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Body weight and labour market outcomes in post-soviet Russia

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Abstract

This paper estimates the impacts of weight, measured by body mass index (BMI), on employment, wages, and missed work due to illness for Russian adults by gender using recent panel data (1994-2005) from the nationally representative Russian Longitudinal Monitoring Survey (RLMS). We employ econometric techniques to control for unobserved heterogeneity and potential biases due to endogeneity in BMI. The results show an inverted U-shaped effect of BMI on probability of employment for men and women. We did not find evidence of wage penalty for higher BMI. In fact, the wages for overweighed men are higher. However, having a BMI in the obese range increases the number of days missing work due to health problems for men. Overall, we find negative effects of obesity on employment only for women but not on wages. During the transition in Russia, the increasingly competitive pressure in the labour market combined with economic insecurity faced by the population has lead to a muted impact of an individual's weight on labour market outcomes.

JEL Classification: D12, J71, O52

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Introduction

Globally, there are more than 1 billion overweight adults with at least 300 million considered being obese. The increased consumption of more energy-dense foods and foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to obesity rates that have risen significantly since 1980 in North America, the United Kingdom, Australia, Eastern Europe, the Middle East, China, etc. (WHO, 2010). Thus, the prevalence of obesity has risen dramatically, not only in high income countries but in middle and low-income regions. A lot of research papers have been published on the determinants and consequences of obesity in developed countries (Chou et al., 2004; Lakdawalla et al., 2005; Rashad et al., 2006). The trend of increasing obesity in transition countries has been analyzed for Russia (Zohoori et al., 1998; Jahns et al., 2003; Huffman and Rizov, 2007, 2010) and other Central and East European countries such as Lithuania and Poland (Kalediene and Petrauskiene, 2004; Koziel et al., 2004).

Obesity is a complex condition that has serious health, social, and psychological dimensions, affecting all ages and socioeconomic groups (WHO, 2010). The negative impacts of obesity on health are well known. Obesity is a major contributor to the global burden of chronic disease and disability, including diabetes, cardiovascular disease, and cancer (WHO, 2010). Economic burdens are the consequence for countries with rising obesity in the form of increased medical expenditures, and individual economic insecurity. Obesity is linked to lower wages and employment, induced wage penalties, and job discrimination (Puhl and Brownell, 2001; Cawley, 2004). Given the health effects of obesity, obese individuals are more likely to have work limiting disabilities or to miss work due to illness if they are employed (Cawley et al., 2007). Obese workers may earn lower wages or be less likely to find employment due to employer discrimination (Puhl and Brownell, 2001). More studies have examined the relationship between obesity and wages (Averett and Korenman, 1996; Baum and Ford, 2004; Cawley, 2004; Morris, 2006; Gregory and Ruhm, 2009; Wada and Tekin, 2010), than the number of studies that have examined the relationship between obesity and employment (Morris, 2007; Norton and Han, 2008).

The goal of this paper is to estimate the impacts of weight, measured by body mass index (BMI), which is calculated as weight divided by height in meters squared on employment, wages, and missed work due to illness for Russian adults by gender, in order to better understand the mechanisms through which obesity affects employment, wages and sick-leave days. The study extends the literature on the relationship between weight and labour market outcomes, measured as employment, wages, and sick-leave days in 'transition' economies by using recent panel data (1994-2005) from the nationally representative Russian Longitudinal Monitoring Survey (RLMS), and provides the first to our knowledge empirical evidence from Russia. We also consider the reverse causality from wages to obesity (where higher wage may lead to lower BMI) and the possibility that obesity may be an endogenous variable. We employ econometric techniques to control for potential biases due to endogeneity and reverse causality. To determine whether obesity reduces employment and wages, we estimate various labour participation and wage model specifications including random and fixed effects models to control for unobservable heterogeneity.

The rest of the paper is organized as follows. The next section discusses current evidence on the relationships between obesity and employment, wage and missed work due to illness. We also briefly review the status of the Russian labour market. Following is a section on methodology and the data for the analysis. Finally, results are discussed and conclusions drown.

Literature review

The relationships between high body weight (obesity) and labour market outcomes has been researched, primarily using data on developed high income countries including the US and West Europe (England, Denmark, Finland, etc). The main labour market outcomes are wage/earnings, employment, and occupational selection. Earlier studies focused on the US have used the National Longitudinal Survey of Youth (NLSY) data, and the results from these studies are mixed (Loh, 1993; Pagan and Davila, 1997). One limitation of the studies is that they ignore the potential endogeneity of obesity, making causal inference impossible.

Later studies have tried to control for the endogeneity of obesity using the Instrumental Variable (IV) approach. Cawley (2000b) uses the weight of a child as an instrument for the weight of the child's mother, and finds no evidence that body weight causes employment disability. In another study, Cawley (2004) employs the fixed effect and IV models with the BMI of a sibling as instrument, and finds obesity wage penalty only for white females. Norton and Han (2008) identify the effect of obesity on labour market outcomes by using genetic information, and find no statistically significant effect of lagged BMI on either the probability of employment or wages conditional on employment, for either males or females. However, the instruments are sometimes weak and do not always pass the overidentification tests (Lindeboom et al., 2010).

Conley and Glauber (2007), using data from the Panel Study of Income Dynamics (PSID), estimate sibling fixed effects models where a body mass index measure is lagged by 15 years to correct for endogeneity bias. They found that obesity is associated with an 18% reduction in women's wages and a 16% reduction in women's probability of marriage. Gregory and Ruhm (2009) find little evidence of an "obesity penalty" but instead show that the wage is often maximized at low levels of BMI. Wada and Tekin (2010) develop measures of body composition, body fat, and fat-free mass, and analyze the relationship with wages. Their results indicate that body fat is associated with decreasing wages for both women and men, and fat free mass is associated with increased wages. In general, the literature on the relationship between BMI and wages finds that the BMI has significant negative consequences on earnings for women, and small or sometimes insignificant effects for men.

The effects of obesity on labour market outcomes have also been examined by European studies. Using data from the Health Survey for England, Morris (2006, 2007) assesses how BMI and obesity affect employment and earnings. He addresses the issue of endogeneity by employing the recursive bivariate probit model and the propensity score matching method. As instruments, Morris uses area level variables, the mean BMI in the respondent's health authority, and the prevalence of obesity in the area in which the respondent lives. Results show that obesity (BMI) has a negative effect on employment for both genders, and that BMI has a positive and significant effect on earnings for men, but a significantly negative effect on women's earnings. Another study by Lindeboom et al.

(2010) employs British data from the National Child Development Study (NCDS), and uses the obesity status of parents as an instrument. Lindeboom et al. (2010) find a significant negative association between obesity and labour market outcomes, but after instrumenting with parental obesity the results are no longer statistically significant. However, the authors are doubtful about the instruments, which did not pass the tests for overidentifying restrictions in several specifications.

Using data from a Danish panel survey from 1995 and 2000, Greeve (2008) analyzes the relationship between body weight, employment status, and wages using the IV models, and whether the respondent's father or mother had been prescribed medication for obesity related health problems. Results show a negative effect of BMI on employment. Sousa (2005) and Atella et al. (2008) investigate the relationship between obesity and wages for European countries using data from the European Community Household Panel. Sousa (2005) finds a negative BMI effect on labour market outcomes for women, and positive BMI effect on labour market outcomes for men.

