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Health Effects of Occupational Change

Olga Lazareva

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HEALTH EFFECTS OF OCCUPATIONAL CHANGE

Olga Lazareva[1]

Abstract

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.

JEL codes: J62, J24, I10
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[1] Stockholm School of Economics and CEFIR (Moscow); olazareva@cefir.ru

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[2]) (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[3]). In this case we would also find a negative relationship between occupational change and health.

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

[2] 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.
[3] 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.

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[4]. 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.

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.

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

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).

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[5]. 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.

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

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

between 1990 and 2000 are reported in Table 1. In subsequent empirical analysis, I mostly use changes of occupations at the two-digit level.

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).

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[6]. 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[7]) 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 on occupational coding. This is not surprising since the self-reported measure of occupational change is much more specific as discussed above.

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

[6] 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.

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

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.

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[8]. Researchers have developed scores to transform individual answers for these five questions into a single continuous health measure,

[8] 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.

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)[9]. 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.

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

[9] 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.

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.

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:

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

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)[10]. 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 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

[10] 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.

forced occupational change for a middle-aged person is equivalent to becoming three years older[11].

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[12]. 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[13]. 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)[14]. 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.

[11] 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.

[12] 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.

[13] 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.

[14] 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.

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.

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[15]. 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[16].

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

[15] 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.

[16] 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.

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 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[17]. This result partly alleviates the concerns about reverse causality.

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[18]. 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. 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.

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

[18] 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.

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[19]. 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.

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.

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

[19] 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.

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.

References

Allen, Jim and Rolf van der Velden, 2001, Educational Mismatches versus Skill Mismatches: Effects on Wages, Job Satisfaction, and On-the-Job Search *Oxford Economic Papers*, New Series, Vol. 53, No. 3, Special Issue on Skills Measurement and Economic Analysis (Jul., 2001), pp. 434-452.

Berger M., J. Earle and K. Sabirianova, 2001, Worker Training in a Restructuring Economy: Evidence from the Russian Transition, *Research in Labor Economics*, Vol. 20, pp. 159-190.

Bjorklund, Anders, 1985, Unemployment and Mental Health: Some Evidence from Panel Data *The Journal of Human Resources*, Vol. 20, No. 4 (Autumn, 1985), pp. 469-483.

Björklund, A., Eriksson, T., 1998. Unemployment and mental health: evidence from research in the Nordic countries. *Scandinavian Journal of Social Welfare* 7, 219–235.

Bobak, M., H. Pikhart, R Kubinova, S Malyutina, A Pajak, H Sebakova, R Topor-Madry, Y Nikitin, W Caan and M. Marmot, 2005, The association between psychosocial characteristics at work and problem drinking: a cross-sectional study of men in three Eastern European urban populations, *Occupational and Environmental Medicine* 2005;62;546-550.

Bosma, H., R Peter, J. Siegrist and M. Marmot, 1998, Two alternative job stress models and the risk of coronary heart disease , *American Journal of Public Health*, Vol. 88, Issue 1 68-74.

Brainerd, Elizabeth and Cutler, David M., 2005, Autopsy on an Empire: Understanding Mortality in Russia and the Former Soviet Union. *Journal of Economic Perspectives*, Vol. 19, No. 1, pp. 107-130

Burström, Kristina, Magnus Johannesson, Finn Diderichsen, The value of the change in health in Sweden 1980/81 to 1996/97, *Health Economics*, Volume 12 Issue 8, Pages 637 – 654.

Case, Anne C. and Angus Deaton, 2003, Broken Down by Work and Sex: How our Health Declines, *NBER Working Paper* No. 9821.

Castro, Felipe G., Ebrahim Maddahian, Michael D. Newcomb and P. M. Bentler, 1987, A Multivariate Model of the Determinants of Cigarette Smoking Among Adolescents *Journal of Health and Social Behavior*, Vol. 28, No. 3 (Sep., 1987), pp. 273-289.

