger firms are more likely to still be holding social assets and bear higher costs to support them relative to wage bill. Moreover, general managers of the larger firms are less eager to divest their current social assets than managers of firms with fewer than 500 employees.

[5] See data description in Section 4.

Table 1 Social asset provision: information from firm survey

Percent of total 404 firms that…	Housing	Medical care	Day care	Recreation
Had in 1990	78.5	76.7	69.8	38.2
Have in 2003	39.5	78.5	11.9	25.9
Spent money on municipal assets in 2002	11.6	15.4	16.6	5.7
Of those who have:				
Deem it profitable	1.9	1.3	2.1	4.8
Want to get rid of (sell or transfer)	70.7	12.4	46.8	29.4
Of those who want to get rid of:				
Local authorities would agree to accept	42.7	35.9	63.6	40.0
Have legal or admin. barriers to selling	38.9	35.9	31.8	23.3

In 1990, almost 80% of the 404 surveyed firms provided housing to their employees. Of those that did, nearly 60% have subsequently fully divested and almost all have divested either fully or partially.[6] In most cases, divested assets went to the municipality, but for more than 20% of the firms that held housing in 1990 at least some apartments have been sold to other parties. In the spring of 2003, over half of the surveyed social managers reported that their respective firms still had housing or provided housing support in some other form, mostly through direct subsidies. It is also striking that for over the half of the firms offering this benefit, the occupants are not only employees and their families. This is a result of the peculiar functioning of the Soviet housing "market", where people could not buy or sell apartments but could exchange them.

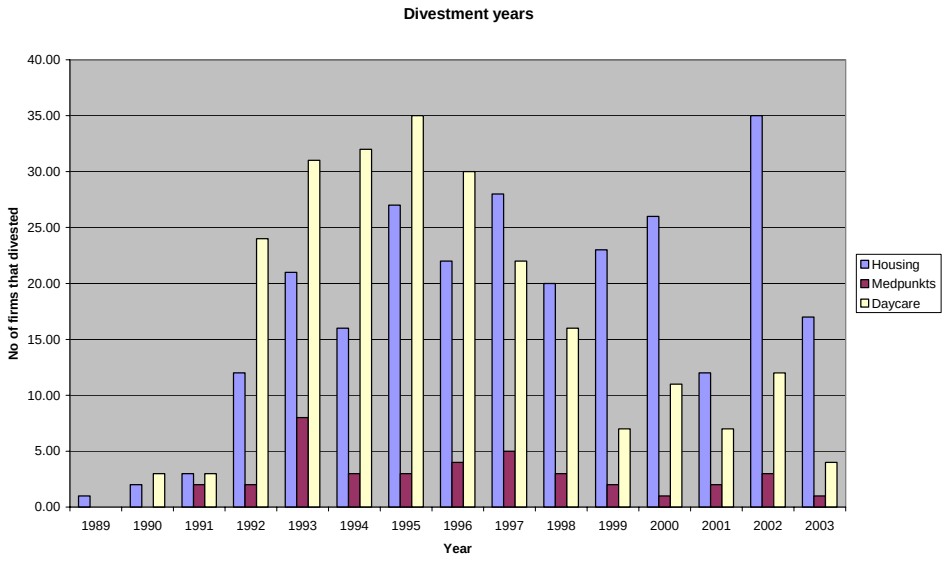
Importantly, the pace of divestiture of housing varied considerably in different locations - the share of municipalized assets was between 15% and 100% by the end of 1990s. Starodubrovskaya (2001, 2002) argues that this was a result of complex relationships and incentive structures between the main players - enterprise management, local and regional governments, trade unions (in some cases), and different segments of the population.

In line with previous studies, our data indicate that both the speed and scope of divestiture differ by asset type and locality. The majority of day care facilities were divested in the middle of the 1990s, while housing divestment has continued quite actively to the present time. Figure 1 shows the annual number of firms that carried out their last divestment of assets

[6] Full divestment includes firms that closed down the operations of social services, even if they did not in fact divest related assets, e.g. buildings

between 1990 and 2003[7]. The average firm in the sample had by 2003 divested 75% of its housing and 86% of its day care capacity. [8]

Figure 1 Number of firms reporting last divestment, yearly



When asked about the main reasons for the divestments that took place during the last three years, a clear majority of the general managers said that the assets were an excessive burden on the firm. Of the firms that provided certain services in 2003, less than 5% of the general managers per asset deemed them profitable. As Table 1 shows, the majority of firms that still held housing in 2003 wanted to divest it. Only a handful had the opportunity to sell the assets profitably, whereas many – about a third for housing, medical care, and day care - had been waiting for the municipality to finally accept the assets. Many managers still think their relations with municipalities would worsen should the firm sell the assets. More than a third of those who would like to divest their housing and day care faced legal or administrative barriers to selling them in the market, as they did not legally own them.

3. Theoretical background and empirical evidence on sub-national fiscal incentives in Russia

In this section we formulate our main hypotheses about the determinants of housing divestment timing. We build our argumentation on the bulk of theoretical and empirical literature

[7] The firm may have divested before this year and may still have some assets left (though the majority was divested) but it did not divest after this date.
[8] Slower divestment of housing relative to day care may also be due to the fact that the share of expenses covered by user fees is typically higher for housing than for day care.

on sub-national fiscal incentives in Russia. These studies show that the regional or local authorities may have incentives to collude with firms when their fiscal incentives are weak. We develop testable implications of this literature for the particular case of housing divestment.

From the beginning of the 1990s, the Russian Federation government has been three-tiered, with federal, regional and local-level governments. Budgetary incomes for the local and regional governments consist of their own revenues (taxes and other revenues accruing to their budget) and transfers from upper-level budgets. The fiscal incentives of the sub-national governments, i.e. their incentives to develop their own tax base in order to improve public service provision, depend on the composition of these incomes and rules that determine inter-budgetary income distribution [9].

Fiscal incentives of the local and regional authorities are modeled in a number of studies. Shleifer and Treisman (2000) find seeds for incentive problems in the Russian system of regional autonomy coupled with local non-autonomy. Such a system provides incentives for the local authorities to treat firms as a source of revenue, by-passing higher level government.

Zhuravskaya (2000) models a situation where local authorities' revenue increases are offset by reductions in transfers from upper level government, leaving them with little incentives to provide public services. Local authorities in her model instead concentrate on revenue extraction from the local firms. She confirms this finding on a dataset of large Russian cities.

Alexeev and Kurlyandskaya (2003) use data from a Russian region to show that transfers from upper-level budgets indeed offset changes in municipal revenues, although according to their results, adjustment comes with a lag due to regional government commitment problems. This leads to a situation where local government has no incentives to improve business climate in the locality in order to increase its tax base.

As shown empirically by Makrushin et al (2003), in Russia it is the larger and richer municipalities that have typically the weakest fiscal incentives, as any additional income they collect is taxed away by a higher level government.

Sonin (2003) argues that in the regions with high shares of productive enterprises, i.e. extensive own tax base, the governor of the region can protect enterprises from federal taxes in return for bribes or other concessions from the firms. The same logic is applicable to the local level. From a panel of 72 Russian regions, Timofeev (2002) finds evidence of persistent subsidies from local governments to firms, associated with price controls due to social and

[9] Federal expenditures aimed at reducing regional inequality and insuring against external shocks are beyond the scope of this paper. E.g. Thornton and Nagy (2006) study the regional-federal fiscal relations and find little evidence that federal expenditures would serve to reduce levels of regional inequality, and no evidence that changes in federal transfers respond to changes in social needs. Martinez-Vazquez and Timofeev (2008) investigate the regional-local dimension of Russia's fiscal equalization and come to the conclusion that regional policies improve equalization outcomes, but the degree of equalization effort varies across regions due to political and socio-economic factors.

political factors. According to his study, decentralization seems to aggravate the situation, i.e. increase subsidies, as sub-national levels of government are more sensitive to the socio-political pressures because of the proximity to their constituency.

Desai et al. (2005) show that Russian regions with unearned income streams coming from natural resource revenues as well as central government transfers, are especially prone to shelter certain firms from market forces. Their results, based on fiscal data from 80 Russian regions, indicate that higher tax retention has had a positive impact on regional reforms and growth. This effect declines as unearned income streams to the regional budget increase.

The studies above do not explicitly address the possibility of cooperation or collusion by local government and firms in the form of local service provision. Haaparanta and Juurikkala (2007) augment Zhuravskaya's model by this possibility and separate it from presumably socially more harmful contributions to the local government such as bribes. They find that the more fiscal autonomy, i.e. the higher the share of own revenues in its budget a municipality has, and thus weaker fiscal incentives as explained above, the more likely the firms are to report bribes..[10]

We apply the insights from this body of literature to the case of housing divestiture in the following line of argument. Keeping housing or other social assets comes with a cost for the firms. One reason for them to agree to bear these costs is to extract rents from the municipality in exchange for providing the housing services. Rents may come in the form of tax reductions, tax arrears, budget subsidies, better access to supplies, selling at non-market prices, and other preferential treatment. When fiscal incentives of the local government are weak, it may agree to forego a part of its budget income [11] (which would be taxed away by the upper level governments anyway) in exchange for shifting costs of the upkeep of housing to the firms. Thus our main hypothesis is that in municipalities with weaker fiscal incentives firms bargain for holding the housing assets longer and getting certain benefits in return, and have in general closer ties to the public sector than those that have already divested housing.

Finally, the interaction of a firm with municipality over housing depends not only on the fiscal incentives of local authorities but also on the firm's bargaining power, which is manifested in its ability to capture the state, i.e. influence the public decision-making (Slinko et al. 2005).

[10] Results of Haaparanta and Juurikkala (2007) indicate potentially fundamental differences between different types of services provided by local firms, i.e. infrastructure and social. Housing provision seems to decrease along decreasing fiscal autonomy, contrary to infrastructure, but in accordance with majority of the other studies cited above. One potential explanation for this difference is that infrastructure upkeep may be even profitable whereas social asset upkeep comes with direct costs rather than revenues.

[11] Most of the budget income of municipalities comes from firms and not from individuals. For example, one of the major local taxes, the property tax, is collected both from firms and individuals. However, the share of property tax coming from firms is on average around 10% of local tax income and may run as high as 85%, while individual property taxes constitute less than 1% of local budgets' incomes.

The firm's bargaining power can be used in two opposing ways: to push for faster transfer of assets or to extract rents in return for keeping assets longer. We test also for this effect of the bargaining power of a firm on divestment timing.

4. Data and Methodology

4.1 Data

Our data come from the survey of 404 middle-sized and large manufacturing firms from 40 Russian regions in April-June 2003. In the survey we examined the extent of social service and infrastructure provision by the firms and the firms' assessment of the quality of public infrastructure and regulatory environment [12]. Background information on ownership, investment, performance, competition, and financing decisions of the firms was also gathered. In this section we describe the survey design, the sample structure and its representativeness.

4.1.1 Sample design

Our survey was initially designed to serve both the need for a general description, as well as the need for a more in-depth analysis of the causes and consequences of social service and infrastructure provision by the firms. Thus, the sample on the one hand is close to representative of the Russian industrial sector; on the other hand, it has some degree of variation in the main object of the study – social assets and infrastructure.

Selecting firms with some degree of variation in their social services and infrastructure provision would have required a costly pre-screening procedure, as official statistics do not include information on these issues. Instead, we used the firm size (number of employees) as a proxy for the probability that a firm would provide social assets or infrastructure. It is natural to assume that larger firms are more likely to keep, for instance, housing, medical facilities or day care facilities. Results of pilot interviews also supported this assumption. Consequently, the size of the firm is the main criterion in the sample construction.

Sample frame

The source of information for the population of firms is the enterprise registry maintained by Goskomstat (State Committee of the Russian Federation on Statistics). Each firm is obliged to report its number of employees, output, profits, fixed capital and wages to Goskomstat. The registry database contains approximately 46,000 entries. At the time when our sample was constructed (spring 2003), the latest available dataset was for the year 2000.

In the construction of our sample we concentrated on the industrial sector, and within it manufacturing firms for which energy production is not a regular line of business. We set a

[12] For details see Haaparanta et al (2003)

minimum size limit of 400 employees, as the pilots indicated that smaller firms are unlikely to provide infrastructure or social services. As the size of the firms is the defining criterion for our sampling procedure, we included only firms which report employment information for the year 2000 in the database. Information on the regional location of the firm should also be present. Thus, we surveyed medium and large manufacturing firms. Constructed in such a way, our sample frame contains 3523 firms.

Choice of regions

There are 89 regions (subjects of federation) in Russia. Not all of them have industrial enterprises of interest to our study. From the list of regions where firms from our sample frame are located we further excluded regions that are not easily accessible (some northern and eastern regions), are in the zone of ethnic conflicts (Caucasian regions), or were otherwise not covered by our interviewer network.

From the remaining 63 regions we randomly selected 40 regions. Three of them - Amur oblast, the Republic of Khakasia, and Khanty-Mansi autonomous okrug – had too few firms in our sample frame, taking into account the expected refusal rate. We replaced them with three regions, drawn from large macro-regions, which were underrepresented in the initial selection. These are Irkutsk oblast, the Republic of Tatarstan, and Ulyanovsk oblast. The final selection of regions where the survey was carried out is presented in Table 2. The total number of firms from our sample frame in these 40 regions is 2379.

Table 2 Regions included in the survey

	Number of firms in the sample frame	Percentage of firms
Altai krai	54	2.23
Arkhangelsk oblast	50	1.93
Belgorod oblast	49	1.89
Chelyabinsk oblast	112	4.33
Chuvash republic	47	1.93
Irkutsk oblast	59	2.06
Ivanovo oblast	65	2.61
Kaliningrad oblast	22	0.92
Kaluga oblast	36	1.51
Karelia republic	25	0.84
Kemerovo oblast	79	3.19
Khabarovsk krai	30	1.22
Kirov oblast	57	2.10
Kostroma oblast	29	1.22
Krasnoyarsk krai	74	2.86
Leningrad oblast	44	1.64
Lipetsk oblast	41	1.68
Mordovia republic	27	1.09
Moscow city	201	7.73
Moskow oblast	183	7.36
Omsk oblast	32	1.30
Orenburg oblast	35	1.47
Perm oblast	96	3.61
Primorskii krai	48	1.68
Rostov oblast	77	2.86
Samara oblast	80	3.11
Smolensk oblast	37	1.51
St. Petersburg city	141	5.51
Stavropol krai	31	1.18
Sverdlovsk oblast	154	6.26
Tatarstan republic	100	3.78
Tomsk oblast	28	0.97
Tyumen oblast	34	1.09
Udmurtia Republic	39	1.60
Ulyanovsk oblast	44	1.85
Vladimir oblast	68	2.73
Volgograd oblast	60	2.40
Vologda oblast	50	1.89
Voronezh oblast	60	2.40
Yaroslavl oblast	59	2.44

Choice of firms

Our target sample size was 400 firms. We constructed the initial sample for each selected region in the following manner: all firms in the sample frame in a given region were ordered by size (number of employees), from largest to smallest. The *initial sample* included every sixth firm from these regional lists. In case the firm from the initial sample was not found or refused to

be interviewed, it was to be replaced by the firm closest to its size from the list. All replacements were to be chosen from within the region where initial firm was located[13].

Constructed in such a way, the sample should reflect the size structure of the medium and large industrial enterprises in the region. The sample also likely includes firms from different industries even without any industry stratification. Industries with higher average firm size can be expected to be overrepresented. Thus, our sampling technique includes a combination of clustering by region and systematic sampling by size.

Fieldwork and data processing

The survey was conducted in April – June 2003 by a survey firm which has a regional interviewer network. Control, checking, and cleaning procedures were devised in order to achieve the best possible quality of the data.

Response rate

In a survey of the medium and large industrial enterprises in Russia, one can expect a high refusal rate. Due to generally low informational transparency, firms are suspicious of attempts to acquire information about their activities. Particularly sensitive questions include information on ownership structure, competition, and financial figures, such as sales, profits, taxes, and investment.

Out of the list of 2379 firms, which includes 399 firms from the initial sample (see definition above) and the replacement firms, a total of 1017 firms were contacted. Out of these, 45 % refused to be interviewed, 15 % were excluded for other reasons (not found, bankruptcy, firm had different identifier than in the database, or did not have any production facilities in the region), and 40 % of firms were actually surveyed.

4.1.2 Sample representativeness

Next, we describe how our sample structure relates to that of the population of Russian firms[14].

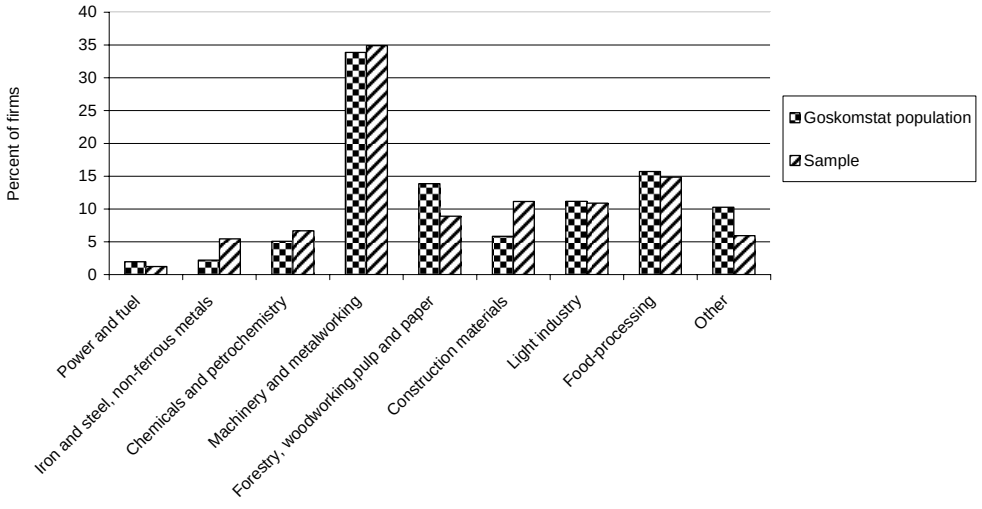
Industry

Figure 2 presents the distribution of firms in the population and in the sample by industry. The majority of industries are adequately represented in terms of the share of the firms. Metallurgy and construction materials industries are overrepresented in our sample as compared to the population of firms. Share of firms in forestry and pulp and paper is underrepresented when compared to the economy as a whole.

[13] In practice some regions did not fulfill regional quota due to high refusal rate and few replacement were made from other regions.

[14] By population we mean all Russian industrial firms as described in the Goskomstat (Russian statistical agency) yearbooks as of year 2000

Figure 2 Industrial distribution



Size

The distribution of the firms in the sample by size (number of employees) is reported in Table 3. The initial sample includes relatively fewer small firms (400-500 employees), and more very large firms (more than 5000 employees) than the sample frame. Due to the higher refusal rate among the largest firms, however, size distribution in the resulting sample is closer to the sample frame. The majority of the firms in our sample employ between 500 and 5000 employees.

Table 3 Distribution of Firms by Size (number of employees) in 2000, Based on Goskomstat data

	Minimum	Mean	Median	Maximum	Number of firms
Sample frame	400	1449.3	749	100005	3523
Initial sample	400	2485.5	817	100005	399
Final sample	400	1648.8	784	38980	404

Origins and ownership structure

The survey provides information on the year of origin and the organizational form of each firm. As was expected with medium and large manufacturing firms, most of them originated during the time before the transition period. Only 5 % of the firms in the sample are relatively new, as they were created during the 1990s. The majority of the firms in the sample are open joint stock companies, which is not surprising as most of the formerly state-owned firms

were turned into open JSCs during the mass privatization of the early 1990s. Some 80 % of the sampled firms were privatized during 1991-1994. Altogether, 16 firms were always private, while 32 firms never went through the privatization.

Almost 7 % of the firms are in the form of a state (*unitary)* enterprise. There are, however, more firms fully or partially controlled by the state. Approximately 40 % of the firms have some state ownership. Of these, state has the majority ownership stake in more than half of the firms. The average stake held by the state is around 15 % (see Table 4 for the statistics on ownership structure of the sample[15]).

Table 4 Ownership Structure

Type of owner	Mean ownership stake	Median ownership stake	Std. Dev.	Number of observations
Employees, of which:	36.54	22.25	36.30	338
Managers	13.53	1.00	23.37	301
Workers	18.18	6.00	25.41	301
Other persons	13.02	0.00	23.69	337
Russian firms, of which:	26.80	0.00	35.12	339
State firms	2.04	0.00	11.16	326
Private firms	23.16	0.00	33.97	327
State, of which:	14.57	0.00	30.46	341
Federal	7.99	0.00	24.14	329
Regional	3.01	0.00	12.84	328
Local	1.42	0.00	10.16	328
Foreign companies	5.11	0.00	17.17	339
Other owners	4.13	0.00	16.73	341

The extent of insider ownership which resulted from the mass privatization is continually decreasing. In our sample, as of the spring of 2003, only 27 % of firms were insider-controlled. This reduction is due to decreasing worker ownership. Managers, on the contrary, increased their stakes since the time of privatization. In our sample managers hold on average 13.5 % of shares. There is also growing evidence in favor of increasing ownership concentration in the hands of outsiders, mostly through buying out dispersed shareholders. In our sample Russian and foreign firms hold on average almost 32 % of shares. It is difficult to say how comparable our sample is to the population of median and large firms in terms of ownership structure as Goskomstat does not provide adequate information on ownership structure. However, the results of our survey on ownership structure are similar to the results of other surveys of Russian firms done in the beginning of 2000s.

[15] Given generally low informational transparency and unwillingness of firms to reveal their ownership structure, the response rate to ownership questions in our survey is quite high: more than three quarters of firms provide information on their ownership structure.

4.2 Methodology

In analyzing the determinants of divestiture timing, we use a survival data approach (see Lancaster 1990), alternatively called duration analysis. Survival analysis is used for analyzing the run-up time to an event. It models the risk of a change in the state of an object. It is used e.g. in the analysis of unemployment duration and in medical research. The reason ordinary least squares (OLS) method is not generally applicable in this kind of analysis is that it assumes normal distribution of residuals, which is in many cases unreasonable with respect to time. Survival analysis helps us to model how quickly an enterprise will transfer its housing to the municipality, or more precisely, what is the probability that this happens in the next time interval, in our case a year, given that the firm has held the housing (i.e. remained in its original state) thus far.

Parametric models of survival analysis apply certain assumptions regarding the distribution of residuals. In contrast, semiparametric models do not make any assumptions about the distribution of event time, though they do parameterize the effects of regressors. Thus these models are more suitable for changing circumstances such as the economic and regulatory environment during transition. We utilize the Cox proportional hazards model, which is a semiparametric estimator. We thus do not make any parametric assumptions as to exactly how the pressure to transfer assets changes over time. This method also accounts for the censoring problem, i.e. the fact that some firms still held housing in 2003, and for them we do not know when the change is going to happen.

At the core of survival analysis is the estimation of the hazard function, which measures the risk of (or the contemporaneous probability of) a change in the object's state:

$$h(t) = \frac{f(t)}{1 - F(t)}$$

where f(t) is the density and F (t) the cumulative distribution function of the time of event.

The resulting coefficients of the explanatory variables are hazard ratios (exponentiated coefficients from the model), which measure the risk of divestment. For example, a hazard ratio of 1.2 indicates that a one-unit change of the corresponding variable increases the risk of divestment by 20%, i.e. it leads to faster divestment. In general, a hazard ratio greater than unity means that the variable speeds up divestment, while a hazard ratio less than unity means that the variable delays divestment.

5. Empirical Results

In this section we test the hypotheses developed in Section 3 using survey data described above. First, we test whether firms that kept to housing are more likely to receive preferential treatment. Second, we analyze the effect of weak fiscal incentives of municipalities and firms' bargaining power on housing divestment timing. We also test for some alternative explanations of delayed divestment.

In addition to the survey data we utilize Goskomstat (State Committee of the Russian Federation on Statistics) enterprise registry data as well as selected information on the municipalities in which the firms are located.[16] Whenever municipal level data is used, Moscow and St Petersburg are excluded. Municipal data does not exist for them and they are in general very special cases.