In addition to studies focused on the developed countries in North America and Europe, Cawley et al. (2009) analyze the association between weight and labour market outcomes among legal immigrants to the US from developing countries. The authors did not find a significant association between weight and employment, wages, or work limitations for men or women; being overweight or obese is associated with lower employment among women who have been in the US for less than 5 years. But there are several limitations of their study as discussed by the authors, such as not accounting for possible endogeneity in obesity, the lack of instruments, the self-reporting height and weight that may lead to measurement error, etc.

Schultz (2008) uses round 13 of the RLMS data conducted in 2004 to investigate the health and disability impacts on labour productivity measured by variations in labour force participation, hours worked, and wage rates. The focus of his study is the impact of health related inputs, which include a medical check-up in the last three months, the consumption of grams of ethanol-alcohol equivalent per day, and the number of cigarettes smoked per day on labour productivity. To correct for potential endogeneity of these health inputs, the author estimates the relationship with labour productivity employing the two-stage least squares. Schultz also fits a quadratic function to BMI that reveals an inverted U-shaped pattern on labour force participation and wages, but he does not account for potential endogeneity in BMI.

To sum up, the findings regarding body weight impact on labour market outcomes are quite mixed and vary by gender and country. It seems that the impact of the commonly used measure, BMI is stronger for women than for men. Furthermore, the effect on women's employment and wages is usually negative, while for men it is sometimes found to be positive or insignificant. The contribution of this study is to extend the literature on the relationship between weight and labour market outcomes measured as employment, wages, and sick-leave days in transition economies by using the entire panel data from the Russian Longitudinal Monitoring Survey (RLMS). To allow for the likelihood that weight/BMI is endogenous, we replace BMI with its lagged value. We assume that the lagged BMI is uncorrelated with the current wage. To the best of our knowledge this study provides the first empirical evidence from Russia using panel data.

Russian labour markets in transition

As a result of the political, economic and social reforms in Russia since the collapse of the state-command economy in 1991, the labour market has experienced significant changes. These include emerging unemployment, exploding inflation, sharp declines in production, as well as a decrease in household income during the early years of transition to a free market economy. The results based on social indicators point to a fall in living standards, deteriorating health conditions, and increased mortality (Brainer and Cutler, 2005). During the transition years, a central issue has been the movement of labour from the former state sector to the newly emerging private sector where the resources are more efficiently utilised. The labour markets allocated the workers from less to more productive activities, the firms changed their employment practices to respond to market forces, and the relative wages changed to encourage worker reallocation. As a result of structural changes and the imposition of hard budget constraints, unemployment in Russia has increased. This includes decreased state employment due to the closure of state enterprises, limited private employment due to the slow expansion of private enterprises, and job quitters' entry into unemployment.

Several papers, overviewed in Earle and Lehmann (2002), have studied the labour markets in transition using micro data from Russia. Results show that Russian firms in transition were responding to wage changes by adjusting employment (Konings and Lehmann, 2002), average wages in privatized firms were higher than those in state enterprises (Brainer, 2002), and individual workers were responding to earnings incentives (Sabirianova, 2002). Sabirianova (1998) analyzes the dynamic changes in the Russian labour market based on movements of the population between employment, economic inactivity, and unemployment, and the gender differences in labour mobility. Female labour was less mobile.

Unemployment has increased steadily since the start of the transition, reaching its peak of 12.9% in 1999 after the Russian financial crisis in 1998, and after that gradually decreasing to 8.2% in 2004 (IMF, 2005). Regional variation in unemployment rates is extremely high in Russia, e.g., in 1999 the unemployment rate in Moscow was 6%, while in the North Caucasus the average rates were over 25%. The collapse of the real wages was drastic also during the period between1994 to 1999. The real wage in Russia started to increase since 2000 (IMF, 2005). The combination of macro- and microeconomic changes brought uncertainty in the lives of the Russian citizens, contrary to what was under the previous economic system. Using data from the RLMS, Linz and Semykina (2008) analyze the perceptions of economic insecurity among Russian workers during the transition, and find that perceptions of job security were higher among workers with more education, workers who live in places that are not adversely affected by the economic changes, and among workers who have supervisory responsibilities. Their results show that perceptions differ between genders, and that age is negatively correlated with the confidence of keeping a job.

In brief, as established in the labour economics literature, individual characteristics such as gender, age, and education, and macroeconomic environmental factors such as regional unemployment rate and other labour market specificities all have an impact on the individual labour market status and performance in Russia. During the transition, economic uncertainty increased and job security disappeared, leading to higher competition in the labour market.

Conceptual issues and methodology

Obesity affects employment and wages in two main ways. First, since obesity is the cause of both chronic and acute diseases, obese individuals are more likely to have health problems. Therefore, individuals who are overweight or obese may earn lower wages compared to their normal weight counterparts, because health problems may decrease their productivity (Baum and Ford, 2004). Second, there may be employer discrimination against obese people, which means that they may be less likely to be hired or promoted (Puhl and Brownell, 2001), and therefore, they work less and may earn lower wages. The goal of this paper is to investigate these relationships during the transition in Russia and compare them to the results from previous studies on developed economies.

Following the labour economics literature, in order to determine the effects of obesity on labour force participation (LFP), wage rate (ln*w*), and the number of sick-leave days (SLD), and to formalize the causal relationships discussed, we develop the following three equation econometric model:

$$LFP_{it}^{*} = \beta_0 + \beta_1 X_{itl} + \beta_2 BMI_{it-1} + \beta_3 BMIsq_{it-1} + \delta_i + \eta_{it}, \quad \text{i=1,…N and t=1,…,T} \quad (1)$$

where LFP_{it}^{*} is unobservable but $LFP_{it} = 1$ if $LFP_{it}^{*} > 0$ and zero otherwise, and the subscript *i* is for individual and *t* for time.

$$\ln w_{it} = \alpha_0 + \alpha_1 X_{itw} + \alpha_2 BMI_{it-1} + \alpha_3 BMIsq_{it-1} + \tau_i + \varepsilon_{it}. \quad (2)$$

$$SLD_{it}^{*} = \chi_0 + \chi_1 X_{its} + \chi_2 BMI_{it-1} + \chi_3 BMIsq_{it-1} + \upsilon_i + \mu_{it}, \quad (3)$$

where SLD_{it}^{*} is partly unobservable as $SLD_{it} = SLD_{it}^{*}$ if $SLD_{it}^{*} > 0$ and zero otherwise. The error terms in equations (1)-(3) include the individual random effects δ_i, τ_i, and υ_i which do not vary with time, and zero-expected-mean error terms η_{it}, ε_{it}, and μ_{it}. It is commonly assumed that δ_i, τ_i, υ_i, and η_{it}, ε_{it}, μ_{it} are normally distributed, mutually independent, and not correlated with the explanatory variables **X** given the randomness of the sample.

LFP is a binary variable, while *SLD* and ln*w* are continuous variables but *SLD* is censored. *LFP* is an indicator equal to 1 if the individual is in the labour force, and 0 otherwise. *SLD* is a censored variable containing 0-value for individuals not reporting any sick-leave days, and positive values for individuals reporting sick-leave days due to illness in the last 30 days. **X** is a vector of exogenous explanatory variables that is shown to be correlated with labour market outcomes in the labour economics literature including age, age squared, household size, education, and marital status, number of children in the household, non-labour income control for constraints and incentives of an individual to undertake market employment, regional dummies, and regional unemployment rate. Body mass index (BMI) is the key regressor we are interested in, and it is defined as individual weight in kilograms divided by height in meters squared (kg/m^2).