Catalano, Ralph, David Dooley, Georjeanna Wilson, Richard Hough, 1993, Job Loss and Alcohol Abuse: A Test Using Data from the Epidemiologic Catchment Area Project, *Journal of Health and Social Behavior*, Vol. 34, No. 3 (Sep., 1993), pp. 215-225

Chaloupka, Frank J., 2000, The Economics of Smoking, in: *Handbook of Health Economics, Vol. 1,* pp. 1541-1566.

Conway, Terry L., Ross R. Vickers, Jr., Harold W. Ward and Richard H. Rahe, 1981, Occupational Stress and Variation in Cigarette, Coffee, and Alcohol Consumption, *Journal of Health and Social Behavior*, Vol. 22, No. 2 (Jun., 1981), pp. 155-165.

Cook, Philip J. and Michael J. Moore, 2000, Alcohol, in: *Handbook of Health Economics, Vol. 1,* pp. 1630-1666.

Cutler, David M. and Elizabeth Richardson, 1998, The Value of Health: 1970-1990, *The American Economic Review*, Vol. 88, No. 2, Papers and Proceedings of the Hundred and Tenth Annual Meeting of the American Economic Association (May, 1998), pp. 97-100.

Cutler, David M. and Elizabeth Richardson**,** 1997, Measuring the Health of the U.S. Population, *Brookings Papers on Economic Activity. Microeconomics*, Vol. 1997, (1997), pp. 217-282.

Dolan P., 1997, Modelling variations for EuroQol health states, *Medical Care* 11: 1095-1108.

Dooley, D., Fielding, J., Levi, L., 1996. Health and unemployment. *Annual Review of Public Health* 17, 449–465.

Gerdtham U-G, Johannesson M. A note on the effect of unemployment on mortality. *Journal of Health Economics* 2003; 22:505-518.

Gimpelson, Vladimir and Doug Lippoldt, 2001, The Russian Labour Market: Between Transition and Turmoil, Rowman and Littlefield, USA.

Greenberg, Edward S. and Leon Grunberg, 1995, Work Alienation and Problem Alcohol Behavior *Journal of Health and Social Behavior*, Vol. 36, No. 1 (Mar., 1995), pp. 83-102.

Guriev, Sergei M. and Zhuravskaya, Ekaterina V., 2008, (Un)Happiness in Transition (March 12, 2008). Available at SSRN: http://ssrn.com/abstract=1077709

Farmer, Melissa M. and Kenneth F. Ferraro, 1997, Distress and Perceived Health: Mechanisms of Health Decline, *Journal of Health and Social Behavior*, Vol. 38, No. 3, Health Professions: Socialization, Organization, Utilization (Sep., 1997), pp. 298-311.

Hamilton, V. Lee; Clifford L. Broman; William S. Hoffman; Deborah S. Renner, 1990, Hard Times and Vulnerable People: Initial Effects of Plant Closing on Autoworkers' Mental Health, *Journal of Health and Social Behavior*, Vol. 31, No. 2. (Jun., 1990), pp. 123-140.

Henry, James P., 1982, The Relation of Social to Biological Processes in Disease, *Social Science and Medicine* 16, 369-380.

Idler, E.L., and Y. Benyamini. 1997. Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior* 38(1): 21-37.

Jin, R.L., Shah, C.P., Svoboda, T.J., 1995. The impact of unemployment on health: a review of the evidence. *Canadian Medical Association Journal* 153, 529–540.

Kambourov, Gueorgui and Iourii Manovskii, 2004, Occupational Mobility and Wage Inequality, *PIER Working Paper* No. 04-026.

Kambourov, Gueorgui and Iourii Manovskii, 2008, Rising Occupational and Industry Mobility in the United States: 1968-97 *International Economic Review*, Vol. 49, Issue 1, pp. 41-79, February 2008.

Kessler, Ronald C., James S. House and J. Blake, 1987, Unemployment and Health in a Community Sample Turner, *Journal of Health and Social Behavior*, Vol. 28, No. 1 (Mar., 1987), pp. 51-59.