5.1 Late divestment and preferential treatment of firms

As discussed above, there is evidence that firms in Russia solve social problems of local and regional authorities and, in return, authorities do not collect taxes from them. In some cases the unpaid taxes may even have exceeded the value of firms' provisions for social purposes. Further, it has been argued in public that the most common way to compensate firms for holding assets is preferential restructurings of tax arrears and that more than half of the firms that were allowed to restructure their tax arrears were not formally eligible for that. In this section we set out to prove that firms have indeed received preferential treatment in return for holding on to the housing assets.

To provide just one example, the mayor of the city of Izhevsk (the center of the Udmurt republic) issued a decree in 1998 stating that the city administration should suggest ways for "partial reimbursement of costs borne by industrial enterprises and other organizations in holding non-transferred housing via reductions in taxes on housing and profits and by writing off their arrears to the city budget".

We utilize our data to show that this is not an exceptional case. We test whether firms that still kept housing in 2003 were more likely to receive various forms of government support, controlling for the firm size, industry and state ownership stake. We use three indicators of government support: a dummy that indicates whether a firm was receiving budget assistance in any form (subsidized credits, tax benefits or direct subsidies) during 2000-2002, a dummy indicating whether a firm received restructuring of tax arrears during 2000-2002, and the share of the firm's sales going to the state in 2002, as state support may also come in the form of preferential conditions of government procurement. As the regression results in Table 5 show,

[16] For the variable definitions and descriptive statistics see Data Appendix

firms that still kept their housing in 2003 were more likely to be recipients of budget assistance, in particular, tax arrears restructuring, and were selling a higher share of their products to the state.

Table 5 Late divestment and preferential treatment

	(1)	(2)	(3)
	Share of sales to state in 2002	Any budget assistance in 2000 - 2002	Restructuring of tax arrears
	OLS	Probit	Probit
Firm still kept housing in 2003	8.669***	0.170***	0.133**
	(3.251)	(0.057)	(0.060)
Log employment 2002	-0.746	0.037	0.027
	(1.868)	(0.035)	(0.036)
State ownership present	25.014***	0.107	0.087
	(7.240)	(0.101)	(0.103)
Energy and fuel	-3.842	0.128	0.395**
	(8.306)	(0.275)	(0.195)
Metallurgy	0.601	-0.019	0.244
	(8.682)	(0.194)	(0.195)
Chemical industry	8.325	0.297***	0.454***
	(9.106)	(0.107)	(0.110)
Machine building	15.079*	0.327***	0.542***
	(8.474)	(0.126)	(0.135)
Woodworking industry	-3.102	0.203	0.406***
	(8.079)	(0.136)	(0.136)
Construction materials	8.125	0.278**	0.464***
	(8.901)	(0.111)	(0.112)
Textile industry	7.612	0.215	0.401***
	(9.014)	(0.132)	(0.141)
Food industry	0.619	0.229*	0.334**
	(8.115)	(0.127)	(0.160)
Constant	3.186		
	(14.266)		
Observations	310	318	318

* significant at 10%; ** significant at 5%; *** significant at 1%
Marginal effects for probit regressions reported; robust standard errors in parentheses

This evidence suggests that firms were holding on to social assets for a good reason: they were "reimbursed" through subsidies and other forms of preferential treatment. Still, some firms divested their assets early on, apparently not being able to obtain such or at least not adequate benefits.

Next we examine the firm and locality characteristics that affect a firm's ability to extract benefits in return for the upkeep of housing, as manifested in the timing of divestiture.

5.2 Determinants of divestment timing

To study the determinants of divestment timing we apply survival data analysis methodology that was described in Section 4. The dependent variable in the Cox proportional hazard regressions is the time, in years, from 1989 to the year when the firm *divested its housing for the last time.* It takes values from 1 for firms that divested in 1990 to 14 for firms that divested last in 2003 or still held housing at that time. As the Cox model is non-linear, regression results in Table 6 contain hazard ratios which should be interpreted in the following way: a hazard ratio greater than unity means that the variable speeds up divestment while a hazard ratio less than unity means that the variable delays divestment. In parentheses we report z-statistics of the underlying coefficients.

As discussed in Section 3, we hypothesize that willingness of local authorities to enter into bilateral bargaining with firms depends on municipalities' fiscal incentives. Makrushin et al. (2003) have shown that larger and richer municipalities, which are able to collect more own incomes, have weaker fiscal incentives, as any additional income they collect is taxed away by a higher level government. We thus proxy fiscal incentives of local authorities by the share of own incomes in the local budget (the higher this share, the weaker the fiscal incentives) [17] and by the size of municipality in terms of population (the larger the size, the weaker the fiscal incentives).

As the first column of Table 6 shows, higher share of own budget income in a municipality indeed leads to slower divestment of housing by firms. Another proxy for fiscal incentives – population size of municipality – also has a robust and significant effect, as the second column of Table 6 shows. In larger municipalities firms held assets for a longer time.

[17] Own budget income includes property and land taxes, sales tax, locally defined taxes and non-tax payments. Other local budget incomes are transfers from upper-level budgets.

Table 6 Cox proportional hazard model for the factors determining housing divestment timing

	(1)	(2)	(3)	(4)	(5)	(6)
Own budget income share 1999	0.237**		0.285*		0.857	0.470
	(2.12)		(1.81)		(0.17)	(0.75)
Log municipal population		0.877**		0.872**		
		(2.33)		(2.31)		
State capture			0.881	0.837	1.688	1.652
			(0.87)	(1.16)	(1.42)	(1.34)
Own budget income*State capture					0.139*	0.150*
					(1.92)	(1.83)
Own budget income*HHI1990						1.065*
						(1.74)
HHI1990	3.818***	4.424***	3.781***	4.374***	4.008***	0.450
	(3.57)	(4.00)	(3.61)	(4.05)	(3.77)	(0.61)
Tight labor market	0.993	0.991	1.020	1.011	1.023*	1.020
	(0.76)	(0.98)	(1.56)	(0.76)	(1.76)	(1.48)
Housing in 1990_per_employee	1.002	1.002*	1.002*	1.002**	1.002*	1.002*
	(1.52)	(1.94)	(1.78)	(2.04)	(1.76)	(1.66)
Firm was not privatized	0.906	0.837	0.857	0.783	0.966	0.954
	(0.23)	(0.38)	(0.33)	(0.50)	(0.08)	(0.10)
Log employment 2002	1.039	1.065	1.044	1.071	1.064	1.067
	(0.51)	(0.85)	(0.57)	(0.90)	(0.80)	(0.84)
Metallurgy	1.086	0.979	0.969	0.893	0.936	0.910
	(0.16)	(0.04)	(0.06)	(0.23)	(0.13)	(0.18)
Chemical industry	0.852	0.682	0.854	0.700	0.917	0.890
	(0.30)	(0.70)	(0.31)	(0.68)	(0.17)	(0.22)
Machine building	1.181	1.092	1.121	1.052	1.141	1.116
	(0.37)	(0.20)	(0.27)	(0.12)	(0.31)	(0.25)
Woodworking industry	1.110	1.069	1.131	1.067	1.160	1.131
	(0.22)	(0.14)	(0.28)	(0.15)	(0.33)	(0.27)
Construction materials	1.251	1.133	1.241	1.101	1.264	1.305
	(0.49)	(0.27)	(0.50)	(0.22)	(0.53)	(0.59)
Textile industry	0.713	0.688	0.819	0.759	0.888	0.831
	(0.70)	(0.77)	(0.43)	(0.59)	(0.25)	(0.39)
Food industry	0.491	0.460	0.502	0.450*	0.512	0.494
	(1.51)	(1.64)	(1.52)	(1.75)	(1.45)	(1.52)
Observations	182	183	178	179	178	178

Hazard ratios instead of coefficients reported; robust z statistics in parentheses;
* significant at 10%; ** significant at 5%; *** significant at 1%

This effect is visible even at the level of simple means: in municipalities with less than 300,000 inhabitants, the average time it took firms to divest their housing was 8.6 years, with a median of 8 years; in larger municipalities, the average transfer time was 10.2 years, with the median firm divesting its housing in 11 years (differences are statistically significant). Consequently, while in 1990 firms in larger municipalities were less likely to hold housing (bigger cities had a higher share of municipal housing), by 2003 this relationship had been reversed: firms in larger municipalities were more likely to hold housing. These results confirm

our hypothesis that firms in municipalities with weaker fiscal incentives were divesting of their housing later.

Quite naturally, the bargaining power of the firm should also affect the bargaining outcome. We asked the firms directly during the survey whether they can influence the laws and regulations adopted at the local, regional or national level[18]. We include this indicator of state capture into the regressions with two alternative measures of fiscal incentives[19]. As columns 3 and 4 in Table 6 show, the "state capture" variable is not significant per se, although the effect is of the right sign. However, when we interact the indicator of a firm's ability to capture state with the municipality's share of own budget income (column 5 of Table 6), the hazard ratio for this interaction term is significant and smaller than one, indicating that in municipalities with weaker fiscal incentives politically influential firms were holding on to their housing for a longer time.

Thus we show that weak fiscal incentives of municipalities coupled with firms' ability to influence authorities lead to the bilateral bargaining outcome where firms keep housing longer in return for various preferential treatments from local authorities.

Whatever the benefits a firm receives for not divesting its housing, it still must bear some costs for the upkeep of the housing. The more housing the firm has, the higher these costs are. Alternatively, the amount of housing a firm has represents its threat point in bargaining with municipality, as the firm can threaten to abandon its assets, i.e. stop financing them. As the regression results in Table 6 show, the higher the firm's amount of housing per employee in 1990 was, the faster the firm divested it. Thus firms that initially had a lot of assets pushed for faster transfer in order to shift costs to municipalities.

In all the regressions in Table 6 we also control for the firm size and industry. There are not significant differences across industries in terms of divestment timing. In addition we include an indicator for the firms that did not go through privatization and thus remain 100% state owned, as these firms may have different type of relationship with local authorities. This variable is, however, not significant in our regressions.

5.3 Additional factors: labor and product market pressure

Apart from the incentive to use social assets for lobbying, firms in transition also face pressures to restructure. Faced with strong competitive pressure in their product market, firms

[18] Interestingly, firms that answered positively to this question are not only huge firms. Though the average size of a firm in this group is large, there are a number of firms with 100-500 employees that are able to influence the state.

[19] An alternative indicator of a firm's bargaining power is its relative importance to the municipality, i.e. the role of the firm as a local employer or taxpayer. It can be measured by the firm's share of total industrial employment in the municipality and by the share of the firm's taxes in the total municipal budget income. The problem with the latter measure is its possible endogeneity to the timing of divestiture. Besides, both of these measures are highly correlated with our proxies for weak fiscal incentives, in particular with municipality size. That is why it is difficult to disentangle the effects of these factors from those of municipalities' incentives.

may try to reduce their non-productive costs via faster divestment of assets. On the other hand, if the potential for extracting government subsidies is large, firms facing tough competition may try to cushion themselves from competition by keeping assets and pressing for budget assistance, preferential government procurement or other forms of protection from local authorities in return.

To control for this possibility we include the measure of product market concentration (industry level Herfindahl-Hirschman index in 1990) into the regressions reported in Table 6. We find that the firms which initially faced less competitive markets actually divested their housing faster[20]. Thus, firms facing tough competition in their product market did indeed seek protection from competition by holding the housing and extracting budget assistance in return. To further test this explanation, we include the interaction term between product market concentration and municipality's own budget income in the column 6 of Table 6. The hazard ratio for this interaction term indicates that in municipalities with weak fiscal incentives (i.e. high potential for rent extraction) firms that face more competition hold housing for a longer time. It is thus the less competitive firms that use social assets to cushion themselves from competition by bargaining for budget assistance.

We also differentiate our "relations with municipalities" story from the hypothesis that firms in transition use in-kind compensation, including housing provision, to reduce the wage bill, attach workers and reduce turnover and/or attract new workers in a tight labor market (Friebel and Guriev 2005, Grosfeld et al. 2001, Juurikkala and Lazareva 2006). To sort out this explanation, in the regressions in Table 6 we include a control variable for the tightness of the labor market, measured by the amount of time the firm needs to find a new employee. This variable is not significant in most specifications. Thus, we do not find that the tightness of the labor market has any effect on the timing of housing divestiture.

6. Conclusions

Industrial restructuring in Russia is clearly a complex issue. In this paper we look at one aspect of restructuring - enterprises' divestment of housing assets to municipalities – and study the political economy of this process. We argue that under poorly defined property rights it is bargaining between firms and local authorities that drives the divestment process.

The rents the firms and the municipalities may bargain over consist mainly of firms' profits and public sector budget flows, but also firms' survival and political support. Bargaining arises from the fact that social assets present a financial burden to both firms and municipalities,

[20] As a robustness check we use another measure of industry level concentration – the share of the two largest firms in the industry. This measure gives the same results as HHI.

due to the social service sector being heavily subsidized. Although there are examples of firms and municipalities concluding formal agreements over the use and joint financing of social assets, a significant part of these issues has been governed by informal relations.

We utilize a survey of 404 firms in 40 regions to study the determinants of housing divestment timing decision and the effects it has had on firms' ability to extract rents from local authorities. Our results show that firms which divested housing later received more benefits from the local authorities, especially in places where there are more rents to extract, i.e. where municipalities' fiscal incentives are weaker, which usually is the case in larger and richer municipalities. We also find that the firms facing more competition in product markets divested later, which could indicate that housing assets are used to lobby for authorities' protection from competition.

Our findings have important social and policy implications. Poorly defined property rights may have an adverse effect on the incentives to invest in social assets and hence on the quality of public service provision. There is ample anecdotal evidence of housing which was kept in a disastrous condition for years before the divestment process was completed. Given the essence of both a competitive private sector and the quality of public services for sustainable development and growth, our findings indicate that attention should be paid to the institutional aspects when designing economic reforms. The importance of the institutional environment for the implementation of reforms cannot be underestimated. Our story is not the only one in which much-needed reform was impeded by poor incentives for the institutions actually in charge of implementing the reform.

Data Appendix. Variables description

Variable name	Description
Housing in 1990 per employee	Tens of square meters of housing the firm had in 1990 per employee
Own budget income share1999	Share of own revenues in total income of municipal budget in 1999 (takes values from 0 to 1)
Log municipal population	Logarithm of the population of municipality
State capture	Dummy equal to 1 if firm admits its ability to influence laws and regulations at local or regional level
HHI1990	Herfihdahl-Hirschman index for 5 digit industries in 1990
Log employment 2002	Logarithm of the number of employees of a firm in 2002
Tight labor market	Amount of time, in weeks, needed to find a new employee for a firm
Firm was not privatized	Dummy equal to 1 if firm did not go through the privatization process, and zero otherwise
State ownership present	Dummy equal to 1 if firm has some state ownership, and zero otherwise

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Chapter 2. Non-Wage Benefits, Costs of Turnover and Labor Attachment: Evidence from Russian Firms

with Tuuli Juurikkala

Like firms in established market economies, many Russian firms provide non-wage benefits to their workers such as housing, medical care or day care. This paper explains the provision of benefits as a strategic choice of firms in the presence of labor and service market imperfections. Analyzing unique survey data for 404 industrial establishments from 40 Russian regions, the authors provide strong evidence that non-wage benefits are used by firms to attach workers and thereby reduce the costs of labor turnover in face of tight labor markets. It is also shown that this attachment strategy works due to imperfections of the regional markets for social services: the share of non-monetary compensation decreases with improved access to local social infrastructure.

1. Introduction

While provision of non-wage, or fringe, benefits for workers is a widespread phenomenon, the motivations for providing non-wage benefits have been discussed mostly in the context of developed market economies. Previous literature examines such explanations as tax benefits (e.g. Woodbury and Hamermesh, 1992), heterogeneous worker preferences for benefits and imperfections of outside markets for services (Dye and Antle, 1984), economies of scale in services provision, and efforts to reduce turnover in the face of rising costs of labor turnover (Rice, 1966). Atrostic (1982) shows that non-pecuniary job characteristics are an important determinant of labor supply. Woodbury (1983) and Olson (2002) test the degree of substitution between wage and non-wage benefits, finding that wages and wage supplements are easily substituted for each other.

In the planned Soviet economy industrial firms were also charged with supplying a great variety of non-wage benefits."[21] In particular, they shouldered the obligation of supporting social assets such as housing, medical facilities and daycare services. Despite a significant amount of transfer of social assets to municipalities in the mid-1990s and generally heavy restructuring of the Russian economy, many firms actively continue to provide social services. The shift, instead,

[21] For Russia-specific discussion, see Stryk and Kosareva (1994), Commander and Schankerman (1997), Leksin and Shvetsov (1998) and (1999), Starodubrovskaya (2002). For an early survey of enterprise and social benefits in various Central and Eastern European countries after communism, see Rein et al. (1997), and Svejnar (1999).

has been away from keeping assets within the firm to other forms of employee support (for a detailed description, see Haaparanta et al., 2003).

In this paper, we test whether social service provision has transmuted from an obligation imposed on firms into a strategic tool for attracting and attaching employees in a tight labor market[22]. Using survey data of 404 large and medium-size industrial establishments in Russia, gathered in 2003, we examine the interaction between labor market tightness, social service provision, and employee turnover. We believe Russia provides a good case for testing the role of non-wage benefits in a developing economy with imperfect labor markets and large regional heterogeneity.

We focus on the role of non-wage benefits in reducing the costs of labor turnover as these costs are estimated to be quite substantial for the Russian firms. According to Gimpelson and Lippoldt (2001), the total turnover was 46% in 1998. Brown and Earle (2003) find that labor flows in the Russian industrial sector increased in magnitude during the 1990s, particularly job destruction and separation. Total worker flows were nine percentage points higher in 1999 than in 1990. The churning rate (worker flows less the absolute value of employment change) was 30–40% during the 1990s. A survey of 304 Russian industrial enterprises in 2003 (Gimpelson, 2004) finds that 77% of firms experienced a deficit of managers and professionals or highly qualified workers or both, indicating tight labor markets.

Little empirical evidence has been offered previously to establish a link between the tightness of the labor market, non-wage benefits and employee turnover. Our unique firm-level data allow us to establish this relationship. The task is complicated by the difficulties in estimating the value of heterogeneous fringe benefits to employees. We have constructed survey questions to obtain a measure of benefits comparable across firms.

We find strong evidence that Russian industrial firms attempt to use social services to reduce costs of labor turnover in the face of tight labor markets. Further, we show that the share of non-monetary compensation decreases with improved access to regional social infrastructure. There is also evidence that the negative effect of benefits on turnover and churning is weaker in the regions with more developed social infrastructure. Finally, we note that the link between non-wage benefits and employee turnover is weakened by a firm's high monopsony power in the local labor market.

The rest of the paper is organized as follows. In Section 2 we explain the mechanisms behind labor attachment through non-wage benefits. Section 3 provides a brief description of our

[22] In companion papers (Haaparanta and Juurikkala 2004, Juurikkala and Lazareva 2006), we also examine the political economy explanation of social service provision by firms. In particular, we analyze the role of bargaining between public sector and firms during the process of divestiture of social assets to municipalities.

data and the evolution of the provision of benefits from planned to market economy. This background information is important for understanding the nature of non-wage benefits in a post-communist economy. In section 4, we test the effect of tightness of the labor market and density of regional infrastructure on the amount of non-wage benefits provision, and then establish the connection between benefits provision and labor turnover. The final section concludes with the discussion of major results and their implications.

2. Non-wage benefits in Russia: mechanisms for labor attachment

The idea that non-wage benefits can be used by firms to reduce labor turnover is hardly new. However, the attachment mechanism treated in the majority of related papers is specific to the pension plans and health insurance that constitute the bulk of non-wage benefits to workers in developed economies. In a framework similar to bonding or efficiency-wage models, the pension plan is a form of deferred payment that imposes a separation penalty on the worker (i.e. all or part of a worker's contributions are forfeited if they quit before vesting), and hence limits turnover (Rice, 1966; Even and Macpherson, 1996; Gustman et al., 1994). Alternatively, firms offering pension plans may be seen to attract saver-types who are less likely to quit (Ippolito, 2002). Empirically, Decressin et al. (2005) show on a large US dataset that health benefits do indeed diminish worker churning.

Non-wage benefits in Russian firms, in contrast, are mostly services and facilities provided or subsidized by the employer. These include housing, day care, recreation, and medical services. Consumption of these services is immediate rather than deferred. The question is how this type of service provision generates an attachment effect.

Two previous studies explain service provision by the labor market distortions arising during transition process.[23] Grosfeld et al. (2001) demonstrate that the Russian labor market is segmented into a pool of low-productivity workers and a dynamic segment of mobile, high-productivity workers. They argue that less productive workers engage in contractual relationships similar to risk insurance contracts, whereby the employee accepts lower wages in exchange for security and social services. Risk in this setting may be related to the non-payment of wages which was widespread in Russian firms during the 1990s.

Another important feature of the Russian labor market is its high local level concentration due to the high geographic concentration of industrial production inherited from the Soviet period. Analyzing worker attachment in Russia, Friebel and Guriev (2005) argue that non-monetary forms of compensation, combined with an inherited monopsonistic or oligopsonistic

[23] For a recent survey of the Russian labor market in transition, including wage formation, see the World Bank report, "The Russian Labor Market: Moving from Crisis to Recovery" (2003).

local labor market structure, can obstruct workers' ability to migrate and thus tie them to their current location. Andrienko and Guriev (2004) find support for the attachment hypothesis by estimating that interregional migration in Russia is low and constrained by lack of liquidity.

In this paper we propose a different mechanism of labor attachment through non-wage benefits that is not specific to the transition environment. Commander and Schankerman (1997) were among the first ones in the Russian context to point out that any restructuring of firm-provided social benefits depends crucially on the availability of alternative providers. We argue that the consumption of employer-provided social services carries a separation penalty as a worker who quits the firm has to incur fixed costs for arranging new housing, day care or medical care. These costs are the higher the smaller is the number of alternative service providers in the locality[24].

We believe that this attachment effect of benefits is particularly strong in Russia, as the social services sector in the country is heavily regulated and subsidized, and thus a difficult market to enter for potential new service providers. A study by the Urban Institute (2004) on regional housing markets notes that the Russian population faces a widespread lack of housing. In 2003, the quantity of housing space per person was a mere 19.3 m^2. Barriers to development of Russia's housing market include the vagueness of rules on distribution and ownership rights for land plots for construction, underdeveloped infrastructure (water, heating, sewage, etc.), corruption, and red tape. These barriers have been created mainly at the regional level, where the authorities have substantial influence over licensing, land distribution and other major phases in the construction process. Similar entry barriers are present for other social services, which as a rule are still heavily regulated and subsidized in Russia[25]. We analyze a channel through which service market imperfections spill over to the labor market, creating labor attachment and thereby reducing labor market flexibility.

3. Social service provision by Russian firms: background and survey evidence

3.1 The data

We analyze the role social benefits play in the employment strategies of industrial enterprises through survey data collected in 2003 from 404 medium and large establishments in 40 regions of Russia. In the survey we examined the extent of social service and infrastructure

[24] In a similar vein, Oyer (2005) finds that in the United States, the fact that it is costly for workers to match with firms that offer the benefits they value has an effect on firms' decisions about which benefits to offer. These matching costs are the higher the lower the number of alternative providers of these services in the region.
[25] Federal housing subsidies officially were ended at the start of 2006, but in practice the reform has yet to be fully implemented (see e.g. BOFIT Russia Review 2/2006).

provision by the firms and the firms' own assessments of the quality of public infrastructure and the regulatory environment. Background information on ownership, investment, performance, competition, and financing decisions of the firms was also gathered. For the firms in our final sample, we conducted face-to-face interviews with the general manager and managers responsible for personnel and infrastructure. Quantitative information was obtained for 2002 and earlier years in some questions.