The probability of being employed (eq. 1) and the number of days missing work due to illness (eq. 3) are estimated by the random effects Probit and Tobit models respectively. The wage equation (eq. 2) is estimated using a random effects GLS estimator, corrected for selection into employment. The Hausman tests for independence between the respective error terms and explanatory variables did not reject the null hypothesis of independence at conventional levels of the critical values, and suggest that the composite errors are not correlated with the explanatory variables, i.e., random effects models are not biased. Furthermore, our sample is randomly drawn from a large population and our aim is to make inference about the population. Therefore, random effects models are more appropriate compared to fixed effects models (Hsiao, 1986; Baltagi, 2001). Nonetheless, in order to ensure the robustness of the results, fixed effects models were also estimated. The results from these models do not differ qualitatively from the results reported. We also estimate the econometric models by gender because there are significant differences between men and women in the labour market (Cawley, 2000a; 2004).

Even though the specification (Hausman) tests did not reject the random effects models suggesting that overall the explanatory variables are exogenous, the standard estimates could still be biased if obesity (BMI) and the error terms are correlated as reviewed in detail in Cawley (2004). Some of the reasons why obesity and employment, wages and sick-leave days might be correlated, include: a) unobservable individual effects such as genetic and non genetic factors included in the error terms may be correlated both with labour force participation (and wage and sick-leave days), and with the individual BMI; and b) potential reverse causality that obesity (BMI) affects labour market outcomes and that labour market outcomes affect obesity. For example, obesity may cause unemployment based on discrimination against the obese (Pagan and Davila, 1997), based on the employers' belief that the obese are less productive (Everett, 1990). On the other hand, unemployment may cause obesity because the unemployed individuals who have lower incomes are more likely to consume inexpensive, fat-containing food (Cawley, 2004), and exercise less. Therefore, the standard estimates may be biased due to the endogeneity of obesity (BMI).

The previous studies (Cawley, 2004; Brunello and D'Hombres, 2007; Morris, 2007; Greve, 2009) have dealt with the endogeneity of obesity using Instrumental Variables (IV) models. In this approach, we need to use instruments that are correlated with obesity but uncorrelated with labour market outcomes. However, obtaining unbiased estimates with the

IV method depends essentially on the predictive power and validity of instruments. If there is a weak correlation between instruments and obesity, or the instruments are correlated with labour market outcomes, then the IV estimates could still be biased.

We follow the previous research that uses a lagged BMI variable to deal with bias due to reverse causality (Averett and Korenman, 1996; Berhman and Rosenzweig, 2001). In this study, in addition to the random effect models with the BMI, we estimate the random effect models using one-period lagged BMI, and instrumented BMI with one-period lagged BMI, and household and individual characteristics as identifying variables. We also experimented with longer lags of BMI. The results from these estimations did not differ importantly. In the next sections we discuss the results with one-period lagged BMI, while the results using the current (same period) BMI are reported in the Appendix. The two sets of estimates represent a robustness test for exogeneity of BMI. No significant differences in the two sets of results will be consistent with the fact that random effects models were not rejected in favour of the fixed effects models.

Data and sample

Data from the RLMS for 1994- 2005 period is used to investigate the impacts of body weight on labour market outcomes. The RLMS is a nationally representative household survey that annually (excluding 1997 and 1999) samples the population of dwelling units. The RLMS is based on multi-stage random probability samples of the Russian population. The annual samples collect data for more than 4000 households and their members, who total more than 10,000 individuals each year. The collected data include a wide range of information concerning household characteristics such as demographic composition, income, and expenditures. Data on individuals includes employment details, anthropometric measures, nutrition, alcohol consumption, and medical problems. The BMI index for each respondent is constructed from data on weight and height collected by trained personnel. Therefore, the BMI values are not based on self-reported weight and height, which may be reported with error. The wealth of relevant variables makes the RLMS appropriate for the purposes of this study. Our sample consists of all adult individuals of working age 18-60. Any pregnant women at the time their weight is measured are deleted from the sample since their weight is affected by the current pregnancy. The sample includes 36,917 (21,236 female and 15,681 male) individuals over 1994-2005 period, including 2373 in 1994, 2492 in 1995, 2710 in 1996, 3037 in 1998, 3404 in 2000, 3816 in 2001, 4157 in 2002, 4457 in 2003, 4886 in 2004, and 5585 in 2005. Table 1 presents the definitions and summary statistics for all variables used in the analysis.

Figure 1 shows the average BMI in Russia for the full sample, and by gender. In the beginning of the period in 1994, the average BMI for the full sample was 26.06, with women having higher average BMI equal to 26.74. By the end of the period in 2005, the average BMI has slightly declined to 25.9, with a small increase for the men's BMI from 25.02 to 25.17, which still remains lower than the women's BMI of 26.49. The figure shows that both women and men had an average BMI that would be classified as overweight. An individual with a BMI over 25 kg/m^2 is defined as overweight, and with a BMI over 30 kg/m^2 as obese (WHO, 2010). Figure 2 presents the pattern of obesity in Russia during the 1994-2005 period. The percent of obese people has increased from 24.1% in 1994, to 25.1% in 1996, but since then it has decreased to 24.3% in 2004. It is important to point out that there was a more significant increase in the percentage of obese men from 13.2% in 1994 to 16.6% in 2005.

[Figure 1 about here]

[Figure 2 about here]

Figure 3 presents the average hourly wage for the full sample, and obese and non-obese subsamples. The numbers indicate that real hourly wage generally increases over time but there is no clear pattern for wages for non-obese and obese people. Wages of the obese individuals were higher during some of the years, and vice versa. An interesting pattern for the wage differentials for obese and non-obese individuals by gender is presented in Figure 4. Men earn more than women with an increasing differential since 2001. Obese men in Russia earn more than non-obese men with the exception of the beginning year 1994, 2000, and 2002. Wages for non-obese women were higher compared to obese women for half of the period.

[Figure 3 about here]

[Figure 4 about here]

Figures 5 and 6 present the employment and monthly hours worked in Russia by gender and by obesity status for the analyzed period from 1994 to 2005. More of the non-obese women are employed compared to the obese women, although in the last years (from 2001 to 2003) the numbers are pretty close. More of the obese men were employed, with the exception of 1996. In general, obese women and men work more monthly hours than their non-obese counterparts. And lastly, Figure 7 shows the number of monthly work days missed due to illness. There is no clear trend. Half of the period, obese men missed work due to illness, with 16 days reported for 2005, while obese women had the most sick leave days in 1994 (12 days) and 2002 (11 days).

[Figure 5 about here]

[Figure 6 about here]

[Figure 7 about here]

These simple descriptive statistics suggest that there is no noticeable wage penalty for obese people, and even obese men earn more. The evidence is in line with the findings of several studies for developed market economies. Next, to further investigate and determine the causal effect of obesity on labour market outcomes, we estimate econometric models to control for various factors that might be correlated with obesity, employment, wages, and sick leave days.