Kletzer, Lori G., 2002, Imports, Exports, and Jobs. What Does Trade Mean for Employment and Job Loss?, W.E. Upjohn Institute for Employment Research, Kalamazoo, Michigan.

Lantz, Paula M., James S. House, Richard P. Mero and David R. Williams, 2005, Stress, Life Events, and Socioeconomic Disparities in Health: Results from the Americans' Changing Lives Study, *Journal of Health and Social Behavior*, Vol. 46, No. 3 (Sep., 2005), pp. 274-288.

Marmot, Michael, and Wilkinson, Richard (eds.). 1999. *Social Determinants of Health.* Oxford, UK: Oxford University Press.

Marmot, M., H. Bosma, H. Hemingway, E. Brunner, S. Stansfeld, 1997, Contribution of job control and other risk factors to social variations in coronary heart disease incidence, *The Lancet*, Vol 350.

Mayer, Francine, Paul-Martel Roy, Aline Emond and Raynald Pineault, 1991, Unemployment and Mental Health: A Longitudinal Analysis, *The Canadian Journal of Economics,* Vol. 24, No. 3 (Aug., 1991), pp. 551-562.

Murphy, Kevin M. and Finis Welch, 1993, Occupational Change and the Demand for Skill, 1940-1990 *The American Economic Review*, Vol. 83, No. 2, Papers and Proceedings of the Hundred and Fifth Annual Meeting of the American Economic Association (May, 1993), pp. 122-126.

Nicholson, Amanda, Rebecca Fuhrer, and Michael Marmot, 2005, Psychological Distress as a Predictor of CHD Events in Men: The Effect of Persistence and Components of Risk, *Psychosomatic Medicine* 67:522–530 (2005).

Pearlin, Leonard I. and Clarice W. Radabaugh, 1976, Economic Strains and the Coping Function of Alcohol, *The American Journal of Sociology*, Vol. 82, No. 3 (Nov., 1976), pp. 652-663

Sabirianova, Klara Z. 2002, The Great Human Capital Reallocation: A Study of Occupational Mobility in transitional Russia, *Journal of Comparative Economics* 30, 191–217 (2002)

Sicherman, Nachum and Oded Galor, 1990, A Theory of Career Mobility, *The Journal of Political Economy*, Vol. 98, No. 1, pp. 169-192.

Sindelar, Jody L., Jason Fletcher, Tracy Falba, Patricia Keenan, and William T. Gallo, 2007, Impact of First Occupation on Health at Older Ages, *NBER Working Paper* No. 13715.

Strauss, John, Paul J. Gertler, Omar Rahman and Kristin Fox, 1993, Gender and Life-Cycle Differentials in the Patterns and Determinants of Adult Health, *The Journal of Human Resources*, Vol. 28, No. 4, Special Issue: Symposium on Investments in Women's Human Capital and Development (Autumn, 1993), pp. 791-837.

Sterling, Peter and Joe Eyer, 1981, Biological Basis of Stress-Related Mortality, *Social Science and Medicine* Vol. 15 E, 3-42.

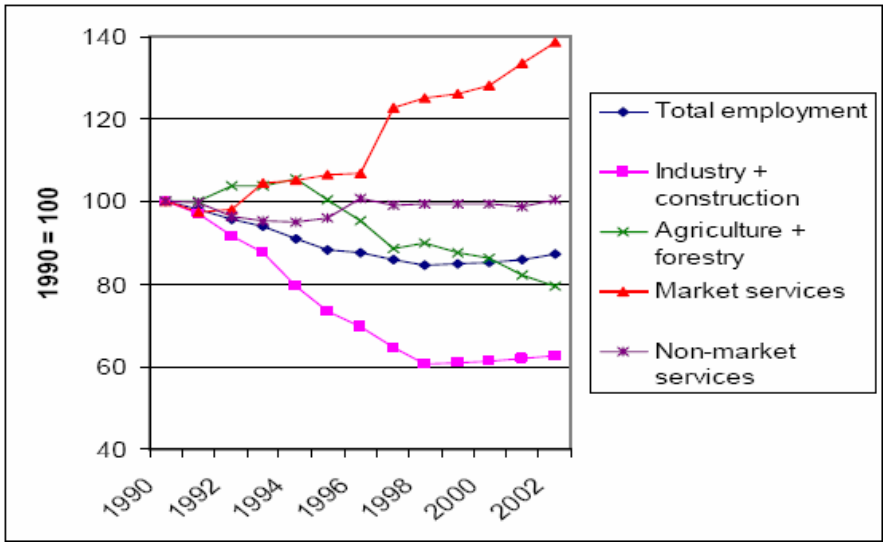
Vichnevski A., 1999, Russian mortality: Past Negative Trends and Recent Improvements. // Population Under Duress. The Geodemography of Post-Soviet Russia. Ed. By George J. Demko, Grigory Ioffe, Zhanna Zayonchkovskaya. Westview Press, 1999.