In constructing our sample, we concentrated on the industrial sector, and within it manufacturing firms for which energy production is not a regular line of business. The source of information for the population of firms is the enterprise registry maintained by Goskomstat (State Committee of the Russian Federation on Statistics). We set a minimum size limit of 400 employees after our pilot interview rounds indicated that smaller firms were unlikely to provide infrastructure or social services. Our sampling technique included a combination of clustering by region and systematic sampling by size.

Our sample is quite representative of the Russian manufacturing sector. Compared to the population of Russian firms, the majority of industries are adequately represented in terms of the share of the firms, as are the federal districts.[26] The fact that we surveyed medium and large enterprises explains the bias towards metallurgical firms regarding the distribution of industrial employment. The size distribution of our final sample is close to the population with the median establishment having 784 employees and the average over 1,600 employees.

Only 5% of the firms in the sample were established during the 1990s. Most firms were formerly state-owned and privatized during 1991–1994. As in many previous surveys, our sample is biased towards better-performing firms as they tend to be more willing to participate.

In addition to survey data, we utilize Goskomstat enterprise registry data and selected information on the municipalities and regions where the firms are located.

3.2 Social service provision by firms, 1990–2003

In the planned economy of the Soviet Union, firms were often made responsible for providing social services to their employees. Most firms maintained considerable physical assets for this purpose, including apartment houses, dormitories, health clinics, and day care centers. According to Leksin and Shvetsov (1998, 1999), in 1992 not more than one third of the total housing stock in Russia was privately owned (mostly individual houses). The rest was considered public housing and included municipal housing (25.7 percent of total housing stock) and departmental (*vedomstvennoe*) housing that existed within branch ministries and was managed by enterprises (41 percent of total housing stock).

[26] See Haaparanta et al. (2003) for detailed analysis of sample representativeness.

The amount of social spending by enterprises in 1992 was the equivalent of almost 4% of GDP. Before reforms started, over half of all workers enjoyed some social services provided by enterprises. The services provided by metallurgy, oil and gas, automobile and machine building industries were especially renowned for their good quality and wide quantity. In 1994 one third of the firms with fewer than 500 employees provided housing, the share increasing to 100% for enterprises with more than 10 000 employees. In the early 90's, some 70% of large and medium-sized enterprises offered medical services while over 75% of large and 50% of medium-sized enterprises had kindergartens. The quality of the services provided by the enterprise sector was generally better than that provided by municipal services. As Leksin and Shvetsov (1998) note, real expenses per child in enterprise-managed kindergartens were 30-50% higher those in the municipal sector.

Fundamental legislation requiring divestiture of housing and the main part of social assets to the municipalities was adopted in 1992 and 1993. The transfer of social assets was supposed to be completed by the end of 1997, and indeed the majority of firms' assets were actually transferred to local authorities (Leksin and Shvetsov 1998, Commander and Schankerman 1997, Starodubrovskaya 2002). Roughly 80% of the housing stock, medical services, day care, sports facilities and children's summer camps, as well as 60–70% of recreation facilities became municipal property during 1993–1997.

Of the 404 firms we surveyed in 2003, over 90% reported having social assets in 1990 and over 90% still provided or supported at least one social service in 2003, although the scale of firm participation in social service provision has diminished significantly during the last decade (see Table 1). Generally, firms either retained some of their social assets (although on a more modest scale) or had replaced those assets with other forms of support such as subsidies to the employees to acquire services. This type of support had gained importance especially in supporting leisure activities. In housing, not only subsidies but also giving out loans or guaranteeing them for the employees had become relatively common.

Table 1 Social service provision: results from firm survey

Percent of 404 firms total:	Housing	Medical care	Day care	Recreation
Had assets in 1990	78.5	76.7	69.8	38.2
Have or provide support in some form(s) in 2003	55.7	90.8	26.0	73.3
Have assets	34.2	67.1	10.4	20.8
Support assets transferred to the municipality	5.0	4.0	6.7	0.3
Give financial assistance to the employees in acquiring services	22.0	42.1	8.9	58.7
Support otherwise	11.4	8.2	3.0	4.5

Source: Haaparanta et al. (2003)

4. Empirical results

In this section, we analyze the determinants of social benefit provision by the firms and its effect on turnover and churning. More precisely, we test two main hypotheses:

- non-wage benefits are used by firms to reduce the costs of labor turnover, which vary with the tightness of labor market, and
- greater availability of alternative social service providers reduces the use of non-wage benefits by firms and the effect of these benefits on turnover.

In the first subsection, we establish the link between the tightness of the local labor market, density of regional social infrastructure, and the use of non-wage benefits. Here, we distinguish between four occupational groups within the firms (managers, professionals, skilled workers, and unskilled workers) and examine for the existence of group-specific differences in how workers are compensated.

In the second subsection, we look into whether the firms actually succeed in reducing labor turnover through service provision. We also test the importance of labor market concentration for the attachment strategies.

4.1 Tight labor markets and non-wage compensation

Measuring the amount of service provision by firms is challenging as the services are very heterogeneous. First, there are different types of them (housing, medical services, daycare etc.); second, there are different ways of provision (actual services or subsidies); third, the

quality of assets that firms own varies tremendously. Housing, in particular, may vary a lot in quality and consequently in its value to the worker depending on when it was built and how it was maintained. Furthermore, under the assumption of heterogeneous preferences often used in the literature on non-wage benefits, even if all workers receive an identical package of social services, some workers value it more than others. To overcome these problems, we have constructed the following survey question asked from the general managers as a measure of the share of social benefits in worker's total compensation:

If you stopped social services provision to employees, by what percentage approximately would you need to raise the wage for each group of workers (managers, professionals, skilled and unskilled workers) to keep them in the firm?

This measure is thus the "value of fringes" comparable across firms. It reflects the importance of services for the workers as it incorporates both the quantity and the quality of the services. Measured in this way, the share of non-wage benefits in total compensation is our dependent variable.

Our major explanatory variable is the tightness of the labor market, which is measured by the following question asked from the personnel managers:

How much time approximately (in weeks) would you need to fill a vacancy for each group of workers (managers, professionals, skilled and unskilled workers)?

These two variables are measured separately for four groups of employees: managers, professionals, skilled workers, and unskilled workers. The descriptive statistics on our variables by four employee groups are presented in Table 2. In line with survey results of Gimpelson (2004), these statistics suggest Russian manufacturing firms face a rather tight labor market. In accordance with the Labor Code, employees must notify the employer two weeks in advance if they plan to terminate their employment voluntarily. This is less than the average search time in our sample. An average firm in our sample would need more than a month to find a new manager, professional, or skilled worker. The median time needed is two to three weeks. Add to this the time and cost of training a new employee. Thus, a large share of the surveyed firms faces indeed high costs of labor turnover.

Table 2 Descriptive statistics by employee categories

	Managers	Professionals	High-skilled workers	Low-skilled workers
Average share in firm's employment, %	7.81	14.38	64.00	13.85
Average number of weeks needed to replace an employee	5.18	4.34	5.99	1.57
	(9.64)	(8.71)	(11.63)	(2.76)
Percent of firms that need to raise wages in order to keep employees if it stops providing social benefits	35.93	44.35	51.80	45.86
Average wage increase needed, % (conditional on being non-zero)	17.36	17.76	20.30	18.31
	(18.61)	(17.96)	(19.73)	(17.02)

Standard deviations in parentheses

As the evidence in Table 2 suggests, Russian firms differ extensively as to the amount of social services they provide. For between a third and half of the firms, depending on the group of employees, the value of the benefits to workers is positive[27]. The average value of the benefits in these firms is quite high: from 17% of the wage for managers to 20% for skilled workers, with the figure reaching as high as 100% of the wage in some firms. In addition, we measure non-wage benefits in terms of the costs of social services provision as a share of the wage bill. Table 2a shows that about a third of the firms in the sample spent less than 1% of their wage bill on social services, another third of the firms spent 1–5%, and the rest spent over 5%.

Table 2a Social costs as a share of the wage bill

Social costs as share of wage bill	Percent of firms
0%	6.6
<1%	22.5
1-5%	36.0
5-10%	21.4
10-20%	9.5
>20%	4.0
N firms	378

We further provide supporting evidence from individual-level RLMS data for years 2000–2003 (around 10,000 individuals surveyed each year)[28]. According to this data (Table 3),

[27] The rest of the firms either do not provide any services or the amount of service provision is very small, e.g. it can be just one medical check-up room at the production site.
[28] RLMS is Russian Longitudinal Monitoring Survey. For the description of the RLMS data and the data itself, go to http://www.cpc.unc.edu/projects/rlms/

the majority of employees enjoyed at least some social services at work in recent years.[29] This share is somewhat higher for white-collar than for blue-collar workers, while according to the firm survey data the value of the benefits was larger for blue-collar workers, although the difference is not big. We also find that skilled workers with longer tenure are more likely to receive benefits, which indicates that the social benefits may also be a form of deferred compensation similar to pension plans.

Table 3 Percent of employees receiving social services at work, by employee categories (RLMS individual-level data, industrial employees only)

Employee category	1999-2000	2001	2002	2003	of which, 2003:				
					medical	recreational	childcare	food	transport
Managers	78.4	69.5	67.7	53.6	33.9	47.3	3.8	19.6	18.2
Professionals	80.4	80.5	78.7	72.1	50.3	54.9	13.1	21.0	12.5
Skilled workers	69.4	76.9	70.4	65.4	39.2	46.3	10.5	24.2	9.6
Unskilled workers	79.2	72.4	71.4	60.6	35.8	38.6	8.8	17.1	10.7

Since our dependent variable is limited at 0 we use tobit regression model for the estimation. In Table 4, we present the results from regressing "value of fringes" for four groups of employees on the tightness of the labor market and social infrastructure index. Table 5 presents the results of an otherwise similar, but pooled, regression, weighted by the share of each group of workers in the firm. As our measure of labor market tightness is likely to be affected by the wage the firm offers, we control for the level of wages in a firm in the regressions. We take the data on wages from the Goskomstat enterprise registry, which provides this information separately for white-collar and blue-collar workers.

[29] Oyer (2005) reports results from the National Longitudinal Survey of Youth in the US. During 1986–2000, employers provided 15.1% of respondents with meals, 7.2% with child care, 56.2% with dental insurance, and 75.8% with medical insurance. The figures for meals and child care are comparable with those of the RLMS from Russia (see Table 3), whereas more employees had employer-provided medical care in the US than in Russia.

Table 4 Tightness of the labor market and amount of services provision for four employee categories, tobit

Dependent variable: Wage increase needed to compensate different occupational groups if the firm stopped social service provision	Managers	Professionals	High-skilled workers	Low-skilled workers
Log of how many days it would take to find a new…				
…manager	0.282			
	(0.595)			
...other professional		1.064		
		(0.716)		
...high-skilled worker			1.815**	
			(0.776)	
...low-skilled worker				2.446**
				(0.965)
Index of the quantity of regional social infrastructure[1]	-1.709	-2.655**	-3.579***	-2.754**
	(1.139)	(1.202)	(1.373)	(1.203)
Log of employment in 2002	0.301	1.501	2.053*	1.762*
	(0.978)	(0.990)	(1.142)	(0.998)
Average wage of white-collar employee in a firm	-0.458	-0.343		
	(1.230)	(1.258)		
Average wage of blue-collar employee in a firm			1.260	0.871
			(1.862)	(1.650)
Constant	-3.469	-11.717	-34.552	-29.550
	(15.158)	(15.832)	(21.479)	(18.721)
Observations	323	334	332	334

Industry and regional dummies included. Marginal effects reported: unconditional expected value, dF/dx. Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
[1] First principal component built on the following regional level variables in 2003: number of places at pre-school institutions per child, residential area per capita, number of hospital beds per capita, and number of swimming pools per 1,000 inhabitants.

Table 5 Tightness of the labor market and amount of services provision, pooled data, weighted tobit

Dependent variable: Wage increase needed to compensate different occupational groups if the firm stopped social service provision	
Log of how many days it would take to find a new employee	1.072***
	(0.411)
Index of the quantity of regional social infrastructure	-1.537**
	(0.762)
Log of employment in 2002	3.547***
	(0.509)
Average wage in a firm	-1.046
	(1.083)
Manager	-5.572***
	(2.124)
Professional	0.036
	(1.665)
Skilled worker	3.839***
	(1.305)
Constant	-17.095
	(12.964)
Observations	1239

Note: observations in a pooled regression are weighted by the number of employees in each skill group (managers, professionals, skilled and unskilled workers).
Industry and regional dummies included. Marginal effects reported: unconditional expected value, dF/dx.
Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%

We find that the shortage in the labor market for a given group, measured by the time needed to find employees, has a positive and significant effect on the amount of non-wage benefits for both high-skilled and low-skilled blue-collar workers.[30] Note that this result is obtained controlling for the level of wage in a firm, i.e. it is not driven by the fact higher wage firms are able to hire new workers more easily and also do not need to raise wages a lot after stopping benefits provision. Rather, we show that among firms with the same wage level firms facing tighter labor markets are providing more non-wage benefits to their workers.

There may be several explanations as to why service provision reacts to the tightness of the labor market for blue-collar workers but not for managers and professionals, while the costs of turnover of a manager and a high-skilled worker differ little. First, it may mean that these groups of workers have different preferences for the structure of compensation. Grosfeld et al.

[30] We also tested whether regional unemployment or the regional wage level (i.e. the workers' outside options) had any effect and found no connection. General unemployment level, however, does not reflect the tightness of the market for particular skills that a firm needs.

(2001) argue that less productive workers are more likely to choose a kind of an insurance contract with a high share of social services. However, both our survey and RLMS data indicate that amount of benefits received by white-collar workers is comparable to what blue-collar workers receive.[31]

The second explanation pertains to wealth constraints. White-collar workers with higher incomes should have better access to outside services. Indeed, as private markets for such services as housing, medical care and day care are still largely underdeveloped in Russia, we would expect low-cost alternative providers of such services to be quite scarce. This argument, however, should only apply to managers, not professionals as RLMS data indicate that the average salary of professionals in the industrial sector does not differ significantly from that of skilled blue-collar workers. Even so, our tightness measure is significant for the latter but not the former.

A possible third explanation relates to the differences in firm-specific human capital. If white-collar workers have higher firm-specific human capital than blue-collar workers, then we simply mis-measure the costs of turnover of white-collar workers for the firm as these costs would include not only the time needed to find a worker but also the costs for the worker to accumulate firm-specific human capital. This would explain why, even when both groups of workers receive benefits almost equally, our tightness measure is significant only for blue-collar workers. Note that in the pooled regression, which comprises differences both within and between groups of workers, the tightness variable is highly significant.

To test our hypothesis that the amount of benefits provided by firms depends on the density of regional infrastructure, we include a measure of the general quantity of the regional social infrastructure in the regressions in Table 4 and 5. The measure is constructed as a first principal component based on the following regional level variables: residential area per capita, number of places at pre-school institutions per child, number of hospital beds per 1,000 inhabitants, and number of swimming pools per 1,000 inhabitants.[32] These variables are chosen so as to reflect the four dimensions of social infrastructure included in our survey: housing, day care, health care, and recreational activities. The components of the index vary considerably among regions. Notably, the amount of residential area per capita ranges from 6.7 to 28.4 square meters and the number of hospital beds per 1,000 inhabitants varies from 41 to 332. [33]

[31] Since Russia has adopted a flat 13% personal income tax rate, differences in marginal tax rates do not affect preferences.

[32] The data are for 2003 and taken from Goskomstat's Russian Regions database.

[33] Note that these figures include all social services in the region irrespective of who owns them. Thus the amount of assets that the firm has previously divested to municipality does not affect our measure of the density of the regional infrastructure. Besides, the amount of assets held by each firm (both before and after the divestiture) relative to the total regional stock is typically quite small, hence our measure of the regional infrastructure density can be considered exogenous to the firm.

In practice, this is a measure of either the congestion of regional facilities (the lower the index, the more congested the facilities) or access to services (the higher the index, the greater the accessibility). This measure should also reflect the costs of arranging new social services for an employee who quits the service-providing firm (the higher the index, the lower the cost). The regression results confirm our hypothesis to the extent that access to local social infrastructure matters particularly for blue-collar workers in the structure of compensation, i.e. the greater the access to local social services, the lower the share of workers' compensation in the form of non-wage benefits. In the pooled regression, the index of social infrastructure is again highly significant.

4.2 Non-wage compensation and labor turnover

In order to prove that firms use non-wage compensation to attach workers, and thereby reduce their turnover costs, we further need to show that a higher share of social benefits in total compensation is related to lower employee turnover. We regress the turnover measures on the share of non-wage services in employee compensation. Our turnover measures include the hiring rate, separation rate, quit rate, turnover rate, and churning rate. All rates are calculated as in Davis et al. (1996) and Burgess et al. (2000) such that worker flows are relative to the average number of employees in the current and previous year (i.e. 2002 and 2001).

Since the survey asked only for the total employee turnover not divided by groups, we use the ratio of the total costs of the social services to the total wage bill as a measure of the share of non-monetary benefits in total compensation (descriptive statistics are reported in Table 2a). Our regression results presented in Table 6 suggest that the higher the share of social services in total compensation, the lower the labor turnover. This result applies to hiring, separation, and quit rates, as well as to the turnover and churning rates. The effect of fringe benefits on the employee churning rate, which is essentially the excessive turnover unrelated to the growth or decline of the firm, is the most significant. We thus find evidence that Russian industrial firms have managed to reduce the volatility they face in the labor market through non-wage benefits provision.

Table 6 Labor turnover in 2002 and social services, OLS

	Hiring rate[1], percentage	Separation rate, percentage	Quit rate percentage	Turnover rate, percentage	Churning rate, percentage
Social costs as a share of the total wage bill	-0.229**	-0.212**	-0.160*	-0.423**	-0.393***
	(0.092)	(0.103)	(0.083)	(0.170)	(0.151)
Log of employment in 2002	-0.899	-12.867***	-3.070**	-13.779***	0.545
	(2.154)	(4.517)	(1.328)	(3.865)	(2.554)
Share of firm's employment in local population	-0.557	1.254	-0.442	0.568	-1.369*
	(0.581)	(0.811)	(0.346)	(1.028)	(0.826)
Share of social costs*share of employment	0.037	0.045	0.031	0.088*	0.067
	(0.028)	(0.039)	(0.020)	(0.051)	(0.044)
Constant	17.817	106.163***	29.260***	125.846***	22.058
	(15.301)	(30.563)	(9.609)	(27.242)	(18.794)
Observations	240	239	236	239	239
R-squared	0.20	0.36	0.24	0.33	0.19

Industry and regional dummies included. Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%
[1] Hiring rate=hiring2002/((empl2001+empl2002)/2)*100
Separation rate= separations2002/((empl2001+empl2002)/2)*100
Quit rate= quits2002/((empl2001+empl2002)/2)*100
Turnover rate=(hiring2002+separations2002)/ ((empl2001+empl2002)/2)*100
Churning rate=((hirings2002+separations2002)/((empl2001+empl2002)/2)-|(empl2002-empl2001)/((empl2001+empl2002)/2)))*100

The relationship between non-wage benefits provision and turnover may be affected by the degree of monopsony power of a firm on the local labor market. Logically, the firm with the highest monopsony power does not need to attach the workers by means of non-wage benefits as there are no other employers in a locality. To test this effect, we measure the firm's monopsony power in the local labor market (share of the firm's employment in the population of municipality) and interact it with our measure of the share of wage benefits in compensation. The results in Table 6 show that where a firm has higher-than-average monopsony power, the negative effect of social benefits on turnover is reduced (the coefficient for churning is not significant).

5. Conclusion

The literature on the attachment effect of non-wage benefits has traditionally focused on pension plans and health insurance and the quit penalty they impose on workers. In this paper, we show that other types of non-wage benefits such as in-kind provision of social services may also have an attachment effect. The strength of this effect depends on the level of development of

social services provision in the locality, i.e. the availability of alternative service providers. This effect is emphasized in Russia, where, relative to countries with more developed service markets such as the US or the EU-15, the social sector remains heavily regulated and subsidized, creating significant barriers to entry.

Our paper also contributes to the literature on the evolution of labor markets in transition. It is well established that labor turnover has been generally high during Russia's economic transition. At the same time, it has been argued that firms try and actually manage to tie their employees to themselves by providing part of their compensation through non-monetary means, such as social services. However, no strong empirical support has been provided yet for this hypothesis.

Analyzing a unique data set of large and medium-sized industrial establishments from 2003, we find strong evidence that Russian industrial firms attempt to use social services to reduce the costs of labor turnover in the face of tight labor markets. The effect is the strongest for blue-collar workers. We also find that the use of non-monetary compensation declines with improved access to local social infrastructure. We also show that the link between non-wage benefits and employee turnover is weakened by the high monopsony power of a firm. In general, given the high share of blue-collar workers in manufacturing, the tightness of the labor market for these workers, and the low level of development of markets for social services, the use of social benefits in compensating Russian industrial workers has been quite pervasive.

Our findings shed light on the mechanisms of the employee compensation formation in an imperfect labor market. They emphasize the importance of taking into account non-wage benefits, for example, in estimation of the returns to human capital, where researchers tend to look only at wages. In Russia, as shown here, there are substantial differences among and within firms as to what part of worker compensation comes in the form of non-wage benefits.

Non-wage forms of compensation can, and do, attach workers to the firms, especially in the regions with poor social infrastructure. To the extent that they impede labor mobility, they also reinforce regional disparities in incomes and living standards. Our results thus provide an argument in favor of fostering the development of the local social infrastructure, both through government policies and involvement of private businesses. This would encourage a more flexible labor market as employees would have greater access to social services and be less tied to their current employer.

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Chapter 3. Russian Migrants to Russia: Location Choice and Labor Market Outcomes

The move of five million Russian and Russian-speaking people to Russia from the other former Soviet republics that took place during the 1990s has been studied by demographers, sociologists and to a lesser extent by economists. This paper presents a study of labor market outcomes for Russian migrants to Russia, using data from a representative survey of the Russian population conducted in 2004-2005. I focus on the location choice of Russian immigrants and test whether immigrants choose regions where the demand for their skills is high and compete for jobs with fellow immigrants rather than with locals. It is shown that in regions with a low percentage of immigrant population, immigrants are doing better in terms of employment opportunities and wages than the local population, whereas in regions with a high percentage of immigrants they are doing worse than locals. These results are consistent with the skill-sorting hypothesis.

1. Introduction

The collapse of the Soviet Union in 1991 has given rise to massive population movements among the newly independent countries that were formerly Soviet republics. The largest of these movements was the migration of ethnic Russians and Russian-speaking people from the other republics of the former Soviet Union (further fSU) to Russia. According to the last census, 5.2 million people living in Russia in 2002 resided outside the country in 1989. That is, 3.6 percent of the current population immigrated to Russia since 1989. Almost all of them (3.4 percent of the population) immigrated from former Soviet republics. Most arrived in Russia in the early and mid-1990s, soon after the collapse of the Soviet Union. In terms of place of origin, the majority of migrants arrived from Kazakhstan (1.4 million), Ukraine (0.8 million) and Uzbekistan (0.6 million.).

While there were substantial movements of people among the republics of the Soviet Union before 1991 as well, the reasons for migration and the demographic characteristics of migrants in the post-Soviet period have been quite different from earlier migrations. The existing literature on migration flows in the former Soviet Union since its collapse has emphasized the socio-political factors of migration. Locher (2002) finds that ethnic sorting is a major determinant of migration among the fSU countries, with the stage of transition and the wealth level of countries playing a minor role. Yerofeeva (1999) shows that ethnic repatriation was one

of the main reasons for the migration from northern and eastern Kazakhstan. The reasons for ethnic repatriation were the political changes in fSU countries that altered the relative position of non-titular nationalities in these countries and at the same time removed barriers to migration. Significantly, economic factors have also affected migration flows to Russia; however, they became more prominent in the late 1990s (Becker et al. 2005).