Results

BMI and labour force participation

The relationship between BMI (overweight and obesity) and labour force participation is estimated with a panel random effects probit model using the STATA *xtprobit* procedure. We use one period lagged individual BMI to correct for the potential endogeneity in the variable. Table 2a presents the estimated coefficients for the total sample and for men and women separately, while Table 2b presents the corresponding marginal effects. The results indicate that BMI has a nonlinear effect on employment since the coefficient of the linear term of BMI is positive and of the squared term of BMI it is negative, and the effects are statistically significant for the women sample, and for the total. Thus, the employment equation is concave in BMI; the probability of women's employment increases with the

BMI until the BMI level is about 30 (the obesity category threshold), and after this level the probability of women's employment continues to decrease with BMI. The BMI overall marginal effects are positive but not statistically significant and the magnitudes are very small. Nevertheless, the nonlinear effect of BMI provides evidence that at very high levels of BMI, individuals may be hampered or discriminated in accessing employment, especially women. The BMI effects on employment are similar but more significant when the model is estimated with current BMI instead of the lagged BMI (Table A1a in the Appendix), and the magnitudes of the marginal effects (Table A1b) are larger.

[Table 2a about here]

[Table 2b about here]

The effects of the other explanatory variables included in the analysis are consistent with the labour economics literature. A woman with a university degree is more likely to be employed by 8.1%, while the effect of university degree for men is only 1.8%. Married men are more likely to work compared to the single men, but married women are less likely to be employed. Marriage increases the men's probability of working by 7.7%, but decreases the women's probability of working by 2.5%. Women with younger children decrease their probability of working by 9.2%. Age has a nonlinear concave effect on probability of employment; it increases with age, and the peak for women is at about 37 years while for men it is about 35 years. There are also significant regional differences in employment. Labour force participation is less likely where the unemployment rate is higher. The choice not to work for both genders is also affected by having a larger household and higher non-labour income. In this and all the following specifications, time trend, is included and it is found to be statistically significant here.

Overall, the results provide evidence that severely obese women (with BMI above 30) are less likely to be in the labour force. The results provide no evidence that obese men are less likely to be employed or seek employment. This result is consistent with Morris (2007) and Sousa (2005), who also find that obesity has a significant and negative effect on employment of women; and with Norton and Han (2008), who do not find a statistically significant effect of obesity on employment for men. However, in the Russian case the positive relationship between BMI and probability of labour force participation holds for a large proportion of the overweight and (slightly) obese population.

BMI and wages

The relationship between BMI and wages (wage rate) is estimated with random effects generalized least-squares (GLS) models for the whole sample and by gender. The results with one-period lagged BMI are reported in Table 3, and show that there is no statistically significant relationship between BMI and wages.

The results with current BMI are reported in Table A2 (in the Appendix) and show that BMI is statistically significant and positively related to wages for the men's samples but insignificant for the women's sample. Similarly, Johansson et al. (2009) find that the coefficients of BMI and BMI squared are statistically insignificant for women. We included the squared term of BMI to allow for nonlinearity in the BMI effect, but the coefficient is not statistically different from zero. Keeping in mind the possible endogeneity of current BMI, one unit (or 4%) increase in men's BMI raises their wage by 1.4% at mean BMI. This result is contrary to some studies for developed economies which find wage penalty for obese workers, but consistent with Morris (2007) and Sousa (2005) who find that BMI has a significantly positive effect on men's earnings.

[Table 3 about here]

We have included the inverse Mills' ratio, calculated as the cumulative normal density function divided by the probability density function, in the wage equation to correct for the selection bias due to the choice into employment. Another determinant of wage that has a positive and statistically significant effect is university education. A university degree increases women's wages by 24.7%, and men's wages by 25.3%. Added schooling increases the wage rate through increased labour productivity, holding other factors equal. The wage equation is concave in age, and the age effect peaks up at about the age of 40 for women, and at about the age of 31 for men. Women holding a managerial or professional job have a wages increase of 15.7%. The wage for an employee in a foreign company is higher by 36.9% for women, and 32.6% for men. The wage of employees in private companies is higher by about 16% compared to the wage of state employees, both for men and women. Wages in all regions in Russia compared to the metropolitan Moscow and St. Petersburg regions are lower both for men and women.

To sum up, we do not find any significant evidence for discrimination against overweight/obese individuals in terms of wages in Russia, which is contrary to Baum and Ford (2004), who find that obese workers suffer a wage penalty. If we use current BMI (do not account for endogeneity), the wages of men with higher BMI are somewhat higher, a result, similar to Morris (2006, 2007) who finds that BMI has a significant positive effect on earnings for men.

BMI and sick-leave days

The relationship between BMI and the number of sick-leave days is estimated with a random effects Tobit models for the whole sample, and by gender using the STATA *xttobit* procedure. The coefficients and the corresponding marginal effects from the estimations are reported in Tables 4a and 4b respectively. The results show that BMI has a non-linear, U-shaped effect on the number of work days missed due to health problems for the total, and for the men's samples, which is statistically significant. The effect of BMI on women's sick-leave days is not statistically significant. The effect disappears when we account for endogeneity of the BMI, while in the specification with current BMI (Tables A3a and A3b) it is statistically significant. The number of work days missed due to illness decreases with BMI for men until their BMI reaches 28.3. After this point, the number of sick-leave days increases with BMI. This level of BMI indicates that men who report more sick-leave days can be classified as seriously overweight, approaching obesity status. The overall marginal effect is negative and statistically significant for men, but its magnitude is relatively small.

[Table 4a about here]

[Table 4b about here]

Our results are in line with the study by Laarsonen et al. (2007) who find that employed overweight women and men face a significantly increased risk of sick leave, compared with normal weight and underweight employees. Similarly, Schmier et al. (2006) find that overweight and obese employees have higher absenteeism and more workplace injuries.

Amongst the other explanatory variables, the effects of household size and regional unemployment rate are statistically significant. Both negatively affect the number of sick-leave days. For men, marital status is also a significant factor; being married increases the number of sick-leave days. Age has a statistically significant and nonlinear effect only for men too. The number of work days missed due to sickness decreases with age until about age 39, and increases thereafter. However, the overall marginal effect of age is not statistically significant.

Conclusion

This paper focuses on the impacts of overweight and obesity on the probability of employment, wages, and the number of sick-leave days by gender in Russia. Analysing the relation between overweight and obesity status measured by the BMI and labour market outcomes is important for understanding the role that the individual weight condition may play in affecting these outcomes in general, and in transition context in particular.

The results from the estimated models show an inverted U-shaped effect of BMI on probability of employment for men and women. We did not find evidence of wage penalty for higher BMI, a result different from findings of some studies on developed market economies. In fact, the wages for overweight men are higher. However, a BMI above 28.3 increases the number of work days missed due to health problems for men, which is consistent with previous studies. Overall, we find negative effects of obesity (BMI above 30) on employment for women, but not on wages. It seems that during the transition in Russia, the increased competitive pressure in the labour market combined with the economic insecurity faced by the population lead to muted impact of an individual's weight on labour market outcomes.

An increase in weight, to levels of overweight and obese is likely to negatively affect future productivity in the society beyond the transition period, as obesity increases the risk of sick leave, disability, and death. This is likely to have a profound effect on the national welfare system. Healthy weight maintenance is a crucial issue in promoting occupational functioning, and minimizing the costs associated with sickness absence. The policy implications suggested by the findings of this study are gender specific, and should help formulate more effective policies for improving the labour market performance through achieving optimal weight of the citizens in Russia. The effects of obesity on labour market outcomes should also raise further attention to the growing obesity problem and the associated societal costs.