Walberg, Peder, Martin McKee, Vladimir Shkolnikov, Laurent Chenet, David A Leon, 1998, Economic change, crime, and mortality crisis in Russia: regional analysis, *British Medical Journal,* 1998;317;312-318.

World Bank, 2003, Russian Labor Market: Moving from Crisis to Recovery.

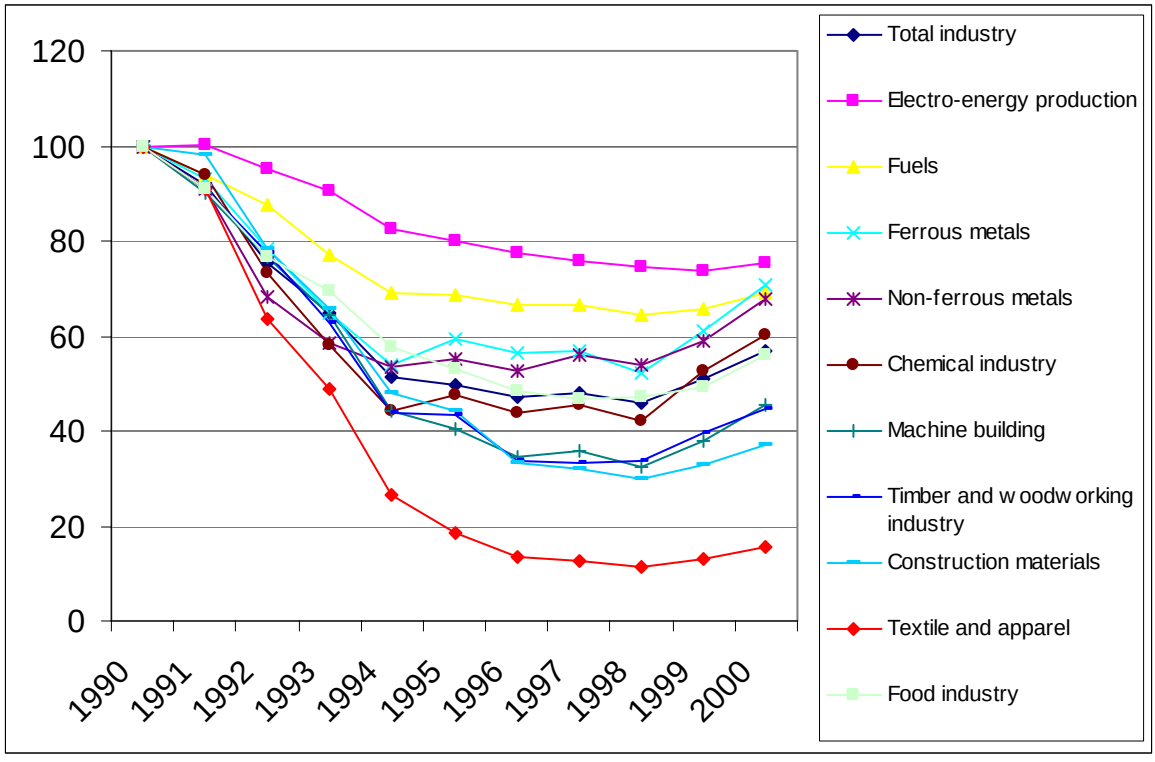
Figures and Tables

Fig.1 Dynamics of the sectoral employment between 1990 and 2002



Source: World Bank 2003

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



Source: Russian Federal Agency on Statistics

Fig. 3 Rates of "forced" occupational change between 1991 and 2006