Given that the decision to leave was in a sense forced upon migrants, they still had a choice in their place of residence within Russia. Russia is large country with more than 80 regions, which vary dramatically in terms of many characteristics, including labor market conditions. Deep structural changes in the economy have created regional labor market distortions in the supply and demand for various skills, which were not significantly reduced over time due to interregional barriers to the movement of labor and capital (see Andrienko and Guriev 2005)[34].

In this paper I emphasize the location aspect of migration decisions and test the hypothesis that Russian migrants sorted themselves by region according to the relative demand for their skills, i.e. they went to the regions where the demand for their profession was highest and not met by the local labor force. Very few studies have touched upon the problem of how the composition of the relative supply and demand for different skills in a certain location of a host country affects the skill mix of migrants attracted to that location. Borjas et al. (2002) study the effect of regional differences in the returns to skills on internal migration. They show that interstate differences in the returns to skills are a major determinant of the size and skill composition of internal migration flows in the US. In particular, more skilled workers move to the regions that offer higher returns to skills while less skilled workers move to regions where returns to skills are more compressed.

In the spirit of Roy's model, the relative wages for certain skill groups across regions should affect the choice of their place of residence. Hence, migrants should sort themselves across the regions of the host country according to where their skills and qualifications are most in demand and better rewarded. According to this hypothesis, first, migrants with necessary skills who arrive in the region are in a privileged position: they can find a job more easily compared to locals with the same broad skills level but with a different profession. However, as more migrants with the same profession arrive, attracted by the high wages, they start competing with each other and their comparative advantage dissolves.

I use Russian Longitudinal Monitoring Survey data from 2004-2005 to conduct an individual level analysis of the relative labor market position of Russian migrants compared to

[34] Internal interregional migration in Russia is indeed quite low. Only around 2% of the population changed their residence within the borders of Russia each year during the 1990s. This figure decreased to 1.4% in 2002, which is quite low compared to the US internal migration rate of 13.7% for March 2002–March 2003.

the local population within the region[35]. I assume that the decision to migrate was mainly caused by exogenous factors but that the choice of location within Russia was endogenous to the specific skills of the migrant and to the demand for these skills on the regional labor markets.

Naturally, the choice of location is not completely unconstrained due to the costs of migration related to distance and information[36]. Given these constraints, there is a relative crowding of immigrants in the regions of Russia that are closer to a border with fSU countries. Moreover, more immigrants settled in regions with better housing availability. Factors not related to the labor market create exogenous variation in the number of immigrants in the location.

I test whether the relative position of immigrants on the labor market compared to locals depends on the number of other immigrants in the location. My empirical analysis shows that in regions with a low percentage of immigrant population, immigrants are doing better than the local population in terms of employment and wages whereas in regions with a high percentage of immigrants, they are doing significantly worse than locals. This result is consistent with the hypothesis outlined above.

Russian migration to Russia provides a good case for testing the hypothesis of the skill sorting of migrants across regions for several reasons. First, as several studies of location choices by migrants show, this choice is confounded by the presence of co-ethnics in the locality (see Bartel 1989, Chiswick and Miller 2002, 2004, Jaeger 2007, Piil Damm 2008). The migrants in my study are mostly ethnic Russians; hence ethnic network effects are not very important. For the same reason, Russian migrants to Russia are much less likely to be discriminated against on the labor market than typical immigrants[37]. Second, there is a self-selection problem: people may self-select for migration based on their unobserved characteristics (ability, motivation, risk aversion), which affect their labor market position in a host country (see Chiswick 1999, Bauer et. al 2002). This is much less of a problem in my study as migration was mainly forced by an external political shock, although there is still some scope for selection.

[35] My methodology is similar to the methodology used in a study of the labor market position of internal migrants in Russia by Gerber (1995).

[36] In addition, regional authorities may put some administrative constraints on the inflow of migrants. The Soviet system of *propiska* (registration at the place of residence) has survived in some form to this day, in particular in large cities, such as Moscow and St. Petersburg. Obtaining the registration often involves a lot of bureaucratic barriers, while living in a city without it limits the access of a person to some jobs and state-provided benefits.

[37] Using data from a small survey of immigrants in the early 1990s, Vitkovskaya (1998) finds that migrants were in a disadvantaged position while searching for a place of residence and for a job, partly due to the limitations imposed by the regional authorities. They often had to take jobs with low qualifications or change their occupation. However, the local population experienced similar problems at that time: there were considerable occupational changes and a downshifting on the qualifications ladder due to massive structural changes in the economy (see Sabirianova 2002). Furthermore, by the time of my study, i.e. by 2004, many of the migrants had spent several years in Russia and had gotten through the most difficult phase of adaptation.

The study has implications for the debate on the effect of immigration on local labor markets, in particular on wages and employment opportunities for the native population. The majority of existing studies find only minor negative effects of migration on the labor market position of locals (see e.g. the meta-analysis in Longhi et al. 2005, 2006). My results suggest that immigrants look for positions that are not filled by the local labor force and compete for these jobs with fellow immigrants rather than with locals.

The study also sheds light on the effect of immigration on regionally segmented labor markets. Borjas (2001) argues that migrants are more responsive to interregional wage differentials than native workers, who face high fixed costs of migration. Consequently, the migrant inflows play an equilibrating role in the country's labor market, thus increasing its efficiency. This effect is particularly important for the Russian labor market, where interregional barriers to the movement of labor and capital are high and persistent.

The rest of the paper is organized as follows. The next section discusses a framework for the analysis of the location choice of immigrants. Section 3 provides a socio-economic portrait of Russian migrants based on RLMS data and some evidence on their regional distribution. In section 4, I analyze the labor market outcomes of migrants compared to locals in terms of their employment status and wages. The last section concludes.

2. Choice of location and economic success of migrants

A number of studies have been devoted to the choice of location by migrants within the destination country. They are mostly based on US data. In an early study of migrant location choices in the US, Bartel (1989) shows that the location choice depends on the number of co-ethnics in the destination region; this effect is less important for higher skilled migrants. More recently, Chiswick and Miller (2004) have shown that US immigrants are highly concentrated geographically in the major "gateway cities," depending on where they arrived from. Piil Damm (2005) has used the Danish spatial dispersion policy as a natural experiment to show that location choices are affected by the presence of co-ethnics and other migrants as well as by economic factors such as access to jobs, education and housing, the unemployment rate and the provision of welfare benefits. Jaeger (2007) shows the importance of both ethnic networks and labor market conditions in migrant location choices in the US. Kaushal (2005) tests the welfare magnets hypothesis and finds little effect of the changes in welfare benefits policies in various US states on the migrants' choice of location.

Significantly, Russian migrants to Russia differ from typical international migrants in several respects. First of all, immigrants usually have a different ethnicity and language from the native population and often have little knowledge of the local language. The migrants that I

study either are of Russian nationality or use Russian as their native language (speak Russian at home) and have received their education in Russian. Second, in the studies of migrants in the US or in Western European countries, it is often emphasized that the education migrants receive in their home country is likely to be very different from the educational standards of the host country, making the migrants' skills less transferable and assimilation more difficult. In contrast, educational standards in the Soviet Union were quite uniform across the country. Third, cultural and social differences for Russian migrants are much smaller than for Asian or African migrants to Western countries. Fourth, Russian migrants can obtain official status in a host country more easily than other migrants; in principle, they were automatically granted Russian citizenship although in practice they faced many bureaucratic hurdles in obtaining it. Finally, Russian migrants face fewer informational barriers in the migration process as they already have information about their destination or can acquire it more easily (e.g. through relatives and friends in Russia). Thus, Russian migrants are much more similar to the local population of Russia than typical migrants. In this sense, movement of Russians to Russia is similar in many respects to interregional mobility within Russia[38].

Consequently, factors that are likely to affect the choice of location by Russian migrants are mainly economic factors; they include the cost of moving, which depend largely on the distance to the region, the probability of finding a job, expected income, and the cost of living in that location, which may be related to the price level, level of development of the regional infrastructure etc. The cost of moving apparently plays an important role here as many migrants were likely to face liquidity constraints at the time of migration and credit markets were not developed. Migrants who could not afford to move long distances to the north or east of Russia had a much more limited choice of regions close to the Russian border with fSU countries.

For simplicity, we can assume that there were two groups of migrants: first, migrants who had no liquidity constraints at the time of migration and could choose any region in Russia; and second, migrants who had a limited amount of money to finance the move and thus could choose from the subset of Russian regions close enough to their place of residence. As a consequence, we should observe the crowding of migrants in the regions that are close to the Russian border of fSU countries. Migration costs related to difficulties acquiring information about the destination should have the same effect.

[38] Bauer and Zimmermann (1997) study the labor market position of ethnic Germans migrating to West Germany from East Germany and other Eastern European countries. Ethnic German migrants are also similar in many respects to the local population of West Germany. However, they moved from countries which formerly had planned economies to a country with a developed market economy, which makes their skills less transferable and their assimilation more difficult than for Russian migrants to Russia.

At the end of the next section, I will estimate how closeness to the border as well as other factors related to labor market opportunities and costs of living affect the size of the Russian migrant population in Russian regions.

3. Russian and Russian-speaking migrants to Russia

Proportion of migrants in the population

The data from the 13th round of the Russian Longitudinal Monitoring Survey (RLMS)[39] conducted in 2004 allows us to sketch a socio-economic portrait of Russian migrants. This survey covers about ten thousand people annually. In the 2004 survey, the respondents were asked whether they had lived in the Russian Federation (further RF) since their birth, moved to the RF before 1991, or moved to the RF in or after 1991. We are interested in the last group: people who migrated since 1991. People who moved to Russia before 1991 moved during the Soviet era, when migration was largely motivated by different reasons than in the 1990s. For example, because of the Soviet system of distributing jobs, people from former republics could be sent to work to some Russian region after completing their higher education.

Unfortunately, we do not know the exact year of migration for those migrating in 1991 or later, but the majority of them should have immigrated in the early and mid-1990s, since that was the most active migration period (the peak year was 1994). Note that the sample, which consists of people residing largely in the same dwelling units in each round, is unlikely to include illegal migrants or temporary (seasonal) labor migrants. Rather, these are mainly people who settled in Russia permanently during the 1990s.

Another important issue is that immigrants to Russia could have moved further into the country after migrating. We only observe their location in Russia in 2004 since the question about migration status was included in the survey only starting from 2004. However, this should not be a problem for my study as I need to observe the place where migrants finally settled after searching for the best location in terms of jobs, and not necessarily their first location after migrating. Besides, since the barriers to internal migration in Russia are very high and the rates of internal migration are extremely low, it is unlikely that many migrants have moved from their initial location in Russia.

As Table 1 shows, 3.2 percent of respondents in our sample moved to Russia in 1991 or later. Thus, the sample is quite representative of the whole country in terms of the share of Russian migrants in the population. Another 5 percent of the sample moved to Russia before 1991. These people will be excluded from further analysis.

[39] See the brief description of this data set in Appendix.

Table 1 Migrants in the RLMS data (2004)

	Percent in the sample	Percent born outside Russia	Percent of ethnic Russians	Percent speaking Russian at home
Always lived in RF	91.8	2.7	86.5	93.2
Moved to RF before 1991	5.1	75.5	59.9	92.8
Moved to RF in 1991 or later	3.2	77.7	67.9	89.6
N obs	10,649			

Significantly, as Table 1 shows, not all of the migrants are of Russian ethnicity but almost 90 percent of them speak Russian at home. Many of them are likely to be members of large non-Russian ethnic groups traditionally living in Russia (Tatars, Bashkirs etc.). In the following analysis, I will consider all Russian-speaking migrants and not just ethnic Russians as Russian migrants to Russia. Although the majority of migrants were born outside Russia, more than 20 percent of them were born in Russia. Most likely, these people moved to one of the fSU republics during the Soviet era either as children with their parents or as adults to study, work or serve in the army, and moved back to Russia after the collapse of the Soviet Union.

Individual characteristics

Let us compare some individual characteristics of Russian migrants and people who have always lived in Russia (see Table 2). There is a slightly higher percent of males among the migrants coming after 1990. They are also on average four years younger than the locals; this difference is statistically significant. At the same time, recent migrants (after 1990) are not significantly different from the locals in their education levels. The statistics on marital status in Table 2 show that locals and recent migrants do not differ much in terms of the numbers of single and married people or in the number of people having children. Some migrants could have moved as families; others could have started families following their migration.

Table 2 Individual characteristics

	Always lived in RF	Moved to RF in 1991 or later
Percent male	43.0	46.0
Age	42.2	38.1
[st.dev.]	[18.9]	[17.2]
Years of education	11.6	11.7
[st.dev.]	[3.4]	[3.1]
Highest level of education obtained, percent:		
Secondary education	32.2	33.5
Lower level vocational education (PTU)	21.7	15.1
Higher level vocational education (trade school, college)	21.5	25.8
Higher education (institute, university)	24.6	25.5
Marital status, percent:		
Never married	21.8	21.7
In a registered marriage	49.2	46.6
Living together, not registered	9.7	16.3
Divorced and not re-married	7.6	6.2
Widow/widower	11.7	9.2
Percent that have children	70.7	67.4

I further consider descriptive statistics on the employment status and occupational structure of migrants as compared to locals. In 2004, the unemployment rate among economically active migrants was 0.9 percentage points higher than among natives[40]. Table 3 also shows self-reported employment status for these two groups in the population. Consistently with the younger average age of the migrants, there are slightly more students and fewer retired people among the migrants than among the locals. The number of entrepreneurs among the migrants is two times higher than among the locals. This may be explained by the higher tolerance of risk among migrants, or self-employment may be a survival strategy for migrants who have problems finding a job.

[40] This unemployment indicator was constructed by RLMS experts using several questions from the survey and based on the US Bureau of Labor Statistics' definition of unemployment. It means that people are classified as unemployed if they are jobless, looking for a job and available for work.

Table 3 Employment status, sectors and occupations

	Always lived in RF	Moved to RF in 1991 or later
Percent unemployed out of economically active population (by BLS definition)	6.7	7.6
Current employment status (percentage of all locals/immigrants):		
Student	11.4	13.1
Unable to work for health reasons, disabled	1.7	0.9
Retired and not working	21.7	17.2
On maternity or childcare leave, housewife	4.7	6.5
Temporarily not employed for other reasons and looking for a job	8.3	9.2
Temporarily not employed for other reasons and not looking for a job	1.5	3.0
An entrepreneur	1.6	3.0
Working at an enterprise, organization, collective farm, state farm or cooperative	44.3	40.4
Working at some other place than an enterprise, organization, collective farm, state farm or cooperative	3.4	5.6
Other	1.4	1.2
Sector of employment:		
Light Industry	6.8	5.3
Civil Machine Construction	4.1	2.9
Military-Industrial Complex	2.5	0.0
Oil and Gas Industry	3.0	1.2
Other Branch of Heavy Industry	5.3	4.7
Construction	7.7	12.9
Transportation, Communication	10.2	12.3
Agriculture	7.1	5.3
Government and Public Administration	2.2	1.8
Education	10.1	9.9
Science, Culture	2.8	4.7
Public Health	8.4	9.4
Army, Ministry of Internal Affairs, Security Services	4.8	8.2
Trade, Consumer Services	21.5	21.1
Finances	1.8	0.0
Other	1.8	0.6
Occupation at the current place of work:		
Manager, including:	*6.0*	*7.4*
Occ1. Legislators, Senior Managers, Officials	6.0	7.4
Professional, including:	*38.9*	*34.1*
Occ2. Professionals	16.9	15.9
Occ3. Technicians and Associate Professionals	16.1	14.2
Occ4. Clerks	5.9	4.0
Skilled worker, including:	*42.8*	*48.9*
Occ5. Service Workers and Market Workers	10.8	13.6
Occ6. Skilled Agricultural and Fishery Workers	0.5	0.0
Occ7. Craft and Related Trades	13.7	21.0

Occ8. Plant and Machine Operators and Assemblers	17.8	14.2
Unskilled worker, including:	*12.3*	*9.7*
Occ9. Elementary (Unskilled) Occupations	12.3	9.7

Note: Occupations in the RLMS data are coded according to the four-digit International Standard Classification of Occupations: ISCO-88 (Geneva: International Labor Office, 1990). Here, they are aggregated into one-digit occupational groups.

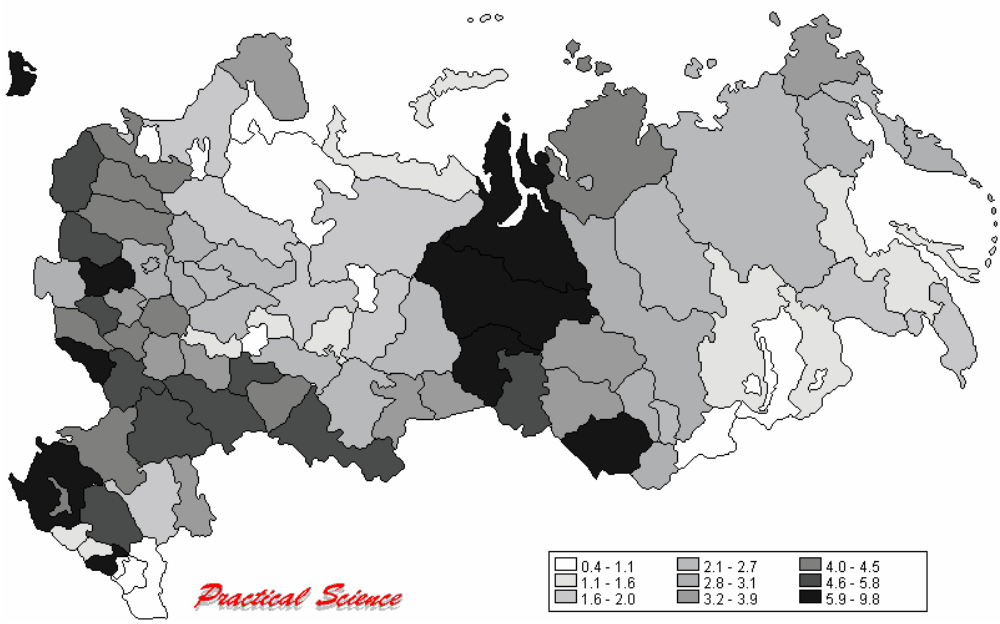
The second panel in Table 3 shows the sectoral structure of employment for respondents employed at the time of the interview. This structure does not differ dramatically for locals and recent migrants. A somewhat smaller number of migrants are employed in industry, and no migrants are employed by the military-industrial sector or by the financial sector. At the same time, more migrants than locals are employed in construction and in the army, police or security services. It may suggest that some migrants are forced into low-skilled occupations in these sectors. However, as the third panel in Table 3 shows, the number of people employed in unskilled occupations among migrants is actually lower than among locals. There are slightly more managers, fewer professionals and more skilled workers (in particular service workers and craft workers) among migrants when compared to locals. Thus, migrants are able to obtain high-skill jobs to the same degree as locals. The only significant difference in employment characteristics is that the average tenure for employed migrants (3.6 years) is twice as short as the average tenure for locals. Obviously, migrants could not have held their current jobs prior to 1991.

Choice of location and regional dispersion

Figure 1 shows the distribution of migrants from fSU countries in 89 Russian regions based on data from the 2002 census [41]. It shows that migrants are quite dispersed over Russia's vast territory: almost all regions received some share of migrants, except for the south of the Far East and European north. A relatively high number of migrants are observed along the border with fSU countries. This can be explained not only by the costs of migration but also by higher cross-border commerce opportunities for migrants (Zaionchkovskaya, 1998). The highest concentration of migrants is observed in particular in Tymen *oblast* in Western Siberia, despite its cold climate: apparently, people are attracted by job opportunities in the region's thriving oil and gas industry. Moscow and St. Petersburg have a relatively small number of migrants due to the very restrictive migration policies of the local authorities.

[41] I used the census data and not the RLMS data to construct the regional numbers of Russian migrants, which I further used in the regression analysis. The RLMS sample is representative nationally but not regionally; hence I cannot use it to construct regional-level variables.

Figure 1 Percent of regional population in 2002 who lived outside Russia (in fSU) in 1989



Within the regions, migrants could have settled in urban or rural areas. In our sample, 76 percent of the locals live in urban settlements, while among migrants this figure is somewhat lower – 71 percent. The anecdotal evidence and early studies of migration (e.g. Vitkovskaya 1998) suggest that it was more difficult for migrants to settle in urban areas, especially in the big cities, due to the registration system still in effect (*propiska*), which was introduced in the Soviet era to limit migration into big cities. Nevertheless, the majority of migrants in our sample live in urban areas, although they indeed settled in somewhat smaller cities (the median city size for migrants in the sample is 350,000 people versus 500,000 for locals).

Next, I estimate the factors that affect the share of migrants in the region, using the framework presented in the previous section. Using regional-level data, I regress the share of Russian migrants in the regions on a number of regional characteristics. First, attractiveness of the region for migrants depends on the probability of finding a job and the expected income for a job in that region. I include the regional unemployment rate in 1994 and real income per capita in 1995 as proxies. I use data from the mid-1990s as this was the most active migration period. Moreover, economic indicators themselves may be affected by the number of immigrants in the region. Using indicators from earlier years to explain the share of immigrants in the region in

2002 reduces this problem[42]. In addition, I include the share of the urban population in a region in 1994. Presumably, there are more employment opportunities for migrants in urban areas.

Migration costs are proxied by a dummy equal to one if a region borders one of the fSU countries. As for the costs of living, one of the major problems for migrants arriving in a region was finding housing. Since we do not have data on regional housing prices in the mid-1990s, I use residential area per capita in the region in 1994 to proxy housing costs. I also include two proxies for the non-monetary costs of living in a region: the average temperature in January and the number of homicides per 1,000 people in 1995. The data on all the regional variables are taken from publications from the Russian State Committee on Statistics.

The results of the regression of the share of immigrants in the region in 2002 on the regional variables above are presented in Table 4. Four of the variables included have a predicted and significant effect. The low unemployment rate and high real income in the mid-1990s are related to the higher share of immigrants in the region in 2002. However, when we exclude Tyumen *oblast*, which is an outlier in terms of income due to its thriving oil extraction industry, the coefficient on real income drops and becomes insignificant (the second column in Table 4). The unemployment rate remains highly significant. Greater availability of housing increases the number of immigrants attracted to the region. Finally, migration costs related to distance obviously play an important role: the share of migrants is significantly higher in the bordering regions.

[42] Ideally, we would like to have used regional characteristics from the year before the migration wave started. However, regional-level data before 1994 are not available.

Table 4 Determinants of the share of immigrants in the regions

	(1)	(2) *Tyumen oblast excluded*
Dep.var.: Percent of region's population in 2002 who lived outside Russia in FSU in 1989		
Share of unemployed in 1994	-0.250***	-0.263***
	(0.071)	(0.071)
Percent of urban population in total population in 1994	-0.011	-0.009
	(0.018)	(0.019)
Log real income per capita in 1995	1.624**	1.108
	(0.685)	(0.921)
Region bordering fSU country	1.886***	1.803***
	(0.403)	(0.422)
Residential area per capita (square meters) in 1994	0.242**	0.268**
	(0.100)	(0.103)
Average temperature in January in 2001	0.013	0.013
	(0.017)	(0.017)
Number of homicides per 1,000 people in 1995	-0.893	-0.916
	(1.513)	(1.492)
Constant	0.449	0.365
	(2.065)	(2.032)
Observations	72	71
R-squared	0.56	0.54

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

As this analysis shows, the migrants' choice of their place of residence is affected not only by labor market characteristics but also by the distance to the region and by the level of development of regional infrastructure, in particular, housing. This creates some exogenous variation in the number of immigrants across regions. In the next section, I will test how the size of the immigrant population in the region affects the labor market position of immigrants relative to the local population, in an attempt to provide evidence for the skill-sorting hypothesis.

4. Labor market outcomes for Russian migrants to Russia

4.1 Employment opportunities

As we have seen from the previous section, Russian migrants on average do not differ dramatically from the local population in terms of individual characteristics and human capital endowment. Why would their labor market position in terms of employment and wages be different? On the one hand, if migrants are discriminated against in regional labor markets, we would expect migrants with the same qualification as the locals to be less likely to have a job and to earn less. However, Russian migrants are much less likely to be discriminated against on the

labor market due to their similarities with the local population, as we discussed in Section 2. On the other hand, if migrants choose the location where their skills are most in demand and this demand is not met by the local population, they are likely to be in the advantageous labor market position relative to the locals.