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Table 1 Definitions of variables and summary statistics (n=36,917)

Variable	Mean (SD)	Definition
Dependent Variables		
Employment (LFP)	0.818 (0.386)	Dummy variable equal to 1 if the individual is in the labour force and 0 otherwise
Wage (*w*)	13.739 (44.574)	Individual real hourly wage rate in Rubles (base 2000)
Sick-leave days (SLD)	0.063 (0.243)	Number of days the individual missed work due to illness in the last 30 days
Explanatory Variables		
BMI	25.853 (4.920)	Individual weight divided by height squared (kg/m2)
Age	37.978 (11.576)	Age in years
Male	0.425 (0.494)	Dummy variable equal to 1 if the individual is a male and 0 otherwise
Base education	0.237 (0.426)	Dummy variable equal to 1 if the individual has base education or up to 8 years
High education	0.597 (0.490)	Dummy variable equal to 1 if the individual has completed high school and 0 otherwise
University education	0.173 (0.379)	Dummy variable equal to 1 if the individual has completed university education and 0 otherwise
Married	0.721 (0.448)	Dummy variable equal to 1 if the individual is married and 0 otherwise
Household size	3.601 (1.507)	Adult equivalent number of household members
Children 6	0.076 (0.134)	Share of children of age 6 years or below in the household
Children18	0.153 (0.187)	Share of children of age above 6 years in the household
Non-labour income	237.475 (2294.384)	Real monthly non-labour income in Rubles (base 2000)
Unemployment rate	0.089 (0.047)	Regional unemployment rate
Manager	0.147 (0.354)	Dummy variable equal to 1 if the individual is in managerial or professional job and 0 otherwise
Foreign firm	0.036 (0.187)	Dummy variable equal to 1 if the firm of employment is foreign owned and 0 domestically owned
Private firm	0.379 (0.485)	Dummy variable equal to 1 if the firm of employment is private owned and 0 if state owned.
Moscow-St. Petersburg	0.024 (0.467)	Dummy variable equal to 1 if the individual resides in Moscow-St. Petersburg region and 0 otherwise
North and Northwest	0.057 (0.231)	Dummy variable equal to 1 if the individual resides in North and Northwest region and 0 otherwise
Central	0.181 (0.385)	Dummy variable equal to 1 if the individual resides in Central region and 0 otherwise
Volga	0.212 (0.408)	Dummy variable equal to 1 if the individual resides in Volga region and 0 otherwise
North Caucasus	0.160 (0.367)	Dummy variable equal to 1 if the individual resides in North Caucasus region and 0 otherwise
Ural	0.160 (0.367)	Dummy variable equal to 1 if the individual resides in Ural region and 0 otherwise
West Siberia	0.075 (0.264)	Dummy variable equal to 1 if the individual resides in West Siberia region and 0 otherwise
East Siberia	0.092 (0.289)	Dummy variable equal to 1 if the individual resides in East Siberia region and 0 otherwise

Table 2a Random effects Probit estimates of the probability of employment equation

Variable	Dependent variable: LFP; Coefficient (SE)		
	All	**Women**	**Men**
L1_BMI	0.072 (0.033)**	0.071 (0.039)*	0.048 (0.066)
L1_BMI_sq	-0.001 (0.0006)**	-0.001 (0.0007)*	-0.001 (0.001)
Gender	0.641 (0.055)***	-	-
Age	0.392 (0.014)***	0.465 (0.018)***	0.240 (0.021)***
Age_sq	-0.005 (0.0002)***	-0.006 (0.0002)***	-0.003 (0.0003)***
University education	0.952 (0.076) ***	1.112 (0.097)***	0.675 (0.118)***
High education	0.124 (0.048)**	0.168 (0.063)**	0.067 (0.072)
Married	0.133 (0.049)**	-0.235 (0.059)***	0.961 (0.094)***
ln(Household size)	-0.422 (0.069)***	-0.433 (0.086)***	-0.353 (0.113)***
Children 6	-0.203 (0.156)	-0.799 (0.191)***	0.246 (0.287)
Children18	0.133(0.118)	-0.200(0.149)	0.093(0.199)
ln(Non-labour income)	-0.061(0.005)***	-0.057(0.007)***	-0.073(0.009)***
Unemployment rate	-2.832(0.393)***	-2.059(0.503) ***	-3.972(0.622)***
North and Northwest	0.252(0.155)*	0.145(0.195)	0.410(0.240)*
Central	-0.087(0.120)	-0.158(0.150)	0.067(0.187)
Volga	-0.225(0.118)*	-0.258(0.148)*	-0.154(0.183)
North Caucasus	-0.666 (0.126)***	-0.706(0.159)***	-0.469(0.194)**
Ural	0.097(0.123)	-0.049(0.154)	0.317 (0.193)*
West Siberia	-0.334(0.138)**	-0.431(0.175)**	-0.168(0.211)
East Siberia	0.078 (0.135)	-0.204(0.171)	0.558(0.213)**
Time trend	-0.034(0.006)***	-0.024(0.007)***	-0.048(0.010)***
Constant	-4.788(0.501)***	-5.689(0.606)***	-1.865(0.939)**
Log likelihood	-9219	-5832	-3262
Number of observations	29240	16937	12303

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 2b Marginal effects for the probability of employment equation

Variable	Dependent variable: LFP; Marginal effect (SE)		
	All	**Women**	**Men**
L1_BMI	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
Gender	0.045 (0.004)***	-	-
Age	-0.002 (0.0002)***	-0.003 (0.0004)***	-0.002 (0.0003)***
University education	0.044 (0.003)***	0.081 (0.007)***	0.018 (0.003)***
High education	0.009 (0.004)**	0.020 (0.008)**	0.003 (0.003)
Married	0.010 (0.004)**	-0.025 (0.006)***	0.077 (0.014)***
ln(Household size)	-0.031 (0.005)***	-0.050 (0.010)***	-0.015 (0.005)***
Children 6	-0.015 (0.012)	-0.092 (0.022)***	0.010 (0.012)
Children18	0.010 (0.009)	-0.023(0.017)	0.004(0.008)
ln(Non-labour income)	-0.005 (0.0005)***	-0.007(0.001)***	-0.003(0.0005)***
Unemployment rate	-0.211 (0.032)***	-0.238 (0.060)***	-0.165(0.033)***
North and Northwest	0.015(0.008)**	0.015(0.018)	0.012(0.005)**
Central	-0.007 (0.010)	-0.020(0.020)	0.003(0.007)
Volga	-0.019 (0.011)*	-0.033(0.022)	-0.007 (0.009)
North Caucasus	-0.075(0.020)***	-0.118 (0.036)***	-0.027(0.015)*
Ural	0.007 (0.008)	-0.006 (0.019)	0.011 (0.005)**
West Siberia	-0.032(0.017)**	-0.066(0.034)**	-0.008(0.012)
East Siberia	0.005 (0.009)	-0.027(0.025)	0.015(0.004)***
Time trend	-0.003(0.0005)***	-0.003(0.001)***	-0.002(0.0005)***

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 3 Random effect GLS estimates of the wage equation