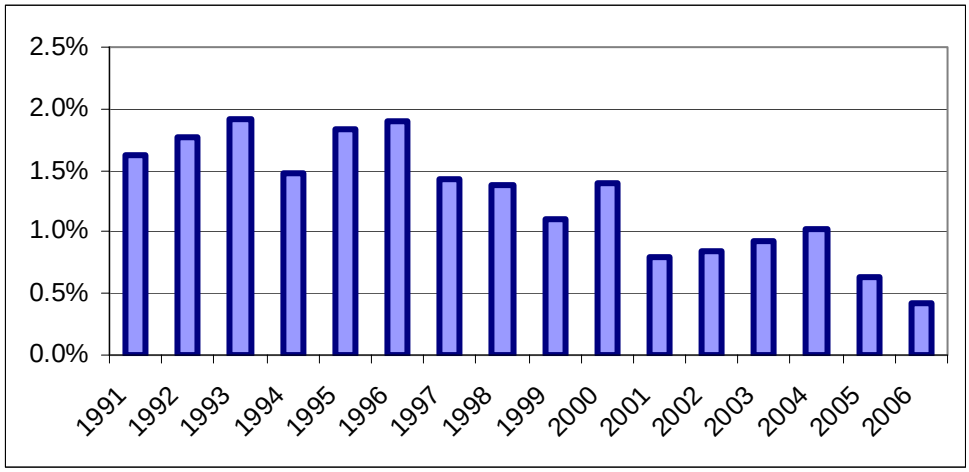


Fig. 4 Average self-rated health scores

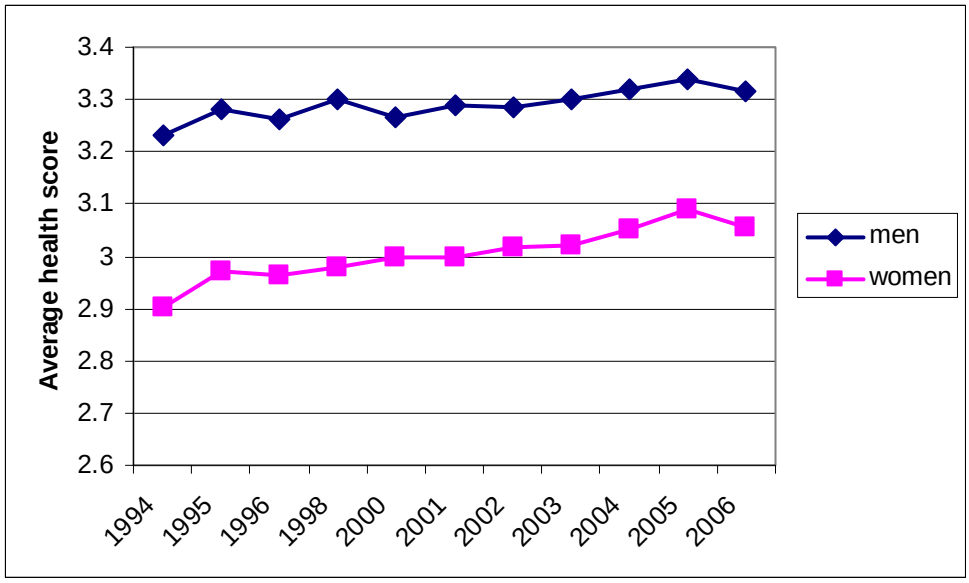


Fig. 5 Incidence and amount of smoking

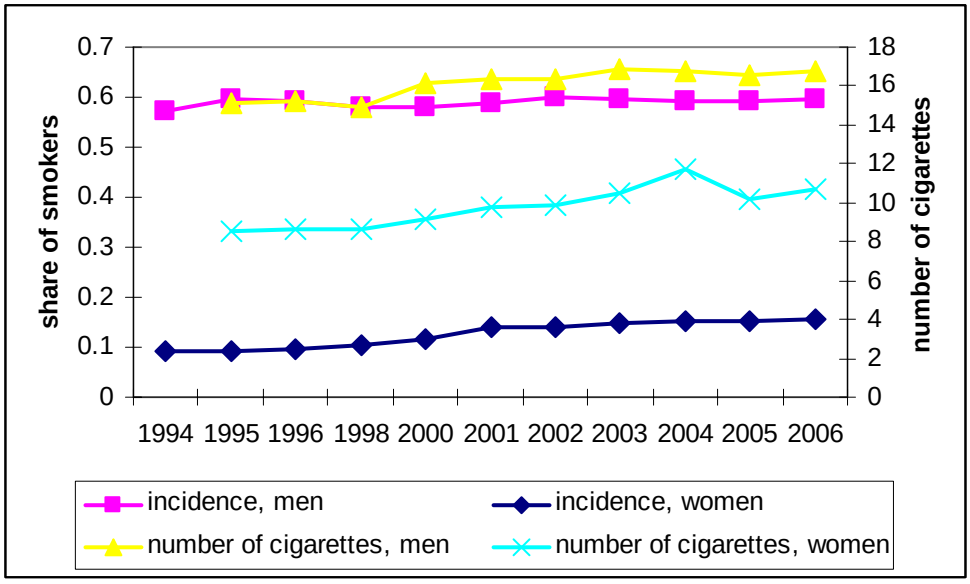


Fig. 6 Incidence and amount of alcohol consumption

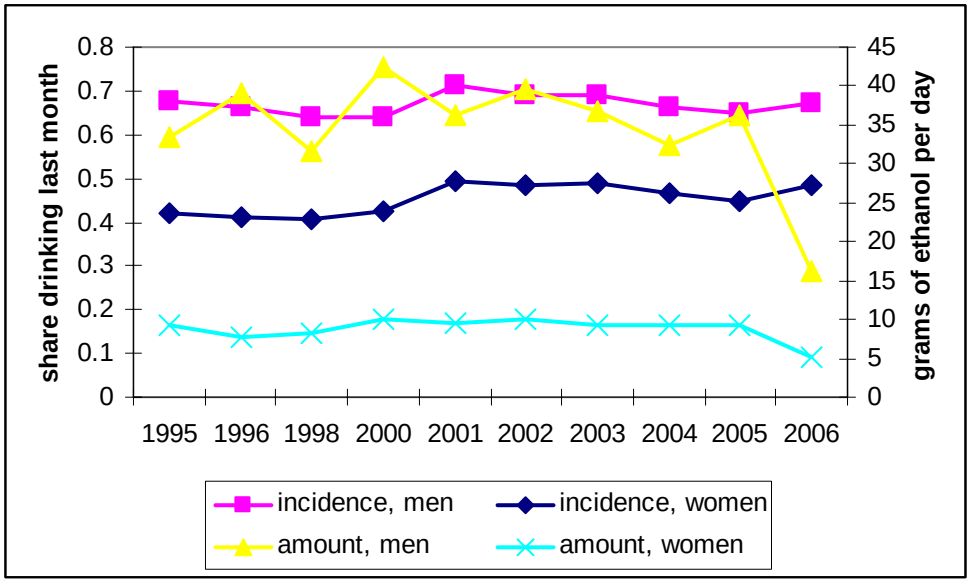


Table 1. Rates of occupational change measured by change in ISCO-88 codes

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

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%

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%; ** significant at 5%; *** significant at 1%

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%

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%

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%

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%

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 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%

Appendix 1. RLMS dataset description

The Russian Longitudinal Monitoring Survey (RLMS)[20] 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.

[20] 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 A2. 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 A3. 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