Ideally, to test whether migrants sort themselves across the Russian regions according to the relative demand for their skills, I would need data on the supply and demand of labor or on wage differentials for rather narrow skill groups or professions for each region. Since such data are not available, I can only test this hypothesis indirectly. Suppose industry in some regions has a need for workers of certain professions/qualifications, and there are not enough such workers in the regional labor force. First migrants with the necessary skills who arrive in that region are in a privileged position: they can find a job more easily and perhaps even earn more, compared to locals with the same broad skills level but with a different profession. However, as more migrants with the same profession arrive, attracted by the high wages, they start competing with each other and their comparative advantage dissolves.

I first test this hypothesis by looking at the employment status of migrants in comparison with locals, using data from 2004-2005[43]. Table 5 presents the results of a probit model, where the dependent variable is equal to one if a person is employed and zero if unemployed. I used the unemployment variable constructed by RLMS experts based on the Bureau of Labor Statistics' definition of unemployment[44]. I start with the simplest specification in column 1, which just includes a migrant dummy on the right-hand side. The regression results show that the migrants in the sample are not significantly more likely to be employed than the locals. When I add individual characteristics including education and labor market experience on the right-hand side in column 2, the effect of being a migrant on employment status remains insignificant in specification 2. The same results hold in column 3 of Table 5 when I add regional fixed effects.

[43] All estimations reported in this section are done for the sample of people who are at least 30 years of age at the time of the survey. Younger people were likely to have migrated to Russia when they were still children; hence the choice of location was decided by their parents. I have also done estimations for the whole sample: the results are still significant but somewhat weaker, as can be expected.

[44] People are classified as unemployed if they are jobless, looking for a job, and available for work.

Table 5 Employment probability of migrants and locals, probit

	(1)	(2)	(3)	(4)
Migrant	-0.163	-0.185	-0.192	0.945**
	(0.130)	(0.129)	(0.123)	(0.466)
Percent of migrants in regional population				0.016
				(0.016)
Migrant*percent in region				-0.247***
				(0.089)
Male		-0.405***	-0.436***	-0.424***
		(0.114)	(0.120)	(0.113)
Age		-0.011	-0.002	-0.006
		(0.019)	(0.020)	(0.021)
Age squared		0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
Years of education		-0.005	-0.017	-0.013
		(0.061)	(0.066)	(0.062)
Years of education squared		0.001	0.002	0.002
		(0.002)	(0.003)	(0.003)
Married		-0.003	0.015	0.001
		(0.075)	(0.075)	(0.075)
# of children <18 years		-0.118***	-0.098***	-0.102***
		(0.041)	(0.037)	(0.038)
Male*married		0.464***	0.488***	0.473***
		(0.141)	(0.146)	(0.141)
Male*# of children <18 years		0.115**	0.126**	0.127**
		(0.059)	(0.057)	(0.055)
Regional fixed effects	No	No	Yes	No
Regional unemployment rate				-0.030***
				(0.007)
Round 14	0.033	0.026	0.031	0.026
	(0.043)	(0.043)	(0.045)	(0.044)
Constant	1.643***	1.935***	1.293**	2.112***
	(0.036)	(0.627)	(0.645)	(0.641)
Observations	8170	8084	8084	8084

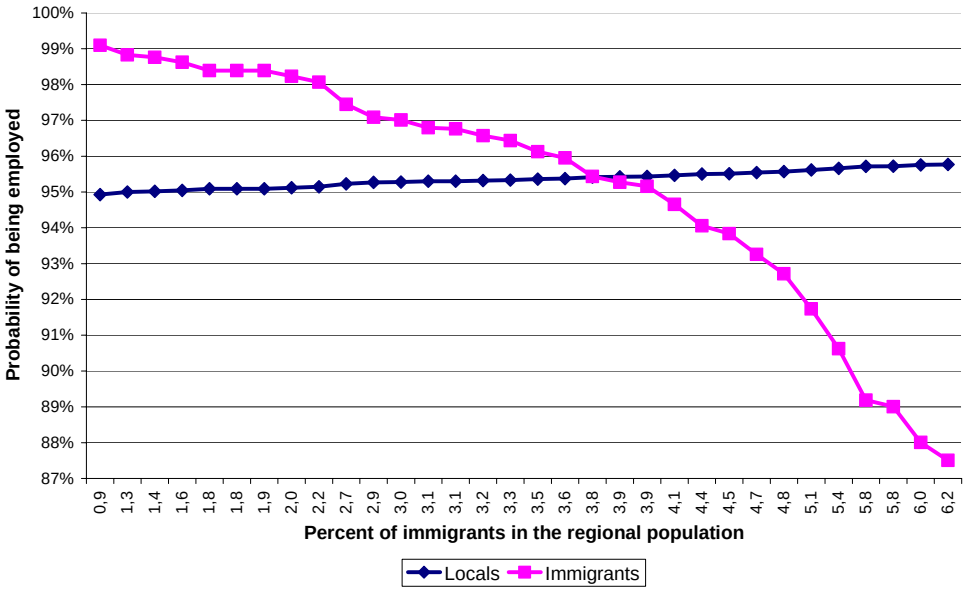
Robust standard errors in parentheses; clustering by regions
* significant at 10%; ** significant at 5%; *** significant at 1%

Finally, in column 4, instead of the regional fixed effects, I add the percentage of fSU migrants in the regional population (from the 2002 census data given in the previous section) and interact it with a migrant dummy. I also control for the regional unemployment rate in 2003. The coefficient on the migrant dummy becomes positive and significant, while the coefficient on the interaction term is negative and significant. It means that when there are few migrants in the

regional population, they are less likely to be unemployed than locals. When the number of migrants in a region becomes large, this effect disappears. The finding is consistent with the argument above about the skill sorting of migrants across regions.

Since the marginal effects in the probit model are non-linear, in order to demonstrate the size of the effect, I use the model estimated in column 4 of Table 5 to calculate the probabilities of being employed separately for immigrants and for locals with sample average individual characteristics for each value of the share of immigrants in the regional population in my sample. The results are presented graphically in Figure 2.

Figure 2 Predicted probabilities of being employed for locals and immigrants



As we can see, the effect is economically significant. In regions with a very low share of migrants, the probability of being employed is more than 99 percent for the migrant while the probability of being employed is around 95 percent for the local resident of a similar age, similar education and broad skill group. The employment probability for migrants declines with an increasing share of migrants in the region but remains above the employment probability for locals until this share reaches about 3.8 percent of the regional population. In regions with the highest share of migrant population, the predicted unemployment rate for migrants is more than 12 percent, which is three times the unemployment rate for locals with similar human capital characteristics. Note that the employment probability for local residents is largely independent of the size of the migrant population in the region.

To further test this finding, I use the question that was asked in the survey: how certain the worker is of finding a new job that is no worse than his current job in the event he loses it. The answer is between 1 (absolutely uncertain) to 5 (absolutely certain). I use this question as a dependent variable in an ordered probit regression. I run the same four specifications as in the probit in Table 5. The results are presented in Table 6.

Table 6 How certain migrants are about finding a new job compared to locals, ordered probit

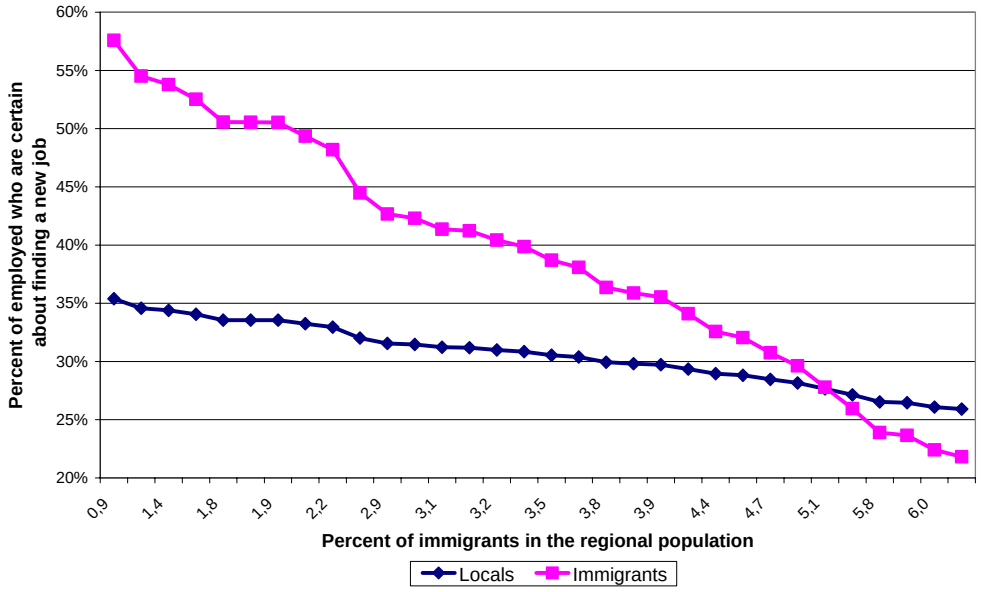
	(1)	(2)	(3)	(4)
Dep. var.: categorical variable from 1 (most uncertain about finding a new job if current job is lost) to 5 (most certain)				
Migrant	0.183	0.090	0.170**	0.684**
	(0.120)	(0.111)	(0.083)	(0.319)
Percent of migrants in regional population				-0.052
				(0.038)
Migrant*percent in region				-0.133**
				(0.066)
Male		0.340***	0.348***	0.339***
		(0.048)	(0.052)	(0.049)
Age		-0.035**	-0.017	-0.030**
		(0.015)	(0.014)	(0.014)
Age squared		0.000	-0.000	0.000
		(0.000)	(0.000)	(0.000)
Years of education		-0.044	-0.088*	-0.043
		(0.056)	(0.047)	(0.055)
Years of education squared		0.003	0.004**	0.003
		(0.002)	(0.002)	(0.002)
Regional fixed effects	No	No	Yes	No
Regional unemployment rate				-0.025***
				(0.010)
Round 14	0.020	0.017		0.018
	(0.028)	(0.027)		(0.028)
Observations	6845	6791	6791	6791

Robust standard errors in parentheses; clustering by regions
* significant at 10%; ** significant at 5%; *** significant at 1%

In the first three specifications, the migrants are not significantly different from locals in terms of their certainty of finding a new job. In column 4, I add the percentage of migrants in the local population and the interaction term. The results show that migrants who constitute only a small fraction of the regional population are more certain about finding a new job than local workers. This effect disappears with a growing migrant population. This result is illustrated in

Figure 3, where I graph the sum of the predicted probabilities of outcomes 4 and 5 (certain or absolutely certain of finding a new job) for migrants and locals. Migrants in regions with a small immigrant population are much more certain about finding a new job than locals, but this difference declines and becomes negative at high values for the size of the regional migrant population.

Figure 3 Predicted certainty of finding new job for locals and immigrants



The results presented in this section clearly show that in regions that have a small number of Russian migrants, e.g. due to the long distance from the border or the lack of housing, migrants have better employment opportunities than locals with the same amount of education and experience. In regions that received large number of immigrants, e.g. regions close to the border, the unemployment rate among migrants is, in contrast, much higher than among locals with similar qualifications. Thus, observed interaction among the size of the immigrant population in the region and the employment probabilities of migrants relative to locals imply that migrants choose the location where their skills are most in demand and where they would have little competition with locals for jobs. With the arrival of more migrants with similar skills, the competition among migrants intensifies and their employment probability declines[45].

[45] In support of this argument, the survey data from Tyuryukanova (2004) show that only 30% of international labor migrants in Russia feel competition with local workers.

4.2 Alternative explanations

The results obtained above cannot be explained by discrimination against immigrants on the labor market: in this case, we would observe a lower employment probability for migrants irrespective of the size of the immigrant population in the region. In the absence of discrimination, if migrants compete for the same jobs as locals, we should observe the same unemployment rates among locals and migrants, irrespective of the size of the immigrant population.

One possible alternative explanation for the results obtained is related to tied movers. When the whole family migrates, as opposed to a single person, they may face tougher liquidity constraints and consequently have a more limited choice of regions. If the choice of region is based on the skills of the head of the family, the other working-age members of the family – tied movers – may have problems finding jobs. Thus, a higher concentration of family migrants in regions close to the border would produce the results above. However, the data do not support this explanation. I divide regions in my sample into two groups: a below-median and above-median share of immigrant population (3.1 percent). In regions with a larger immigrant population, the share of two-immigrant households (i.e. families where both the husband and wife are immigrants) is if anything smaller than in regions with a smaller number of immigrants: 37.5 percent of households are two-immigrant households in regions above the median versus 50 percent in regions below the median.

Another potential explanation is related to the differences in unobserved characteristics of migrants, such as ability or attitude to risk. Suppose there are two groups of immigrants. The first group consists of people who were forced to leave due to the changing political situation and who are not on average different from the population in Russia in terms of unobserved characteristics. These people would be more likely to face liquidity or informational constraints and to settle in regions close to the border. The second group consists of people who have above-average abilities and who decide to migrate in order to obtain higher returns on their abilities; they should have fewer limitations in their choice of location. Then in regions with a small migrant population, the share of high-ability migrants should be higher and they should have better employment opportunities and higher wages compared to the locals, which is consistent with my results. However, in the absence of skill sorting in the choice of location, the inflow of migrants from the first group to the region should worsen the employment opportunities of locals; that is, in regions with a large migrant population, the unemployment rates for migrants and locals should not differ. This is not what the data show, as we have seen in Table 5 and Figure 2.

4.3 Wages

Let us now look at the wages of migrants in comparison with locals. I use one of the two measures of earned income available from the survey data: the actual amount of money received for the last month. I divide this variable by the number of hours worked during that month in order to obtain the hourly wage during the last month, and take a logarithm.

The results of the wage regressions are presented in Table 7. As before, I start with the simplest specification, which includes just a migrant dummy in the main equation. The coefficient of the migrant dummy in this specification is insignificant. When I add the individual characteristics, job characteristics and sectoral dummies in column 2 and the regional fixed effects in column 3, the coefficient on the migrant dummy drops slightly and remains insignificant.

Table 7 The effect of migrant status on wages, OLS

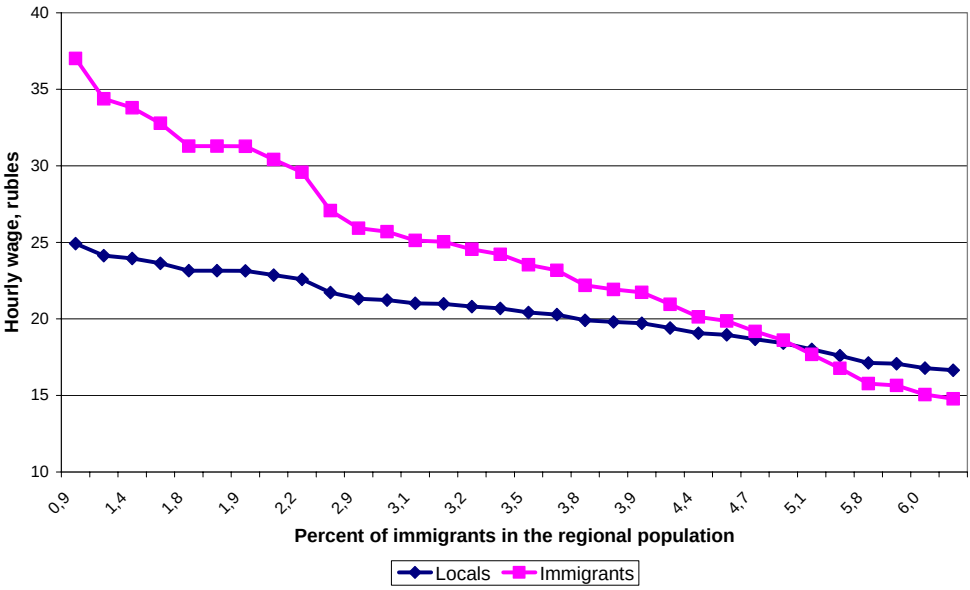
	(1)	(2)	(3)	(4)
Dep. var.: log of the last month's hourly wage				
Migrant	0.067	0.038	0.059	0.482**
	(0.073)	(0.058)	(0.047)	(0.206)
Percent of migrants in regional population				-0.077**
				(0.037)
Migrant*percent in region				-0.098*
				(0.051)
Male		0.287***	0.281***	0.282***
		(0.038)	(0.030)	(0.031)
Age		0.010	0.026**	0.013
		(0.010)	(0.009)	(0.010)
Age squared		-0.000	-0.000***	-0.000*
		(0.000)	(0.000)	(0.000)
Years of education		0.087***	0.096***	0.097***
		(0.028)	(0.027)	(0.029)
Years of education squared		-0.001	-0.002	-0.001
		(0.001)	(0.001)	(0.001)
Tenure		0.003	0.007**	0.006
		(0.004)	(0.003)	(0.004)
Tenure squared		-0.000	-0.000*	-0.000
		(0.000)	(0.000)	(0.000)
Manager		0.594***	0.640***	0.618***
		(0.069)	(0.066)	(0.069)
Professional		0.472***	0.476***	0.454***
		(0.043)	(0.044)	(0.048)
Skilled worker		0.293***	0.332***	0.291***
		(0.046)	(0.033)	(0.042)
Log firm size		0.054***	0.036***	0.041***
		(0.011)	(0.008)	(0.009)
Firm size missing[+]		-0.091***	-0.112***	-0.096***
		(0.026)	(0.021)	(0.026)
Sectoral fixed effects	No	Yes	Yes	Yes
Regional fixed effects	No	No	Yes	No
Regional unemployment rate				-0.034
				(0.020)
Round 14	0.219***	0.218***	0.228***	0.219***
	(0.021)	(0.020)	(0.020)	(0.020)
Constant	3.197***	1.417***	1.378***	1.911***
	(0.089)	(0.280)	(0.260)	(0.357)
Observations	5918	5642	5642	5642
R-squared	0.02	0.25	0.39	0.30

Robust standard errors in parentheses; clustering by region; * significant at 10%; ** at 5%; *** at 1%

[+] As there are many missing values in the variable "firm size" (number of employees), the average values were imputed and a dummy for missing values introduced

In column 4 of Table 7, I add the percentage of migrants among the regional population and an interaction term instead of the regional fixed effects. The coefficients on the migrant dummy and interaction term have expected signs (positive for the dummy and negative for the interaction term) and are significant. Thus, the migrants who were able to obtain jobs receive wage premiums on their specific skills compared to locals, but the size of the wage premium declines and eventually becomes negative as the size of the immigrant population in the locality grows. This result is illustrated in Figure 4.

Figure 4 Predicted wages for locals and immigrants



Finally, in an attempt to get to the skill-sorting hypothesis more directly, I look at the broad skill groups. Suppose that a migrant in a broad skill category (e.g. skilled manual worker) chooses a location where his narrow skill/profession within this category (e.g. carpenter) is most in demand as there are not enough local carpenters in the region. Then he will probably earn less than local people from a higher skill group (e.g. managers) but he is expected to earn more than locals from the same broad skill group but who have different professions. I test this hypothesis by interacting a migrant dummy in a wage regression with four broad skill categories: manager, professional, skilled and unskilled worker (unskilled local worker is an excluded category).

The results of this wage regression are presented in Table 8; fixed effects for the regions are included.

Table 8 The effect of migrant status on wages by four skill groups, OLS

	(1)	(2)
Dep. var.: log of the last month's hourly wage		
Migrant*manager	-0.470**	-0.515**
	(0.192)	(0.193)
Migrant*professional	-0.063	0.030
	(0.081)	(0.082)
Migrant*skilled worker	0.190**	0.155*
	(0.087)	(0.081)
Migrant*unskilled worker	0.121	0.218
	(0.249)	(0.232)
Male	0.316***	0.284***
	(0.032)	(0.030)
Age	0.033***	0.027***
	(0.011)	(0.009)
Age squared	-0.000***	-0.000***
	(0.000)	(0.000)
Years of education	0.113***	0.095***
	(0.027)	(0.027)
Years of education squared	-0.002**	-0.002
	(0.001)	(0.001)
Tenure	0.002	0.007**
	(0.004)	(0.003)
Tenure squared	-0.000	-0.000**
	(0.000)	(0.000)
Manager	0.693***	0.669***
	(0.078)	(0.066)
Professional	0.468***	0.483***
	(0.047)	(0.046)
Skilled worker	0.384***	0.332***
	(0.042)	(0.034)
Log firm size	0.041***	0.036***
	(0.008)	(0.008)
Firm size missing[+]	-0.116***	-0.110***
	(0.018)	(0.022)
Regional fixed effects	Yes	Yes
Sectoral fixed effects	No	Yes
Round 14	0.231***	0.227***
	(0.019)	(0.020)
Constant	1.056***	1.359***
	(0.293)	(0.255)
Observations	5729	5642
R-squared	0.34	0.39

Robust standard errors in parentheses; clustering by region
* significant at 10%; ** significant at 5%; *** significant at 1%
[+] As there are many missing values in the variable "firm size" (number of employees), the average values were imputed and a dummy for missing values introduced

The coefficient for the interaction of the migrant dummy and skilled worker dummy in column 1 is positive, significant and quite large in economic terms. That is, migrant skilled workers in a region on average earn more than local skilled workers with the same amount of education and experience. At the same time, migrant managers receive a negative wage differential compared to local managers. This may indicate e.g. the lack of sector-specific or location-specific knowledge on the part of a migrant that may be important for a manager. When we add the sectoral fixed effects in column 2 of Table 8, the coefficients on both interaction terms remain significant. Thus, wage premiums for migrant workers exist mainly within the sectors.

It would be even more insightful to look at the more disaggregated skill groups although it may be asking too much from the available data, since the total number of migrants in the sample is not large. Hence, the following results should be taken with caution. I run the same analysis with four broad skill groups above, disaggregated into nine occupational groups, which are listed in the third panel of Table 3. The results of the wage regression are presented in Table 9. Occupations for which migrants receive a wage premium include plant and machine operators and assemblers and technicians and associate professionals (the latter becomes significant when I add sectoral fixed effects in column 2). Migrants in the groups of managers and professionals receive a negative wage premium although the coefficient for the latter group becomes insignificant when we add sector fixed effects.

Table 9 The effect of migrant status on wages by nine skill groups, OLS

	(1)	(2)
Dep. var.: log of the last month's hourly wage		
Occ1.Legislators, Senior Managers, Officials	0.714***	0.695***
	(0.077)	(0.064)
Migrant *Occ1	-0.455**	-0.509**
	(0.198)	(0.200)
Occ2. Professionals	0.570***	0.669***
	(0.061)	(0.059)
Migrant*Occ2	-0.267**	-0.199
	(0.129)	(0.127)
Occ3.Technicians and Associate Professionals	0.414***	0.434***
	(0.042)	(0.045)
Migrant*Occ3	0.159	0.233*
	(0.118)	(0.132)
Occ4. Clerks	0.365***	0.276***
	(0.059)	(0.048)
Migrant*Occ4	-0.200	-0.065
	(0.179)	(0.207)
Occ5. Service Workers and Market Workers	0.265***	0.206***
	(0.048)	(0.035)
Migrant*Occ5	-0.192	-0.239
	(0.171)	(0.172)
Occ6. Skilled Agricultural and Fishery Workers	0.042	0.175
	(0.242)	(0.215)
Occ7. Craft and Related Trades	0.475***	0.396***
	(0.051)	(0.040)
Migrant*Occ7	0.127	0.119
	(0.150)	(0.150)
Occ8. Plant and Machine Operators and Assemblers	0.408***	0.369***
	(0.040)	(0.040)
Migrant*Occ8	0.509***	0.483***
	(0.156)	(0.154)
Migrant*Occ9	0.123	0.206
	(0.252)	(0.222)
Male	0.273***	0.232***
	(0.032)	(0.032)
Age	0.032***	0.026***
	(0.011)	(0.009)
Age squared	-0.000***	-0.000***
	(0.000)	(0.000)
Years of education	0.117***	0.096***
	(0.027)	(0.027)
Years of education squared	-0.003**	-0.002*
	(0.001)	(0.001)
Tenure	0.001	0.006*
	(0.003)	(0.003)
Tenure squared	-0.000	-0.000*
	(0.000)	(0.000)
Log firm size	0.037***	0.037***

	(0.007)	(0.007)
Firm size missing[+]	-0.103***	-0.106***
	(0.018)	(0.022)
Regional fixed effects	Yes	Yes
Sectoral fixed effects	No	Yes
Round 14	0.234***	0.236***
	(0.019)	(0.021)
Constant	1.128***	1.411***
	(0.302)	(0.268)
Observations	5729	5642
R-squared	0.35	0.40

Robust standard errors in parentheses; clustering by region
* significant at 10%; ** significant at 5%; *** significant at 1%
[+] As there are many missing values in the variable "firm size" (number of employees), the average values were imputed and a dummy for missing values introduced

Taken together, the evidence presented in this section indeed suggests that, in their choice of location within Russia, Russian migrants responded to the excess demand for their skills in certain regions and filled some regional labor market niches that were not filled by the local population or by internal migrants.