Variable	Dependent variable: ln*w*; Coefficient (SE)		
	All	**Women**	**Men**
L1_BMI	0.025 (0.020)	0.020 (0.023)	0.022 (0.042)
L1_BMI_sq	-0.0004 (0.0003)	-0.0003 (0.0004)	-0.0003 (0.001)
Gender	0.274 (0.028)***	-	-
Age	0.025 (0.008)***	0.021 (0.012)**	0.021 (0.012)*
Age_sq	-0.0004 (0.0001)***	-0.0003 (0.0001)**	-0.0003 (0.0002)**
University education	0.239 (0.039)***	0.247 (0.050)***	0.253 (0.062)***
High education	0.037 (0.027)	0.067 (0.035)*	0.002 (0.040)
Manager	0.097(0.029)***	0.157(0.034)***	-0.0002(0.054)
Foreign firm	0.347(0.046)***	0.369(0.070)***	0.326(0.062)***
Private firm	0.163 (0.020)***	0.167 (0.027)***	0.164(0.031)***
Unemployment rate	0.754(0.319)**	0.244(0.392)	1.298(0.549)**
North and Northwest	-0.175(0.074)**	-0.248(0.092)**	-0.082(0.121)
Central	-0.496(0.051)***	-0.485(0.064)***	-0.520(0.081)***
Volga	-0.630(0.051)***	-0.631(0.065)***	-0.641(0.083)***
North Caucasus	-0.609 (0.058)***	-0.597(0.072)***	-0.628 (0.092)***
Ural	-0.482 (0.053)***	-0.483 (0.067)***	-0.484 (0.085)***
West Siberia	-0.562 (0.074)***	-0.591(0.093)***	-0.539 (0.122)***
East Siberia	-0.442 (0.065)***	-0.457(0.084)***	-0.427 (0.102)***
Time trend	0.051 (0.007)***	0.064 (0.008)***	0.035 (0.012)**
Mills ratio	-1.761(0.153)***	-1.158(0.197)***	-2.349(0.253)***
Constant	1.418(0.308)***	1.124(0.367)***	2.207(0.617)***
Wald chi2	2650	1274	1444
Number of observations	15950	9054	6896

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 4a Random effects Tobit estimates of the sick-leave days equation

Variable	Dependent variable: SLD; Coefficient (SE)		
	All	**Women**	**Men**
L1_BMI	-1.697 (0.522)***	-0.797 (0.629)	-3.516 (1.012)***
L1_BMI_sq	0.031 (0.009)***	0.017 (0.011)	0.062 (0.019) ***
Gender	0.036 (0.637)	-	-
Age	-0.284 (0.229)	0.169 (0.304)	-0.946 (0.352) **
Age_sq	0.003 (0.003)	-0.003 (0.004)	0.012 (0.004) **
University education	0.084 (0.924)	1.069 (1.213)	-1.098 (1.472)
High education	-0.277 (0.734)	0.121 (1.020)	-0.731 (1.061)
Married	0.888 (0.751)	0.287 (0.897)	2.887 (1.494)**
ln(Household size)	-5.434 (1.161)***	-5.255 (1.485) ***	-5.723 (1.883)***
Children 6	0.866 (2.512)	1.619 (3.281)	-1.069 (4.133)
Children18	1.587 (1.886)	0.079 (2.366)	2.737 (3.236)
ln(Non-labour income)	0.115 (0.114)	0.235 (0.137) *	-0.152 (0.209)
Unemployment rate	-22.988 (7.839)***	-21.925 (10.338)**	-24.630 (12.050)**
North and Northwest	2.379 (1.776)	1.633 (2.295)	2.955 (2.780)
Central	-0.030 (1.421)	-0.273 (1.790)	0.010 (2.310)
Volga	-0.999 (1.435)	-0.951 (1.811)	-1.431 (2.331)
North Caucasus	-2.203 (1.637)	-2.220 (2.095)	-2.236 (2.610)
Ural	-0.323 (1.482)	-0.007 (1.874)	-1.081 (2.398)
West Siberia	-0.644 (1.694)	-0.804 (2.167)	-0.749 (2.701)
East Siberia	1.545 (1.616)	1.691 (2.084)	0.966 (2.559)
Time trend	-0.684 (0.112) ***	-0.793 (0.146)***	-0.521 (0.176) ***
Constant	11.331 (8.072)	-8.105 (9.944)	46.174 (14.914)***
Log likelihood	-11576	-6587	-4977
Number of observations	24196	13415	10781

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 4b Marginal effects for the sick-leave days equation

Variable	Dependent variable: SLD; Marginal effect (SE)		
	All	**Women**	**Men**
L1_BMI	-0.006 (0.005)	0.006 (0.006)	-0.027 (0.009)***
Gender	0.005 (0.096)	-	-
Age	-0.002 (0.002)	-0.002 (0.003)	-0.005 (0.004)
University education	0.013 (0.139)	0.164 (0.187)	-0.161 (0.215)
High education	-0.042 (0.111)	0.018 (0.155)	-0.109 (0.158)
Married	0.133 (0.112)	0.043 (0.136)	0.419 (0.212)**
ln(Household size)	-0.818 (0.174)***	-0.798 (0.225)***	-0.849 (0.279)***
Children 6	0.130 (0.378)	0.246 (0.498)	-0.159 (0.613)
Children18	0.239(0.284)	0.012(0.359)	0.406(0.480)
ln(Non-labour income)	0.017(0.017)	0.036(0.021) *	-0.023(0.031)
Unemployment rate	-3.461(1.179)***	-3.329(1.568) **	-3.655(1.785)**
North and Northwest	0.368(0.282)	0.253(0.360)	0.453(0.440)
Central	-0.004(0.214)	-0.041(0.271)	0.002(0.343)
Volga	-0.149(0.213)	-0.143(0.272)	-0.210 (0.341)
North Caucasus	-0.325(0.237)	-0.330(0.307)	-0.326(0.375)
Ural	-0.049 (0.222)	0.001 (0.285)	-0.159 (0.351)
West Siberia	-0.096(0.252)	-0.121(0.324)	-0.110(0.395)
East Siberia	0.236(0.251)	0.261(0.327)	0.145(0.386)
Time trend	-0.103(0.017)***	-0.120(0.022)***	-0.077(0.026)***

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Figure 1 BMI by gender in Russia, 1994-2005