5. Conclusion

The move of about five million Russian and Russian-speaking people from the former Soviet republics to Russia that took place after the collapse of the Soviet Union has been studied by demographers, sociologists and to a lesser extent by economists. Up until now, there was no rigorous study of the economic position of these people based on microeconomic data from a representative sample. This paper presents an analysis of labor market outcomes for Russian migrants to Russia, i.e. people from the former Soviet republics, who settled permanently in Russia during the 1990s. As the data show, these people, being on average slightly younger than the local population, barely differ from the locals in terms of education, skill level and occupational structure, employment status and wages. However, the analysis reveals important differences when the location aspect of the migration decision is considered.

The main focus of the study is the location choice by immigrants within the host country, given the large regional heterogeneity in the structure of labor demand and in the presence of liquidity or information constraints at the time of migration. I tested the hypothesis that a migrant chooses the region where excess demand for his skills (profession) is highest, that is, where the competition for jobs with local workers is minimal. However, due to liquidity or information constraints, some migrants have a more limited choice of locations than others. This

leads to the crowding of immigrants in some regions and tighter competition for jobs among immigrants in these regions.

Studying Russian migration to Russia provides a clean test of this hypothesis as the effect is not confounded by the problems of the assimilation of migrants who have a different ethnicity, language, culture, education and experience from the native population in a host country.

In accordance with my hypothesis, I found that migrants who reside in regions with a small migrant population are more likely to hold a job and are more certain of their employment prospects were they to lose their current job, compared to the local population in the region. The effect disappears with an increased number of migrants in the local population; that is, intensified competition among migrants wipes out their comparative advantage. As wage regressions show, migrants who were able to obtain jobs in regions with a small immigrant population receive a wage premium compared to locals with the same amount of education and experience; the effect is mostly due to the skilled manual workers group. These results suggest that migrants bring in skills that are scarce in the regional labor market.

The study has important implications for the effect of immigrant flows on the regional labor markets of a host country. It implies that in the presence of barriers to interregional migration in Russia, the inflows of Russian migrants had some equilibrating effect on the regional labor market. At the same time, better employment opportunities for migrants in regions with a low number of migrants and persistent wage premiums for some skill groups of migrants show that there are still substantial barriers to migration in regions that do not allow labor markets to come to equilibrium. This situation preserves large regional disparities and the inefficiency of the labor market structure in Russia.

This study in a sense combines two strands of migration literature: that of location choice and that of the effect of migration on a host country's labor market. It provides evidence that in the absence of non-economic motives for their location choice, migrants choose locations where competition with locals for jobs is minimal. Further investigation of this issue would require more detailed data on the disaggregated skill groups of migrants and locals on the regional level.

Appendix. The RLMS data set description

The Russian Longitudinal Monitoring Survey (RLMS)[46] is a household-based survey, designed to measure the effects of Russian reforms on the economic well-being of households and individuals. The RLMS is a longitudinal study of populations in dwelling units. In each round, the RLMS interview was completed with a household and its members in the original sample dwelling unit. Thus, it is a repeated cross-section sampling. The RLMS employs a multi-stage probability sample, starting from a list of 2029 *rayons* serving as Primary Sample Units (PSU). Moscow City, Moscow Oblast, and St. Petersburg City were included with certainty (self-representing strata), while other non-self-representing *rayons* were allocated into 35 equally sized strata. Then 35 *rayons* were chosen (one from each stratum) with a probability proportional to the size of the *rayon*. The target sample was constructed in accordance with the proportion of urban and rural population sizes and ethnic composition. The villages in rural areas and districts in urban areas served as Second-Stage Units (SSU). Within these areas, the dwellings were enumerated and then drawn randomly from a list. The RLMS sampling procedure ensured sample representativeness with respect to geographical and ethnic factors (for large ethnic groups) and level of urbanization.

RLMS survey instruments were designed by an interdisciplinary group of Russian and American social science and biomedical researchers with extensive experience in survey research. One part of the questionnaire is comprised of questions about a person's work. It also includes a variety of personal characteristics.

[46] http://www.cpc.unc.edu/projects/rlms/

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Chapter 4. Health Effects of Occupational Change

Rapidly changing technologies and the growing openness of economies to international trade sometimes make entire occupations in the countries affected redundant. People employed in these occupations have to switch to other occupations that they do not necessarily like. Such "forced" occupational change causes stress, which can be harmful to their health. The effect of people losing their profession on their health has not been previously studied. This paper is intended to fill the gap. I study the effect of occupational change on health and health-related behavior using data from Russia's economic transition, which was characterized by massive occupational mobility. The results show that "forced" occupational change has a significant negative effect on individual health; it also increases smoking and alcohol consumption. These results survive a number of robustness checks.

1. Introduction

Rapidly changing technologies and the growing openness of economies to international trade sometimes make entire occupations in the countries affected redundant (Kletzer 2002, Murphy and Welch 1993). People employed in these occupations have to switch to other occupations that they do not necessarily like. A change of occupation is a major event in the working life of a person. No doubt, it induces certain psychological stress due to the loss of occupation-specific human capital, pressure to acquire new skills, a possible change in social status and the loss of social networks. Consequently, the loss of an occupation or profession, like any stressful event, may be harmful to a person's health.

The negative health effects of occupational change are potentially important, and as yet overlooked, social and economic consequences of structural economic changes, and we need to understand how important these effects are. To my knowledge, there have been no studies addressing this issue. This paper is intended to fill the gap. I test the effect of occupational change on individual health and health-related behavior, namely, smoking and alcohol consumption, using individual-level panel data from Russia for 1995-2006. The Russian economic transition provides a good case for testing the health effects of occupational changes: due to the major restructuring of the economy, a large number of people permanently changed

occupations (about 42% between 1991 and 1998 according to Sabirianova 2002). The implications of my analysis, however, are not limited to transition economies.

Sicherman and Galor (1990) provide a theoretical background for analyzing occupational mobility as an individual choice along a person's career path. Kambourov and Manovskii (2004, 2008) document the high and rising occupational mobility in the US: the annual rate of occupational change at the highest disaggregation level of occupations increased from 16% in the early 1970s to 19% in the early 1990s. They argue that growing occupational mobility is largely explained by the increased variability of occupation-specific productivity shocks, which can be caused by such things as technological shifts, changes in international trade and government regulations. Thus, exogenous shifts in technology or international trade flows cause some occupations to become less productive and force people to switch to another occupation. The extent of these structural shifts makes it necessary to study their health effects.

Although there have been no studies on the health effects of occupational change, some authors have tried to look at how job loss and unemployment affect health. Since there is a potential reverse causality problem between health and losing a job, several papers study the effect of an exogenous job loss due to plant closures. In one of those studies, Hamilton et al. (1990) show that job insecurity (anticipation of job loss) and the job loss itself have negative health effects. Catalano (1993) finds that job loss increases the risk of alcohol abuse. With respect to unemployment, a number of studies show that unemployed people have a lower health status than employed people (for surveys, see Jin et al. 1995; Dooley et al. 1996; Björklund and Eriksson 1998). Several studies use individual-level panel data in order to estimate the causal effect of unemployment on health. While Bjorklund (1985) finds no significant relationship, Kessler et al. (1987) find a negative effect of unemployment on subjective health. Mayer et al. (1991) show that the risk of deterioration of mental health is greater among unemployed people and Gerdtham and Johannesson (2003) find that unemployment raises the mortality risk.

There are a number of studies in the sociological and medical literature looking at how various aspects of occupational stress affect health. In particular, these studies show that occupational stress factors, such as low job satisfaction, lack of control, work overload and effort-reward imbalance are negatively related to mental health and cardiovascular diseases, lead to more smoking and alcohol consumption (Conway et al. 1981; Bosma et al. 1998; Marmot et al. 1997; Bobak et al. 2005; Greenberg and Grunberg 1995). One needs to be careful about interpreting the results of these studies as most of them do not address endogeneity or the reverse causality problem. In the economic literature, Fischer and Sousa-Poza (2007) provide panel data evidence that higher job satisfaction has a positive effect on workers' health.

These studies suggest some ideas concerning psychological and physiological mechanisms through which occupational change may affect health. Leaving a profession in which a person was successful and having to go into an occupation that a person dislikes is stressful in itself. A person may feel that his skills are under-utilized in the new occupation, which has been shown to have a negative effect on job satisfaction (Allen and Velden 2001). Additional stress may come from the fact that the occupational switch may result in the loss of social status if the status (prestige) of the new occupation or the person's status in this occupation is lower compared to the previous occupation (Marmot and Wilkinson 1999). Guriev and Zhuravskaya (2008) show that people in transition economies who received their education before the start of the transition have lower life satisfaction levels. This can be due both to the declining status of an old occupation and to the forced occupational change and resulting skill mismatch. Work overload arising from the need to acquire new skills over a short period of time may also negatively affect physical and mental health.

The medical literature has established a strong link between psychological stress and cardiovascular diseases (Sterling and Eyer 1981; Henry 1982; Nicholson et al. 2005). It is shown that stressful life events negatively affect health (Lantz et al. 2005) and distress leads to more negative health perceptions (Farmer and Ferraro 1997). Moreover, stress is conducive to increased levels of smoking and alcohol consumption (Peralin and Radabaugh 1976; Castro et al. 1987). It is by now well established that smoking negatively affects long-term health as it is a leading cause of lung cancer and other lung diseases and a major cause of heart disease and stroke (Chaloupka 2000). Negative health effects of alcohol consumption are due to both short-term consequences of intoxication (increased probability of accidents and violence) and long-term effects of chronic heavy drinking (cirrhosis, coronary heart disease[47]) (Cook and Moore 2000).

Testing the effect of occupational change on health is complicated by a potential endogeneity problem. Indeed, deteriorating health or a negative health shock can make it impossible for a person to stay in his current occupation (e.g. if it is physically demanding) and cause occupational change. Alternatively, people who changed their occupation during the transition period in Russia might have worked predominantly in occupations that are relatively more harmful to a person's health (like low-skill manual occupations[48]). In this case we would also find a negative relationship between occupational change and health.

[47] While moderate alcohol consumption is sometimes shown to have a positive effect in terms of reducing the risk of CHD, heavy drinking or binge drinking has an unambiguously negative effect on health.
[48] Case and Deaton (2003) and Sindelar et al. (2007) show that people employed in manual occupations are in poorer health and their health is declining more rapidly.

To deal with this problem, I conduct a number of robustness checks. The panel structure of the data allow me to test whether individuals prior to occupational change had the same levels of health, smoking and alcohol consumption as those who stayed in the same occupation throughout the period. In addition, I apply an instrumental variable approach. My results show that people who changed their occupation during the transition period in Russia suffered a long-term decline in their level of health and increased their level of smoking and alcohol consumption.

In addition to providing evidence on the social cost of economic transformations in terms of the decline in the health of the working population due to occupational change, this paper contributes to the understanding of Russia's mortality crisis. There was a sharp rise in both male and female mortality rates at the beginning of the economic transition in the early 1990s (Vichnevski 1999). Life expectancy for men dropped from 65 years in 1988 to 58 in 1994; for women, it dropped from 75 to 72. The mortality increase was highest among the working-age population over 40, with the main medical cause of death being cardiovascular disease. This rise in mortality is still not well understood.

Brainerd and Cutler (2005) empirically test a wide range of possible explanations and suggest two main ones: broadly defined psychosocial distress from the transition (stress from increased uncertainty; a higher risk of bad outcomes in the absence of a social security net) and an increase in alcohol consumption which paralleled the rise in mortality. However, increased alcohol consumption itself calls for an explanation. Apart from the political economy's supply-side factors suggested by Treisman (2007) (greater availability of spirits due to populist price regulations at the local level), individual demand was also likely to be affected by the stress of transition and in particular by labor market changes. The role of labor market transformations during the transition in the mortality crisis is under-explored, although some studies indicate its importance[49]. Massive occupational reallocation that had negative health effects and increased individual levels of smoking and alcohol consumption is likely to have contributed to rising mortality in Russia in the early 1990s.

The rest of the paper is organized as follows. Section 2 provides the description of labor reallocation during the transition and the accompanying occupational changes. Section 3 describes the data and empirical strategy. In Section 4, I present the results of the empirical analysis including baseline results, robustness checks and IV results. Section 5 concludes.

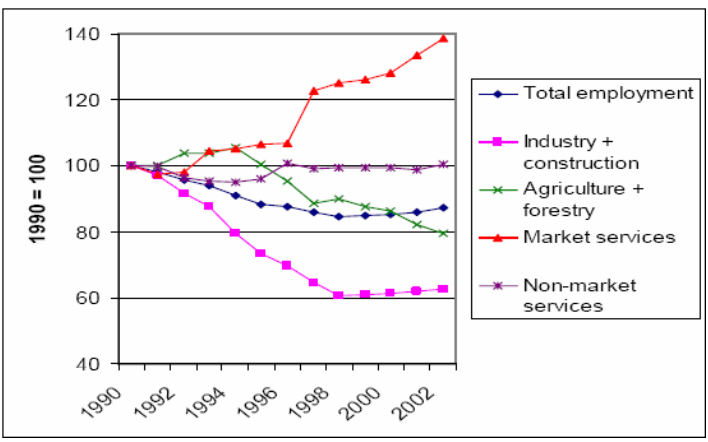
[49] Walberg et al. (1998) show that the mortality increase in Russia was higher in the urban regions with higher labor turnover

2. Labor market reallocation and occupational mobility in Russia during the 1990s

The structure of the Russian economy underwent dramatic changes during the transition period. After price and trade liberalization in the early 1990s, different sectors of the economy experienced differential demand shocks depending on the degree of their technological backwardness and the competitiveness of their products with imports. The decline in total GDP amounted to almost 60% between 1990 and 1996. This decline was not accompanied by a rise in unemployment to the same extent. Instead, labor market adjustments were mostly through declining real wages, wage arrears and various forms of underemployment (see Gimpelson and Lippold 2001; World Bank 2003). At the same time, economic restructuring was accompanied by major labor flows across sectors and occupations.

The aggregate reallocation of labor across major sectors in the economy is illustrated in Figure 1. Employment in industry and construction declined by 40% from 1990 to 1998. Employment in agriculture also fell after 1994 and declined by 20% from 1990 to 2002. In contrast, employment in the market services sector, which was underdeveloped in the Soviet economy, had increased 40% by 2002, while employment in non-market services remained virtually unchanged. Thus, labor was reallocated from industry and agriculture to the market services sector.

Figure 1 Dynamics of the sectoral employment between 1990 and 2002

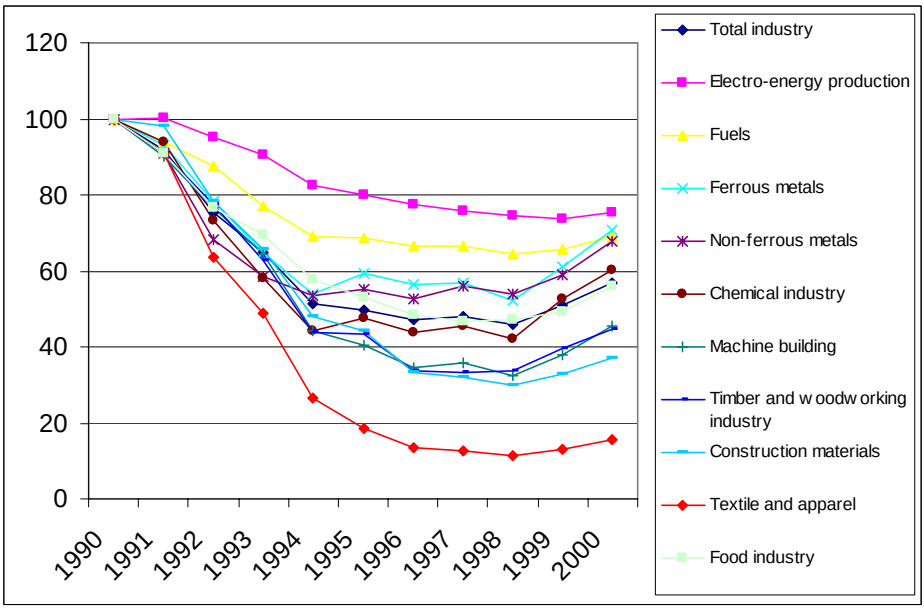


Source: World Bank 2003

Within the industrial sector, which comprised 30% of total employment in 1990, there were also different trends in output and employment as some industries suffered more severe demand shocks than others. Figure 2 illustrates the extent of the output decline by sector. The

output declined least in the energy and fuel sector (between 20 and 40% of the 1990 level) while the deepest decline was observed in the textile industry (almost 90% by the end of the 1990s).

Figure 2 Dynamics of industrial output by sector, 100% in 1990



Source: Russian Federal Agency on Statistics

Such a decline in the industrial sectors and the massive shift of labor into the service sector must have been accompanied by occupational switches. The extent of occupational mobility during the Russian transition was first documented by Sabirianova (2002). She used data from the Russian Longitudinal Monitoring Survey. This is a household survey that is conducted annually starting from 1994 (with the exception of 1997 and 1999). In each round, employed respondents are asked about their current occupation. Furthermore, in the 1998 round, survey respondents were asked about their occupation in 1985 and 1991. Sabirianova (2002) uses this information to analyze the extent of occupational mobility in Russia between 1991 and 1998.

In my analysis, I use the same data set for all available rounds up to 2006[50]. To obtain information about a person's occupation before the transition, I use the 2000 round (instead of 1998), where respondents were asked about their occupation in 1985 and 1990 (instead of 1991). Moreover, the survey asked about the respondents' place of work in those years, which allows me to retrieve information about the sector of employment at the start of transition.

[50] A description of the survey and sampling procedure can be found in Appendix 1.

Occupations in RLMS are coded according to the ISCO-88 classification. This classification distinguishes 390 four-digit occupations that can be further aggregated into 116 three-digit occupations, 28 two-digit occupations and 10 one-digit groups. As Sabirianova (2002) notes, there are many miscoding errors in RLMS over the years, so occupational mobility rates based on the original coding are over-estimated. Following Sabirianova, I manually corrected miscoding errors in codings for the occupations in 1985, 1990, 1995 and 2000 by reading through all the text answers provided by respondents.

We can determine that a person has changed occupations if the occupational code in 2000 is not equal to the occupational code in 1990. The question is at which level of ISCO coding the occupational change should be defined. In order to have an effect on health, the occupational switch should be quite significant. Shifts between four-digit occupations within broader groups (e.g. from roofers (7131) to floor layers (7132)) may be too small in terms of the change in the mix of skills required; hence, such a shift is not much of a stress for a person. Thus, I consider occupational switches at the three-digit, two-digit and one-digit levels; the rates of changes between 1990 and 2000 are reported in Table 1. In subsequent empirical analysis, I mostly use changes of occupations at the two-digit level.

Table 1 Rates of occupational change measured by change in ISCO-88 codes

Occupation change types	Total sample
% of people who changed occupations on the 3-digit level from 1990 to 2000	44.7%
% of people who changed occupations on the 2-digit level from 1990 to 2000	40.9%
% of people who changed occupations on the 1-digit level from 1990 to 2000	35.4%
% of cases where occupation change from 1990 to 2000 was due to career advancement	3.1%
% of people who changed occupations on the 2-digit level to occupation requiring more years of education from 1990 to 2000	17.9%
% of people who changed occupations on the 2-digit level to occupation requiring fewer years of education from 1990 to 2000	22.3%
% of people who changed occupations on the 2-digit level to occupation requiring same years of education from 1990 to 2000	0.7%
% of people who changed occupations on the 2-digit level to occupation requiring more hard physical labor from 1990 to 2000	21.8%
% of people who changed occupations on the 2-digit level to occupation requiring less hard physical labor from 1990 to 2000	18.3%
% of people who changed occupations on the 2-digit level to occupation requiring same hard physical labor from 1990 to 2000	0.7%
Number of observations	2933

As Table 1 shows, almost half of the working people in Russia – 44.7% – changed their occupation measured at the three-digit ISCO level between 1990 and 2000. The rates were

naturally somewhat lower at the two-digit and one-digit level. Still, more than a third of the workers changed occupations at the one-digit level, which implies a very significant change (e.g. going from technician to service worker or agricultural worker). There is virtually no difference between men and women in the rates of occupational mobility.

One caveat is in order here. The ISCO classification is based predominantly on the skills required for different occupations. Nevertheless, to some extent it incorporates the position of a worker within the firm. In particular, group 1 includes all kinds of senior managers and directors. Hence, some of the occupational changes observed may be due to career advancement. In the process of correcting occupational codes, I tried to classify such cases whenever it was possible to determine them from the verbal answers of the respondents. Based on this information, only 3.1% of the total sample or about 7% of the three-digit occupational changes were due to career advancement.

The rates of occupational changes in Table 1 are similar to those reported in Sabirianova (2002), although her estimates are made using data from the 1998 round of the RLMS for a shorter time period (1991-1998) and at the four-digit level. She also shows that occupational change rates were almost twice as high during the 1990s than before the reform period. Most of the occupation shifts were permanent: only 5.7% of the sample surveyed in 2000 had changed their two-digit occupation between 1990 and 1995 but were back to their 1990 occupation in 2000.

As Sabirianova (2002) has shown, about half of the occupational flows during the 1990s were net occupational flows, i.e. they were associated with the changing occupational structure due to sectoral restructuring. Indeed, as Table 2 shows, between 1990 and 2000 there were significant inflows into service occupations (group 5) and almost no inflows into agricultural occupations (group 6).

Table 2 Transitions across occupations

Occupation in 1990	Occupation in 2000										Total
	1	2	3	4	5	6	7	8	9	0	
1 Officials and managers	**66%**	8%	9%	3%	5%	1%	2%	3%	3%	0%	100%
2 Professionals	10%	**71%**	9%	1%	3%	0%	2%	1%	3%	0%	100%
3 Technicians	7%	7%	**62%**	4%	7%	1%	3%	3%	6%	0%	100%
4 Clerks	4%	2%	5%	**51%**	17%	0%	2%	4%	15%	0%	100%
5 Service workers	6%	2%	8%	5%	**53%**	0%	4%	4%	18%	0%	100%
6 Skilled agricultural workers	6%	0%	6%	0%	6%	**59%**	6%	12%	6%	0%	100%
7 Craft workers	3%	1%	4%	1%	3%	0%	**67%**	9%	9%	1%	100%
8 Operators and assemblers	2%	1%	3%	2%	3%	1%	12%	**67%**	9%	0%	100%
9 Elementary occupations	3%	0%	2%	4%	7%	1%	7%	10%	**66%**	0%	100%
0 Armed forces	10%	5%	13%	3%	10%	0%	0%	8%	8%	**44%**	100%

Since Table 2 shows quite significant inflows into the elementary occupations group, it is interesting to see whether the occupational flows were predominantly going into occupations requiring less education (which would imply a loss of human capital and social status) and into occupations requiring harder physical labor. Based on the assumption that the amount of education required and the extent of hard physical work in the occupations have not changed significantly during the last 15 years, I calculated the average number of years of education and the average share of working time spent doing heavy physical labor for each of the 22 two-digit occupational groups[51]. Table 1 shows that slightly more than half of the people who changed occupations at the two-digit level went into occupations requiring less education and/or more heavy physical labor. Thus, it is not true that the economic crisis and the restructuring drove people predominantly into low-skill manual occupations.

An additional measure of occupational change can be obtained from the question that was asked of respondents in the 2006 round of the RLMS survey. Respondents were asked whether "from 1991 until now, you had to change your place of work for another permanent job which didn't correspond to your qualifications and which you didn't like." Although this question does not directly ask about occupational change, moving to a job that does not correspond to the person's previous qualifications unambiguously implies a shift to another occupation. This measure of occupational mobility is narrower than the measure based on occupational codings. It specifically measures a "forced" occupational change, when people have to take a job in another occupation that they do not like. Another benefit of this measure is that it captures occupational changes that people themselves consider significant.

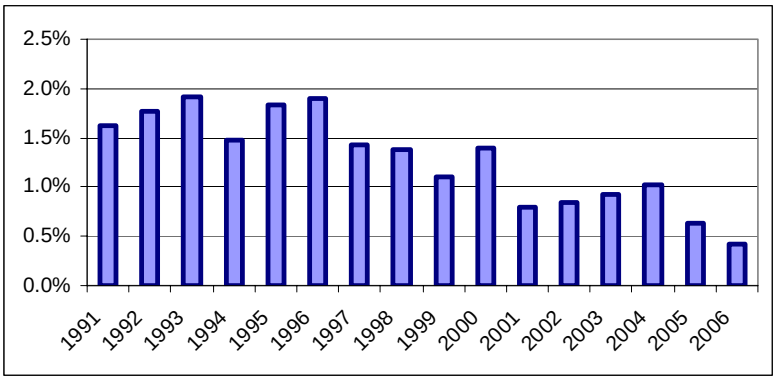
20.6% of the people who responded to this question in 2006 (7880 respondents[52]) report having had to change their job to a job in another occupation since 1991 (21.3% among men and 20% among women). People were also asked in what year this change occurred. Figure 3 shows the percentage of respondents in the 2006 survey who had to change their occupation for each year since 1991. As the figure shows, the most active process of occupational mobility took place during the years of the most dramatic structural change and the economic downturn, in 1991-1996. The rates of "forced" occupational changes then went down. Between 1991 and 2000, 15.9% of the 2006 sample had to change their occupation. This figure is lower than the rates of occupational change measured based

[51] I merged some small occupational groups into the closest occupational group. It is not possible to estimate these parameters for the more disaggregated occupational groups due to the small number of observations in some groups. Computed means of years of education and the share of heavy labor for 22 occupations are presented in Table 1A in the Appendix.

[52] This question was asked only to people who where born before 1978, e.g. those who were of the working age in the 1990s.

on occupational coding. This is not surprising since the self-reported measure of occupational change is much more specific as discussed above.

Figure 3 Rates of "forced" occupational change between 1991 and 2006



The question asked in the 2006 round does not address the reasons for occupational change although the question was raised in the section in the questionnaire concerning the person's labor market history during the transition period, together with questions asking whether a person had lost his job due to a plant closure or experienced a drop in wages since 1991. Many of the occupational shifts captured by this question are likely to be due to structural changes in the economy. Nevertheless, it is still possible that some of these changes could be due to the decline in the health of an individual or other observed or unobserved factors. Hence, we need to consider the endogeneity problem when estimating the effect of occupational change on health – the issue that I will discuss in the next section.

3. Data and empirical strategy

In this section I will discuss the data, in particular, the measures of health and health-related behaviors, and present my approach to the empirical estimation of the effect of occupational change on health.

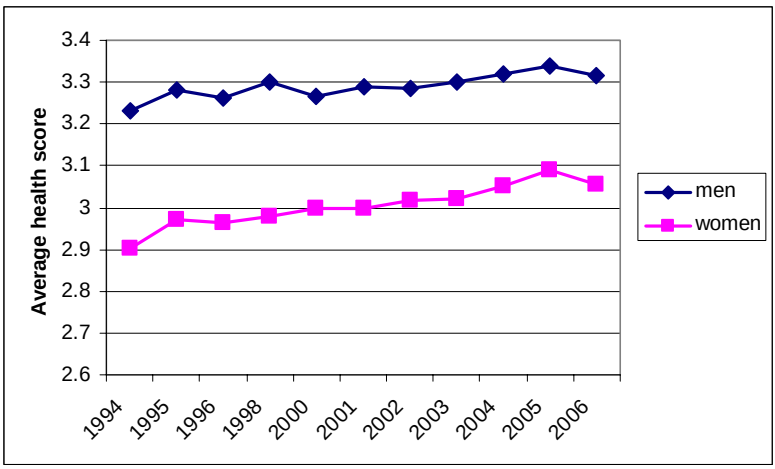
3.1 Data on health

In addition to the occupational change variables described in the previous section, I use a number of health measures obtained from the same data set. The RLMS survey questionnaire has a section on health where a number of questions are asked about different aspects of a person's health and health-related behavior. The main measure of the level of

individual health that I used is self-rated health: respondents were asked to rate their health on a scale from 1 (best) to 5 (worst). This measure is widely used in health studies. Although it is a subjective measure of health, it has been shown to be highly correlated with objective health measures, such as mortality (Idler and Benyamini 1997). Thus, it has a benefit of universality and comparability to other studies, while a potential drawback is that it is subjective and may be affected by unobserved characteristics of a person.

This question was asked in every round of the RLMS survey. I transformed the variable so that the value 1 corresponds to the worst health and the value 5 to the best health, which is more intuitive. Figure 4 shows the dynamics of the average health scores for the Russian population, separately for men and women. Women on average rate their health lower than men, which is a typical finding in the data for other countries as well (Strauss et al. 1993; Case and Deaton 2003). Average health scores of men and women improved slightly over the observation period, i.e. since 1995. This corresponds to the trend in mortality rates, which started to decline after they reached a peak in 1994.

Figure 4 Average self-rated health scores



Another health measure that is used more and more widely in recent years is the EQ-5D index. It is based on five standard questions concerning different aspects of individual health: mobility, self-care, usual activity, pain and anxiety[53]. Researchers have developed

[53] The exact questions asked are: Do you have any problems with mobility? Do you have any problems taking care of yourself? To what extent does your health allow you to carry out your routine chores and duties? Do you feel any pain? Do you feel any anxiety or depression? Answers are on a scale from one to three.

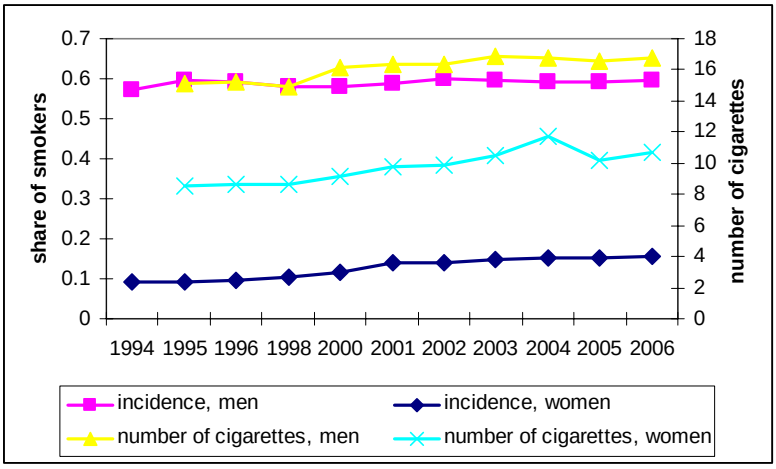
scores to transform individual answers for these five questions into a single continuous health measure, the EQ-5D index (Dolan 1997). The value of 1 corresponds to full health while 0 corresponds to death. For some combination of answers, EQ-5D can take negative values, which are interpreted as conditions worse than death (implying very serious illness)[54]. Since the EQ-5D index is continuous, it is easier to use in empirical work than the categorical self-rated health measure. In addition, it is more informative since it is based on more detailed information and differentiates between many more health states than just the five states derived from the self-rated health measure. Unfortunately, in the RLMS data, EQ-5D can be constructed only for 2005, when the five questions were asked.

I also estimate the effect of occupational change on such health-related behaviors as smoking and alcohol consumption. The medical literature has shown that smoking and drinking are ways to cope with stress (Peralin and Radabaugh 1976; Castro et al. 1987). In the long run, these risky behaviors may have negative health effects. It is by now well established that smoking negatively affects long-term health as it is a leading cause of lung cancer and other lung diseases and a major cause of heart disease and stroke (Chaloupka 2000). Negative health effects of alcohol consumption are due to both short-term consequences of intoxication (increased probability of accidents and violence) and long-term effects of chronic heavy drinking (cirrhosis, coronary heart disease) (Cook and Moore 2000).

In the RLMS survey, a number of questions about smoking and alcohol consumption were asked. In each round, people were asked whether they smoke and how many cigarettes per day they usually smoke. Figure 5 shows the dynamics of both the incidence of smoking and the average number of cigarettes per day smoked by men and women. Almost 60% of Russian men smoke while the share of women smoking has risen from 10 to 15% over the last ten years. The average number of cigarettes smoked per day among smokers is 1.5 times higher for men than for women.

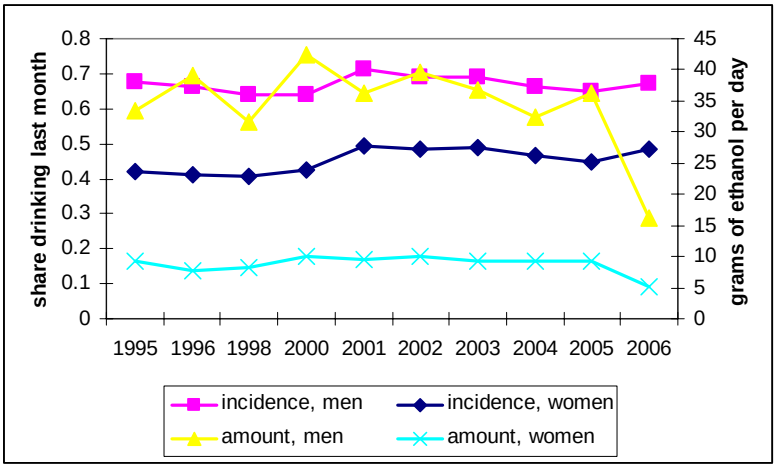
[54] In health economics literature, EQ-5D and analogous indexes are used to obtain weights for the calculation of QALY – quality-adjusted life years. E.g. if EQ-5D is equal to 0.5, then a year of life in the corresponding state of health is equivalent to half a year in full health.

Figure 5 Incidence and amount of smoking



As for alcohol consumption, people were asked about the frequency of alcohol consumption during the month before the interview as well as the types and quantities of alcohol consumed. All this information is combined into a single measure: the amount of alcohol consumed per day, measured in grams of ethanol. Figure 6 shows the incidence of alcohol consumption as well as the amount of alcohol per day for drinkers, separately for men and women. More than 60% of men and between 40 and 50% of women report some alcohol consumption during the month before the survey. Among drinkers, men drink more than three times as much as women do. The amount of alcohol consumed declined sharply in 2006; this is probably due to changes in the methodology of measuring alcohol consumption that were aimed at more accurate measurement. I carried out the analysis presented in the next section both with and without the 2006 data, and it turns out that this change in methodology does not affect my results.

Figure 6 Incidence and amount of alcohol consumption



Summary statistics for all variables used in the following analysis are provided in Tables A2 and A3 in the Appendix.

3.2 Estimation strategy

In order to estimate the effect of occupational change on health, smoking and alcohol consumption, I use data for 1995-2006 and a linear unobserved effects panel data model of the following form:

$$Y_{it} = \alpha + \beta\, OccCh_{it} + X_{it}'\gamma + D_t + c_i + \varepsilon_{it} \qquad (1)$$

Y is an outcome variable: the measure of health, the amount of smoking or alcohol consumption. *OccCh* is a measure of occupational change, *X* is the vector of control variables (age, age squared, education, gender, family income per person, marital status), *c* is an individual-fixed effect, *D* is a time-fixed effect.

The indicator of self-reported occupational change obtained from the question about "forced" occupational change is equal to zero for all the years before the occupational change and equal to 1 in the year of the first occupational change and for all years after that. Since my panel only started in 1995, this variable is equal to one for all years in the panel for those who changed occupations before or in 1995, which is almost half of all cases of occupational change in the sample. While a fixed-effects model would be more appropriate for estimating equation 1 due to a potential correlation between unobserved individual characteristics and explanatory variables, I cannot use it because my main variable of interest is constant over time for nearly half of the observations on which identification is based. A fixed-effects

model would identify the effect using only those people who changed occupations after 1995, whereas the most significant occupational shifts took place in the first half of 1990s, during the years of deepest economic decline. Therefore, I estimate equation 1 using a random-effects model and I address the potential endogeneity problem as well as reverse causality problem using the instrumental variables approach discussed below.

The alternative measure of occupational change between 1990 and 2000 based on occupational codings is constant over time for all individuals in the sample (equal to either zero or one) because, for this measure, we do not know in what year the change occurred. I include this measure in the model above as a single dummy. Since this variable is time-invariant, I estimate a between-effects model, i.e. I test how occupational change affects average levels of health, smoking and alcohol consumption from 1995 to 2006. In these regressions, I also include a control for whether occupational change was due to career advancement.

Since the EQ-5D index is available only for 2005, I estimate a cross-sectional OLS model for this variable.

The coefficient on occupational change obtained from the linear random-effects model above can be biased due to the potential endogeneity or reverse causality problem. In particular, a deterioration in health or an unexpected health shock (serious illness or injury) can force a person to change occupations, e.g. if this occupation is physically demanding. This is a reverse causality problem.

The reverse causality problem is of little relevance to the estimation of the effect of occupational change on smoking as it is unlikely that a person has to change his occupation because he smokes a lot, unless heavy smoking has affected the person's health. However, the health effects of smoking are usually delayed. A high level of alcohol consumption may, in principle, negatively affect a person's ability to perform tasks required in his occupation to the point where he has to switch to another (less skilled) occupation.

In addition to the reverse causality problem, there may be some factors not included in the model that affect both the probability of occupational change and individual health. Inclusion of additional controls may alleviate the endogeneity problem. After reporting the baseline results from model 1 in the next section, I will present a number of robustness checks that were carried out. In particular, panel data allow me to test whether individuals prior to occupational change had the same levels of health, smoking and alcohol consumption compared to those who stayed in the same occupation throughout the period. Such a test

partially accounts for both the reverse causality and endogeneity problem due to unobserved factors.

Finally, I apply an instrumental variable approach. I use three instruments. The basic idea behind my identification strategy is to exploit the exogenous factors that affect the probability of changing occupations and determine how difficult it is for a person to switch occupations. The first instrument is the degree of sectoral decline measured by the ratio of sectoral employment in 1995 to employment in 1990. I obtained information about the person's sector of employment in 1990 from the verbal answers to the question asked in the 2000 round and manually coded them. Presumably, people employed in the sectors that experienced the deepest decline during the transition were more likely to change occupations.

The ability to change occupations also depends on the degree of specificity of occupational skills. If the skills obtained in a person's current occupation are very specific to this occupation, then it is more difficult for a person to shift to another occupation. The second instrument is the degree of occupational skills specificity proxied by the concentration of occupations across sectors. If the occupation is very concentrated, e.g. it can be found only in one sector, then occupational skills are considered to be very specific. When the same occupation is scattered across many sectors, its skills are likely to be more general. Assuming that the degree of occupational concentration did not change significantly during the 1990s, I estimate it based on the data for the years 1995-2002 for the three-digit ISCO occupations. I compute shares of people in a particular occupation working in each sector of the economy and then construct an index equal to the sum of squared shares (analogous to the Herfindahl-Hirschman index of concentration)[55]. An index equal to one means that this occupation exists only in one sector; thus, skills in this occupation are most specific, i.e. least transferable to another occupation. I merge this index with the corrected occupational codes for 1990 obtained from the 2000 survey.

In addition, most people moving to a new occupation would need training in this occupation. Berger et al. (2001) have shown that the incidence of re-training in an occupation different from a person's current occupation increased the probability of occupational change during the transition in Russia. In many cases, training courses were provided by professional educational institutions in a region. The third instrument I use is a measure of educational

[55] The sectors over which the occupational concentration was computed include nine major extracting and manufacturing industries and fourteen non-manufacturing sectors: agriculture, construction, different types of services, government and army. This division is based on the OKONKH classification of sectors that was used in Russian statistics until recently.

infrastructure in the region a person lives in: the number of instructors in institutions of higher education in the region per resident.

4. Estimation results

4.1 Baseline results

To estimate the effect of occupational change on health, alcohol consumption and smoking, I first estimate equation 1 by a random-effects panel data model. The baseline results are shown in Table 3. The main variable of interest is the self-reported "forced" occupational change. As expected, it has a significant negative effect on health measured both by self-reported health status and by the EQ-5D index. The magnitude of the effect on self-reported health status is difficult to interpret as the dependent variable is discreet. Still, we can compare the obtained effect to the coefficients on age variables. This comparison shows that health deterioration due to forced occupational change for a middle-aged person is equivalent to becoming three years older[56].

Table 3 Forced occupational change and health, smoking and alcohol consumption

	(1)	(2)	(3)	(4)
	Random-effects model, years 1995-2006			Cross-section, year 2005
	Self-rated health	Number of cigarettes per day	Log alcohol consumption	EQ-5D
Forced occ. change	-0.044***	0.604***	0.204***	-0.022***
	(0.011)	(0.124)	(0.059)	(0.008)
Log hh income per person	0.010***	0.126***	0.215***	0.012**
	(0.004)	(0.033)	(0.019)	(0.005)
Age	-0.011***	0.214***	0.053***	0.002
	(0.002)	(0.019)	(0.010)	(0.002)
Age squared	-0.000***	-0.003***	-0.001***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Male	0.195***	9.401***	2.179***	0.065***
	(0.011)	(0.178)	(0.055)	(0.007)
Married	0.004	-0.244***	-0.004	0.013
	(0.009)	(0.075)	(0.045)	(0.008)
Years of education	0.010***	-0.121***	0.057***	0.004***
	(0.001)	(0.017)	(0.007)	(0.001)
Constant	3.513***	-1.564***	-4.245***	0.678***
	(0.056)	(0.562)	(0.274)	(0.053)
Observations	44631	44599	44285	5340
Number of id	7651	7649	7643	

Robust standard errors in parentheses; year fixed effects included; * significant at 10%; ** at 5%; *** at 1%

[56] As an alternative to the linear model, I also estimated the equation for self-reported health status using a panel ordered probit model and obtained a marginal effect of the occupational change variable. The magnitude of the effect estimated this way is very similar.

It is somewhat easier to quantify the effect using EQ-5D as a dependent variable. For people who reported a change in occupation since 1991, their EQ-5D in 2005 was 0.022 lower and this effect is highly significant. To quantify the effect in monetary terms, I use the value of QALY, which is used in a number of studies: 100,000 dollars (Cutler and Richardson 1997, 1998; Burstrom et al. 2002). Thus, the estimated loss from the decline in individual health due to an occupational change is equivalent to 2,200 dollars per year[57]. Moreover, this is likely to be an underestimate of the effect since the sample includes only those who survived until 2005. Some of those who experienced worst stress due to an occupational change could have died before 2005. It is also evident that the negative effect of occupational change is long-lasting since the majority of people in the sample switched occupations in the early and mid-1990s.

The second and third columns of Table 3 show the estimated effect of self-reported occupational change on the level of smoking and alcohol consumption. People who changed occupations smoke 0.6 cigarettes per day more and consume 20% more alcohol[58]. Since it is argued that the amount of alcohol consumption has a non-linear effect on health, I also estimated a multinomial logit model for the two levels of alcohol consumption: moderate drinking (below 40/20 grams of ethanol per day for men/women) and heavy drinking (above that level)[59]. The results of the estimation (not reported) show that a forced occupational change increases the probability of both types of drinking: the probability of moderate drinking grows by 5%; the probability of heavy drinking grows by 1%.

Next, I estimate model 1 using the alternative measure of occupational change based on a change in the ISCO code between 1990 and 2000. Since this variable does not vary over the years, I estimate a between-effects model (Table 4). Occupational change measured in this way is also associated with poorer health, more smoking and drinking. The size of the effects on self-rated health and EQ-5D is somewhat smaller than the effect of forced occupational change. The effects of the measure of ISCO-based occupational change on smoking and drinking are somewhat higher compared to the results in Table 3: people who changed occupations between 1990 and 2000 smoke 1.1 more cigarettes per day and consume 22% more alcohol compared to non-switchers.

[57] Given that around 20% of Russia's working-age population (around 15 million people) have experienced forced occupational change, the associated health loss is roughly equivalent to 2.5% of Russia's GDP.
[58] The same equations were estimated using a panel tobit model (not reported) since both dependent variables contain a lot of zeros. Similar effects were obtained.
[59] This definition of heavy drinking level is suggested in the publications by the World Health Organization.

I also estimated the baseline equations separately for men and women (results not reported), but the results were not significantly different, i.e. the effect of occupational change was similar for men and women.

Table 4 ISCO occupational change and health, smoking and alcohol consumption

	(1)	(2)	(3)	(4)
	Between-effects model, years 1995-2006			Cross-section, year 2005
	Self-rated health	Number of cigarettes per day	Log alcohol consumption	EQ-5D
ISCO occ. change 1990-2000	-0.030**	1.119***	0.217**	-0.018*
	(0.015)	(0.267)	(0.087)	(0.011)
Career growth 1990-2000	-0.060	-0.997	0.014	0.045*
	(0.042)	(0.754)	(0.246)	(0.026)
Log hh income per person	0.024*	0.254	0.557***	0.011
	(0.013)	(0.229)	(0.075)	(0.008)
Age	-0.044***	0.361***	-0.017	-0.014***
	(0.006)	(0.112)	(0.036)	(0.004)
Age squared	0.000***	-0.005***	-0.000	0.000*
	(0.000)	(0.001)	(0.000)	(0.000)
Male	0.203***	9.916***	2.411***	0.059***
	(0.015)	(0.270)	(0.088)	(0.011)
Married	-0.047**	-1.055***	-0.143	0.008
	(0.023)	(0.404)	(0.132)	(0.013)
Years of education	0.007**	-0.342***	0.027	0.002
	(0.003)	(0.051)	(0.017)	(0.002)
Constant	4.079***	-3.456	-4.744***	1.094***
	(0.196)	(3.500)	(1.129)	(0.118)
Observations	21999	21988	21840	1942
Number of id	2918	2917	2918	
R-squared	0.19	0.36	0.25	

Robust standard errors in parentheses; year fixed effects included
* significant at 10%; ** significant at 5%; *** significant at 1%

4.2 Robustness checks

In this section, I carry out a number of robustness checks for the baseline results reported in Tables 3 and 4. The idea is to include controls for variables that could have affected both the level of health and the probability of occupational change. The coefficients on the forced occupational change indicator from the four separate regressions including the controls described below are reported in Table 5 along with the baseline results from Table 3. The results of the same analysis using the ISCO-based occupational change measure (the between-effects model) are reported in Table 6.