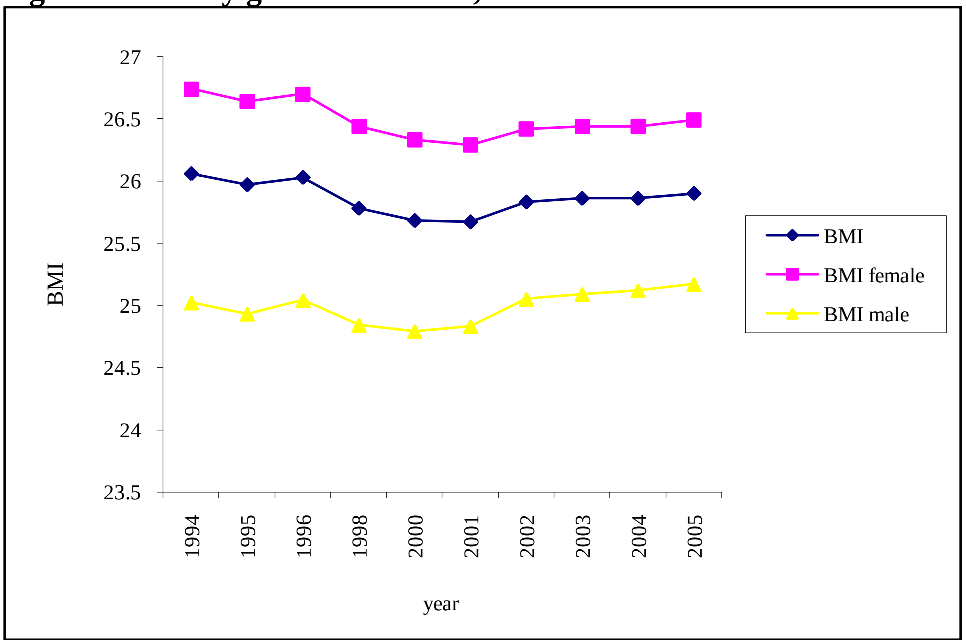


Figure 2 Obesity share by gender in Russia, 1994-2005

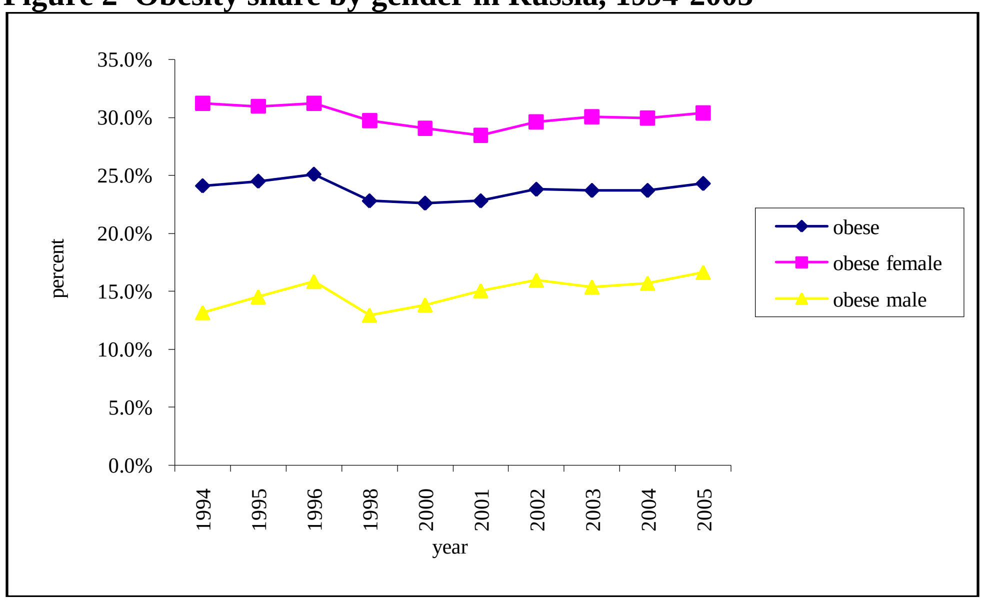


Figure 3 Hourly wage by obesity status in Russia by obesity, 1994-2005

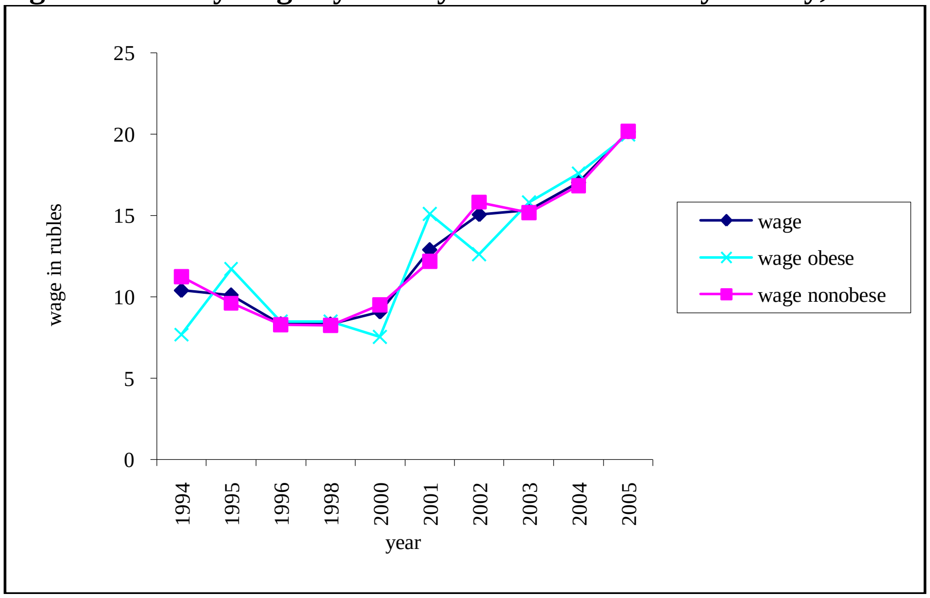


Figure 4 Hourly wages in Russia by gender and obesity, 1994-2005

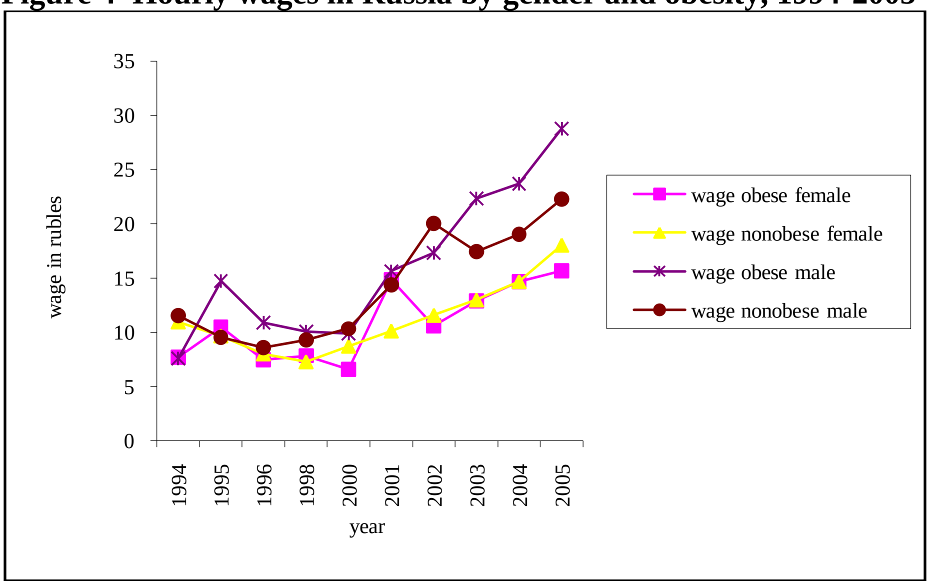


Figure 5 Employment by gender and obesity in Russia, 1994-2005

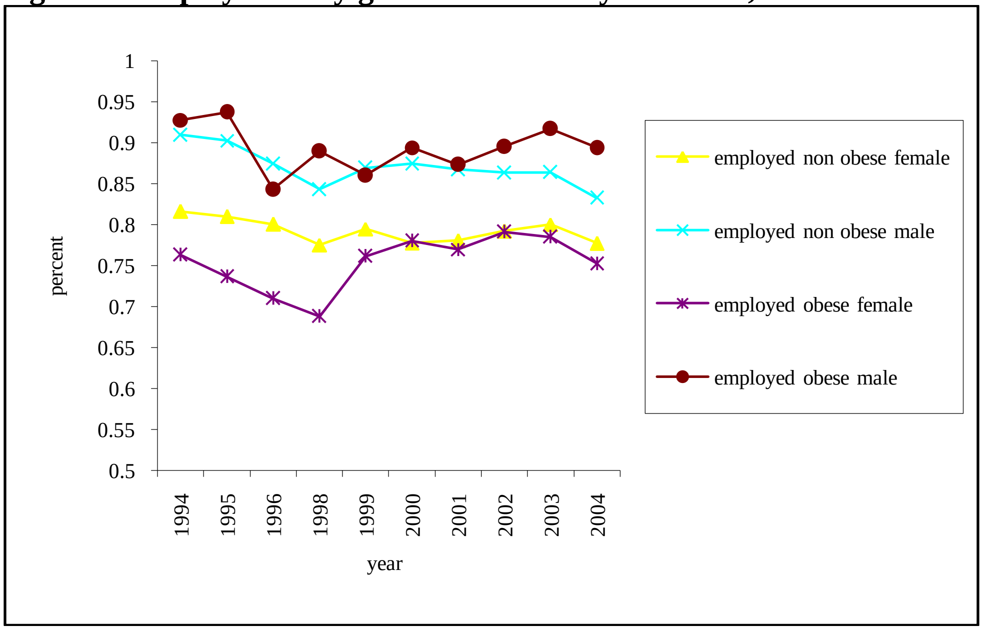


Figure 6 Monthly work hours by gender and obesity in Russia, 1994-2005

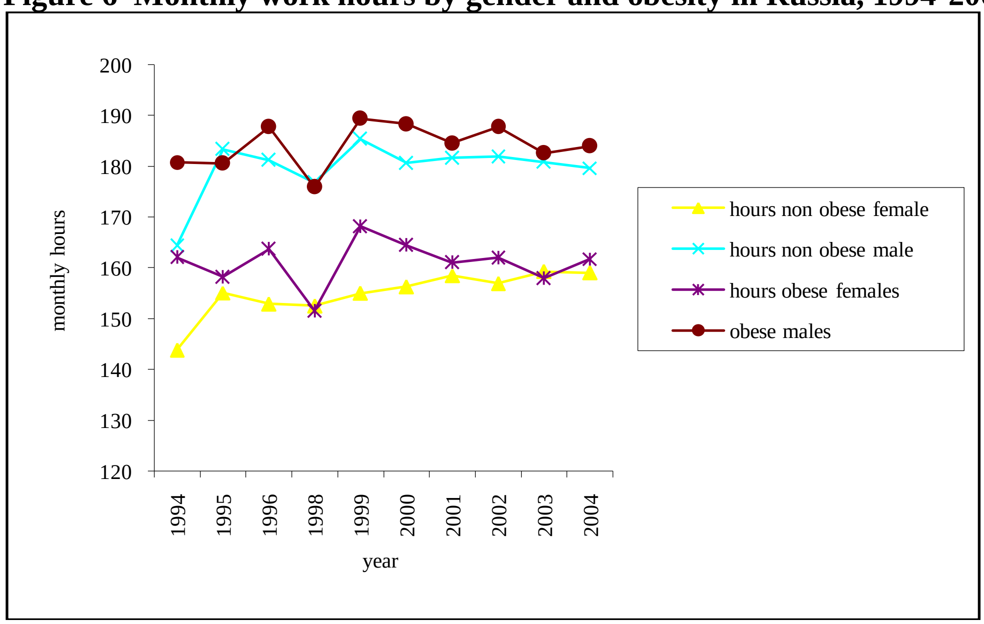
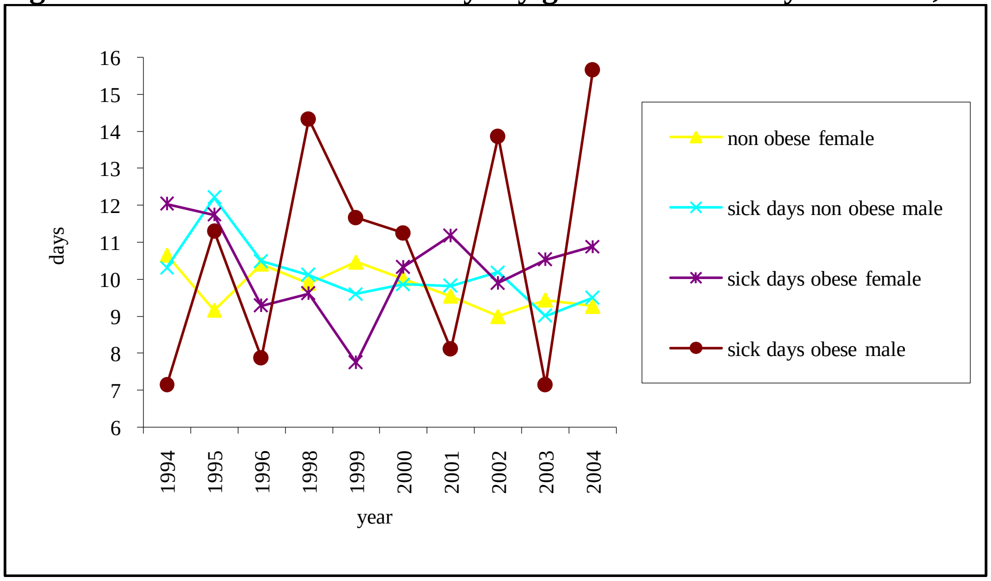


Figure 7 Number of sick-leave days by gender and obesity in Russia, 1994-2005



Appendix: Estimation results with current BMI

Table A1a Random effects Probit estimates of the probability of employment equation

Variable	**Dependent variable: LFP; Coefficient (SE)**		
	All	**Women**	**Men**
BMI	0.091 (0.028)***	0.070 (0.033) **	0.130 (0.055)**
BMI_sq	-0.002(0.0005)***	-0.001 (0.0006)**	-0.002 (0.001)**