Table 5. Robustness checks, forced occupational change

	(1)	(2)	(3)	(4)
	Random-effects model, years 1995-2006			Cross-section, year 2005
	Self-rated health	Number of cigarettes per day	Log alcohol consumption	EQ-5D
Baseline results	-0.044***	0.604***	0.204***	-0.022***
	(0.011)	(0.124)	(0.059)	(0.008)
Results controlling for:				
Heavy work share	-0.034**	0.676***	0.156*	-0.017
	(0.016)	(0.164)	(0.091)	(0.012)
1990 occupation fixed effects	-0.032**	0.690***	0.144	-0.016
	(0.016)	(0.165)	(0.092)	(0.012)
Job loss	-0.037***	0.612***	0.221***	-0.013
	(0.012)	(0.139)	(0.066)	(0.009)
Unemployment (without round 15)	-0.037***	0.575***	0.155**	-0.022***
	(0.012)	(0.135)	(0.067)	(0.008)
Occupational change dummy split in two:				
Forced occ. change in 1991-1995	-0.065***	0.818***	0.390***	-0.040***
	(0.019)	(0.295)	(0.095)	(0.012)
Forced occ. change after 1995	-0.033**	0.560***	0.107	-0.008
	(0.013)	(0.134)	(0.071)	(0.009)

Robust standard errors in parentheses; year fixed effects included
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 Robustness checks, ISCO occupational change

	(1)	(2)	(3)	(4)
	Between-effects model, years 1995-2006			Cross-section, year 2005
	Self-rated health	Number of cigarettes per day	Log alcohol consumption	EQ-5D
Baseline results	-0.030**	1.119***	0.217**	-0.018*
	(0.015)	(0.267)	(0.087)	(0.011)
Results controlling for:				
Heavy work share	-0.030**	1.090***	0.213**	-0.018*
	(0.015)	(0.266)	(0.087)	(0.011)
1990 occupation fixed effects	-0.023	1.182***	0.215**	-0.016
	(0.015)	(0.273)	(0.090)	(0.011)
Job loss	-0.015	0.829***	0.197*	-0.015
	(0.017)	(0.306)	(0.102)	(0.011)
Unemployment (without round 15)	-0.032**	1.051***	0.196**	-0.018*
	(0.015)	(0.268)	(0.089)	(0.011)

Robust standard errors in parentheses; year fixed effects included
* significant at 10%; ** significant at 5%; *** significant at 1%

As the first robustness check for the baseline results, I add controls for the share of heavy work in an occupation where a person was employed in 1990 to the basic specifications in Tables 3 and 4[60]. It is possible that people who changed occupations in Russia during the transition period initially were predominantly in occupations that are more harmful to a person's health, such as heavy manual occupations in manufacturing industries or agriculture – sectors that experienced the deepest decline during the transition. Two studies – Sindelar et al. (2007) and Case and Deaton et al. (2003) – have shown that workers in low-skill manual occupations have poorer health that is declining more rapidly. Note, however, that the rate of occupational mobility among clerks, which is not at all a physically demanding occupation, was one of the highest (see Table 2). Still, there is scope for an omitted variable bias here. As the second rows in Tables 5 and 6 show, inclusion of this control slightly reduces the magnitude of the effect of the forced occupational change on self-rated health and alcohol consumption while the baseline results for the ISCO occupational change measure are not affected[61].

In the event there are other characteristics of initial occupations that affect both the probability of occupational change and health, I include fixed effects for two-digit occupational groups in 1990 in the second robustness check. In these specifications (rows 3 in Tables 5 and 6), the baseline results are affected differently for the two health measures. The effect of forced occupational change on alcohol consumption declines in magnitude to the point where it becomes insignificant (but close to significant). The same can be said about the effect of the ISCO change on self-rated health and the effect of both occupational change measures on the EQ-5D index. The other coefficients are not significantly affected.

Thus, it is not the type of initial occupation that fully explains the correlation between occupational change and health and health-related behaviors. Within an initial occupation group, people who changed occupations have poorer health and smoke and drink more compared to those who stayed in this occupation.

Further, it is possible that the observed negative health effect of occupational change is not due to stress associated with the new occupation but rather due to stress from losing the old job or from experiencing a spell of unemployment before moving into another occupation. As a number of plant closure studies show, an involuntary loss of job *per se* is

[60] Mean values of the amount of working time spent doing heavy work for 22 occupational groups are provided in Table 1A in the Appendix 2.

[61] Note that the inclusion of controls for the characteristics of occupations in 1990 significantly reduces the number of observations as this information is obtained from the 2000 survey. The person had to be present and employed in the 2000 sample and to be employed in 1990 and to respond to the question about his occupation in 1990.

harmful to a person's health, irrespective of whether the person changes his occupation after that or not. As a check against these explanations of my results, I include a control for whether the person experienced a job loss due to plant closure (respondents in 2006 were asked this question along with the question on forced occupational change). Indeed, of those who report having had to change occupations between 1991 and 2006, 45% also experienced job loss due to plant closure or mass layoffs in the year of occupational change or the year before that. Controlling for job loss due to plant closure (row 4 in Tables 5 and 6) reduces the magnitude of the baseline results on occupational change somewhat, but they are still high and significant (except for the effect of ISCO occupational change on self-rated health and the effect of both measures on EQ-5D). Thus, even after controlling for plant closure, those who changed their occupation have poorer health and smoke and drink more compared to those who stayed in the same occupation.

Next, I include in the baseline specifications a control for unemployment status (row 5 in Tables 5 and 6). Unfortunately, the information about unemployment spells in RLMS data is incomplete. People are not asked about all the unemployment spells they had during the year; we only know whether they are unemployed at the time of the interview in each round of the survey. Since we do not know the exact time of year when the occupational change occurred, we cannot be sure that the reported unemployment spell indeed occurred in the process of occupational change. With this caveat in mind, controlling for the available information about unemployment spells does not significantly affect the baseline results for either of the occupational change measures.

Since the most dramatic changes in the economy and on the labor market that might force people to change occupations occurred in the first half of the 1990s, it is instructive to split the forced occupational change dummy into change that occurred in 1991-1995 and change after 1995. The results on these two variables are presented in the last two rows of Table 5 (they come from a single regression). They show that the negative effects of forced occupational change during the early transition period are much stronger than the effects of an occupational switch after 1995. The effect of occupational change between 1991 and 1995 on self-rated health is -.065 compared to -0.044 in Table 3; the effect on EQ-5D is -0.04 compared to -0.022 in Table 3. The effect of occupational change during the early transition period on alcohol consumption and smoking is also of a higher magnitude. Thus, it appears that occupational changes that were most exogenous in nature (as they occurred during the period of the deepest structural changes) were also most damaging to a person's health.

The final robustness check addresses the idea that, if there is reverse causality between health and occupational change, we should observe a decline in health some years before or in the year of occupational change. I tried to test this idea by splitting the single forced occupational change variable in Table 3 into separate dummies for the year before the switch, the year of the switch and the number of years after the switch. For those who did not change occupations, all these dummies are equal to zero. The results are reported in Table 7. Note that the coefficients on the dummy for the year before the occupational change are not significant, i.e. the levels of smoking, drinking and health were not different between the two groups before the change[62]. This result partly alleviates the concerns about reverse causality.

[62] Note that we observe the level of health, smoking and alcohol consumption prior to occupational change only for those who changed occupations after 1995.

Table 7. Forced occupational change and health, time effects

	(1)	(2)	(3)
	Self-rated health	Number of cigarettes per day	Log alcohol consumption
Year before occ. change	0.010	0.301	0.142
	(0.027)	(0.226)	(0.152)
Year 0 since occ. change	-0.000	0.307	-0.057
	(0.024)	(0.197)	(0.138)
Year 1 since occ. change	-0.039*	0.600***	-0.004
	(0.023)	(0.198)	(0.126)
Year 2 since occ. change	-0.053**	0.581***	0.303**
	(0.023)	(0.211)	(0.129)
Year 3 since occ. change	-0.052**	0.830***	0.269**
	(0.022)	(0.220)	(0.120)
Year 4 since occ. change	-0.053**	0.928***	0.166
	(0.023)	(0.241)	(0.124)
Year 5 since occ. change	-0.045**	0.648***	0.285**
	(0.023)	(0.223)	(0.127)
Year 6 since occ. change	-0.064***	0.806***	0.269**
	(0.021)	(0.226)	(0.122)
Year 7 since occ. change	-0.071***	0.802***	0.313**
	(0.022)	(0.220)	(0.125)
Year 8 since occ. change	-0.026	0.675***	0.382***
	(0.022)	(0.211)	(0.117)
Year 9 since occ. change	-0.052**	0.686***	0.249**
	(0.022)	(0.232)	(0.126)
Year 10 and more since occ. change	-0.040**	0.855***	0.298***
	(0.017)	(0.202)	(0.086)
Log hh income per person	0.010***	0.125***	0.214***
	(0.004)	(0.033)	(0.019)
Age	-0.011***	0.212***	0.052***
	(0.002)	(0.019)	(0.010)
Age squared	-0.000***	-0.003***	-0.001***
	(0.000)	(0.000)	(0.000)
Male	0.195***	9.399***	2.179***
	(0.011)	(0.178)	(0.055)
Married	0.004	-0.242***	-0.002
	(0.009)	(0.075)	(0.045)
Years of education	0.010***	-0.121***	0.057***
	(0.001)	(0.017)	(0.007)
Constant	2.511***	-1.516***	-4.212***
	(0.056)	(0.564)	(0.274)
Observations	44631	44599	44285
Number of id	7651	7649	7643

Robust standard errors in parentheses; year fixed effects included
* significant at 10%; ** significant at 5%; *** significant at 1%

Overall, occupational change measured in two different ways is strongly associated with poorer health and more alcohol consumption and smoking over a period of 15 years. Controlling for the type of occupation in 1990 and for the additional factors does not significantly affect these results, except for the results for the EQ-5D index[63]. However, the inclusion of additional controls does not fully eliminate possible endogeneity; hence, I move to the instrumental variables analysis.

4.3 IV results

The variables that I use to instrument occupational change in equation 1 were described in section 3.2. How well do they explain occupational change? Table 8 presents the first stage results for the cross-sectional and panel models.

[63] Note, however, that inclusion of the controls for the characteristics of occupations in 1990 reduces the number of observations more than two times compared to the baseline regressions, which negatively affects the precision of the estimates.

Table 8 First stage IV for 2SLS

	Forced occ. change, random-effects model	Forced occ. change, cross-section	ISCO occ. change 1990-2000, between-effects model	ISCO occ. change 1990-2000, cross-section
Occupational. concentration across sectors	-0.100***	-0.130***	-0.118***	-0.109***
	(0.025)	(0.029)	(0.033)	(0.039)
Ratio of sectoral employment 1995 to 1990	-0.110***	-0.127***	-0.126***	-0.150***
	(0.035)	(0.046)	(0.042)	(0.054)
Number of professional education instructors per person in a region	15.132**	16.260	12.948	14.832
	(7.705)	(11.362)	(8.999)	(13.033)
Career growth 1990-2000			0.586***	0.587***
			(0.052)	(0.038)
Log hh income per person	0.000	-0.022	-0.000	0.004
	(0.002)	(0.014)	(0.017)	(0.017)
Age	0.014***	-0.004	-0.024***	-0.027**
	(0.002)	(0.008)	(0.008)	(0.011)
Age squared	-0.000***	-0.000	0.000**	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Male	-0.003	0.002	-0.047**	-0.024
	(0.015)	(0.021)	(0.021)	(0.026)
Married	-0.005	-0.035	0.038	0.012
	(0.005)	(0.023)	(0.029)	(0.028)
Years of education	0.002*	0.006*	-0.003	-0.003
	(0.001)	(0.003)	(0.004)	(0.004)
Year fixed effects	+	-	+	-
Constant	-0.065	0.724***	0.973***	1.351***
	(0.061)	(0.218)	(0.261)	(0.300)
Observations	19106	1964	20030	1773
Number of groups	2157		2639	
R2adj		0.05	0.08	0.07
Partial R2 for excluded instruments		0.018		0.012
F-stat (2, N) for excluded instruments	12.2	12.0	9.8	7.2

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

The sectoral decline and occupational specificity instruments are highly significant at the first stage; the educational infrastructure instrument is significant only for forced occupational change. As expected, the probability of changing occupations is higher for people employed in sectors that experienced deeper decline. The probability of occupational

change also declines with higher occupational specificity (proxied by occupational concentration) and grows with more developed regional educational infrastructure.

Since I use more instruments than there are instrumented variables, I was able to run an overidentification test. The results of this test (not reported) show that I cannot reject the validity of my instruments. The F-statistic for the joint significance of these three instruments in the equation for forced occupational change is around 12. At the same time, the partial R-squared for the excluded instruments is quite low at 0.018, i.e. these variables explain only a small part of occupational change. The F-statistic for the joint significance of the instruments in the equation for the ISCO occupational change is somewhat below 10, which indicates that the second stage results for this measure will be less reliable.

Table 9 presents the results of the second stage of the 2SLS model for the panel (columns 1-3) and cross section (column 4). The set of controls is the same as in Table 3; the occupational change measure is the self-reported "forced" change. The effects of occupational change obtained in the 2SLS model are much higher in magnitude compared to the results in Table 3, but they are also much less precisely estimated. The standard errors on the coefficients of the instrumented occupational change have increased considerably. This is probably due to the low explanatory power of the instruments at the first stage as well as to the loss of more than half of the observations[64]. Nevertheless, the effects of the forced occupational change remain significant except for the effect of occupational change on the EQ-5D index in 2005. It is difficult to infer the magnitudes of the effects as the confidence intervals are very wide.

[64] So many observations are lost because I use sectoral decline and occupational specificity instruments. Unfortunately, for many people in the sample, information about their occupation and sector of employment in 1990 is not available.

Table 9 2SLS regressions, second stage, forced occupational change

	(1)	(2)	(3)	(4)
	Random-effects model, years 1995-2006			Cross-section, year 2005
	Self-rated health	Number of cigarettes per day	Log alcohol consumption	EQ-5D index
Forced occ. change	-0.329*	7.418**	4.321***	0.015
	(0.186)	(3.258)	(1.214)	(0.093)
Log hh income per person	0.010**	0.083*	0.198***	0.014**
	(0.005)	(0.043)	(0.028)	(0.007)
Age	-0.009**	0.117*	-0.012	-0.006
	(0.004)	(0.060)	(0.027)	(0.005)
Age squared	-0.000*	-0.002***	-0.000	-0.000
	(0.000)	(0.001)	(0.000)	(0.000)
Male	0.219***	9.353***	2.260***	0.068***
	(0.017)	(0.297)	(0.113)	(0.011)
Married	-0.025*	-0.148	-0.120	0.002
	(0.014)	(0.134)	(0.082)	(0.014)
Years of education	0.009***	-0.116***	0.051***	0.004**
	(0.002)	(0.027)	(0.015)	(0.002)
Year fixed effects	+	+	+	-
Constant	3.517***	-0.471	-3.040***	0.847***
	(0.105)	(1.260)	(0.632)	(0.143)
Observations	19050	19049	18901	1954
Number of id	2157	2157	2157	

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10 reports results of the 2SLS model using an ISCO occupational change measure. Probably due to the weaker relationship between this measure and the instruments, only the effect on alcohol consumption is statistically significant.

Table 10 2SLS regressions, second stage, ISCO occupational change

	(1)	(2)	(3)	(4)
	Between-effects model, years 1995-2006			Cross-section, year 2005
	Self-rated health	Number of cigarettes per day	Log alcohol consumption	EQ-5D index
ISCO occ. change 1990-2000	-0.101	1.888	3.188***	0.064
	(0.149)	(2.562)	(1.031)	(0.101)
Career growth 1990-2000	0.023*	0.264	0.459***	0.009
	(0.014)	(0.234)	(0.094)	(0.008)
Log hh income per person	-0.027	-1.302	-1.706**	-0.003
	(0.096)	(1.664)	(0.667)	(0.066)
Age	-0.043***	0.353***	0.023	-0.012**
	(0.007)	(0.126)	(0.050)	(0.005)
Age squared	0.000***	-0.005***	-0.000	0.000
	(0.000)	(0.001)	(0.000)	(0.000)
Male	0.207***	9.667***	2.445***	0.059***
	(0.016)	(0.280)	(0.112)	(0.011)
Married	-0.043*	-0.974**	-0.163	0.006
	(0.023)	(0.408)	(0.163)	(0.014)
Years of education	0.008***	-0.305***	0.053**	0.003
	(0.003)	(0.052)	(0.021)	(0.002)
Year fixed effects	+	+	+	-
Constant	4.087***	-3.724	-5.897***	1.018***
	(0.231)	(4.060)	(1.600)	(0.163)
Observations	19964	19956	19818	1762
Number of id	2639	2638	2639	

Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Overall, instrumental variable estimates suggest that the effects of a forced occupational change on health, smoking and alcohol consumption are causal, although the magnitudes of these effects should be interpreted with caution.

5. Conclusion

Rapidly changing technologies and the growing openness of economies to international trade sometimes make entire occupations in affected countries redundant. People employed in these occupations have to switch to other occupations that they do not necessarily like or deem suitable to their skills and abilities. Such "forced" occupational change is certainly a stress for a person and this stress may persist over a long period before a person fully acquires new skills and adjusts to the new profession. It is established in the medical literature that chronic stress is harmful to a person's health (Sterling and Eyer 1981; Henry 1982; Nicholson et al. 2005). While we know something about the effect of the loss of

a job on a person's health, the consequences of losing one's profession have not been studied before. This paper is intended to fill the gap.

I studied the effect of occupational change on health as well as on the level of smoking and alcohol consumption using data from the Russian economic transition, which was characterized by massive occupational changes due to major structural shifts in the economy. I used individual-level data from multiple rounds of the survey, carried out in 1995-2006, and estimated a panel data model of the effect of occupational change on health and health-related behaviors. To deal with potential endogeneity, I conducted a number of robustness checks and applied an instrumental variables approach.

The results of my analysis show that occupational change has a significant negative effect on individual health; it also leads to an increased level of smoking and alcohol consumption. The negative effects persist over a period of at least 10-15 years, which implies long-term damage to a person's health. The size of the effect on health is likely to be underestimated, first, because I do not account for those who died during the 1990s, and second, because the negative health effects of increased alcohol consumption and smoking are likely to grow over a longer time period.

The present study is the first to highlight this particular channel though which structural economic changes affect the health of people. This is part of the social and economic costs of structural changes or economic reforms. When restructuring affects a large part of the population, these costs can be considerable. This aspect needs to be taken into account in the analysis of various policy alternatives.

Appendix 1. RLMS dataset description

The Russian Longitudinal Monitoring Survey (RLMS)[65] is a household-based survey, designed to measure the effects of Russian reforms on the economic well-being of the households and individuals. RLMS is a longitudinal study of populations in the dwelling units. In each round, the RLMS interview was completed with a household and its members in the original sample dwelling unit. Thus it is a repeated cross-section sampling. The RLMS employs a multistage probability sample, starting from a list of 2029 *rayons* serving as Primary Sample Units (PSU). Moscow City, Moscow Oblast, and St. Petersburg City were included with certainty (self-representing strata), while other non-self representing *rayons* were allocated into 35 equally sized strata. Then 35 *rayons* were chosen (one from each stratum) with a probability, proportional to the *rayon*'s size. The target sample was constructed in accordance with the proportion of urban and rural population sizes and ethnic composition. The villages in rural areas and districts in urban areas served as Second-Stage Units (SSU). Within these areas, the dwellings were enumerated and then drawn randomly from a list. The RLMS sampling procedure ensured sample representativeness with respect to geographical and ethnic factors (for large ethnic groups) and level of urbanization.

RLMS survey instruments were designed by an interdisciplinary group of Russian and American social science and biomedical researchers with extensive experience in survey research. One part of questionnaire is comprised of questions on the person's work. It also includes a variety of personal characteristics.

[65] http://www.cpc.unc.edu/projects/rlms/

Appendix 2. Summary statistics for variables

Table 1A Average educational attainment and share of heavy work in occupations

Occupational groups	Average years of education (estimated on rounds 5-14)	Number of observations (rounds 5-13)	Rank by years of education	Average % of working time doing hard physical labor	Number of observations (rounds 6-9)
Military specialists	14.3	401	6	7.9%	178
Officials and managers	14.2	2359	5	5.3%	578
Physicists, mathematicians and engineers	15.5	2212	2	1.7%	787
Life science and health professionals	16.2	1121	1	1.7%	424
Teaching professionals	15.3	2881	3	1.4%	933
Business, law and other professionals	15.0	2064	4	1.4%	641
Technicians	13.4	1780	8	5.3%	545
Life science, health and teaching associate professionals	12.5	2234	9	4.0%	882
Finance, business and other associates	13.9	3650	7	3.8%	1148
Clerks	12.5	3016	10	3.8%	1071
Personal, catering and protective services	12.1	2146	11	10.1%	610
Salespersons	12.1	2635	12	8.8%	822
Agricultural workers	11.6	264	15	35.3%	88
Construction and building trades workers	11.6	2617	16	41.8%	826
Metal and machinery workers	11.7	3778	14	28.5%	1456
Other craft workers	11.8	923	13	25.4%	303
Stationary-plant operators	11.5	1510	17	26.8%	516
Machine operators and assemblers	11.4	1741	18	25.5%	561
Drivers and mobile-plant operators	11.1	5499	19	25.3%	1877
Elementary occupations in services	11.1	3827	20	11.3%	1260
Elementary occupations in agriculture	10.4	1006	22	49.2%	419
Elementary occupations in construction and manufacturing	10.9	1297	21	55.3%	415

Table 2A Years 1996-2005

variable	mean	p50	sd	min	max	N
Self-rated health	3.14	3.00	0.76	1.00	5.00	98907
Number of cigarettes per day	4.83	0.00	8.27	0.00	80.00	98746
Log alcohol consumption	-1.05	-0.33	3.43	-4.61	7.38	98062
Occ. concentration across sectors	0.33	0.16	0.30	0.08	1.00	28476
Sectoral employment ratio 95 to 90	0.92	0.99	0.22	0.44	2.04	26899
Number of instructors at regional prof.educ. institutions in 1990	0.0024	0.0020	0.0013	0.0009	0.0060	97132
Log hh income per person	7.57	7.63	0.90	-0.21	13.64	93524
Age	42.88	41.00	18.74	13.00	102.00	99263
Age squared	2189.71	1681.00	1766.64	169.00	10404.00	99263
Male	0.43	0.00	0.50	0.00	1.00	99263
Married	0.62	1.00	0.49	0.00	1.00	99223
Years of education	11.42	11.00	3.54	0.00	34.00	98307
Round 7	0.08	0.00	0.28	0.00	1.00	99263
Round 8	0.09	0.00	0.28	0.00	1.00	99263
Round 9	0.09	0.00	0.29	0.00	1.00	99263
Round 10	0.10	0.00	0.30	0.00	1.00	99263
Round 11	0.11	0.00	0.31	0.00	1.00	99263
Round 12	0.11	0.00	0.31	0.00	1.00	99263
Round 13	0.11	0.00	0.31	0.00	1.00	99263
Round 14	0.10	0.00	0.31	0.00	1.00	99263
Round 15	0.13	0.00	0.33	0.00	1.00	99263

Table 3A Year 2005

Variable	mean	p50	sd	min	max	N
EQ-5D	0.75	0.80	0.27	-0.59	1.00	10237
Self-rated health	3.20	3.00	0.75	1.00	5.00	10310
Number of cigarettes per day	5.06	0.00	8.48	0.00	60.00	10298
Log alcohol consumption	-1.12	-0.43	3.45	-4.61	7.30	10230
Occ. concentration across sectors	0.33	0.16	0.30	0.08	1.00	2498
Sectoral employment ratio 95 to 90	0.92	1.00	0.21	0.44	2.04	2365
Number of instructors at regional prof.educ. institutions in 1990	0.0024	0.0020	0.0014	0.0009	0.0060	10134
Log hh income per person	7.89	7.93	0.75	2.69	13.00	9803
Age	42.56	41.00	18.80	14.00	102.00	10337
Age squared	2164.54	1681.00	1772.67	196.00	10404.00	10337
Male	0.43	0.00	0.50	0.00	1.00	10337
Married	0.59	1.00	0.49	0.00	1.00	10323
Years of education	11.71	12.00	3.42	0.00	24.00	10251

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