Gender	0.608(0.047) ***	-	-
Age	0.414 (0.011) ***	0.469 (0.014)***	0.293 (0.017)***
Age_sq	-0.006 (0.0001) ***	-0.006 (0.0002)***	-0.004 (0.0002)***
University education	0.859 (0.064) ***	1.031 (0.083) ***	0.555 (0.099)***
High education	0.104 (0.041) ***	0.146 (0.054)**	0.032 (0.061)
Married	0.151 (0.040) ***	-0.170 (0.049) ***	0.837 (0.076)***
ln(Household size)	-0.412 (0.058)***	-0.393 (0.072)***	-0.356 (0.094)***
Children 6	-0.042 (0.128)	-0.501 (0.156) ***	0.301(0.239)
Children18	0.048(0.100)	-0.177(0.128)	-0.069(0.165)
ln(Non-labour income)	-0.059(0.005) ***	-0.054(0.006)***	-0.072(0.008)***
Unemployment rate	-3.063(0.338) ***	-2.325(0.431)***	-4.241(0.536)***
North and Northwest	0.320(0.129) **	0.251(0.165)	0.421(0.196)**
Central	-0.048(0.097)	-0.095(0.124)	0.042(0.148)
Volga	-0.167(0.096)*	-0.144(0.123)	-0.186(0.145)
North Caucasus	-0.490(0.102)***	-0.528(0.131)***	-0.336(0.156)**
Ural	0.136(0.100)	0.055(0.128)	0.233(0.153)
West Siberia	-0.263(0.114) **	-0.352(0.147) **	-0.127(0.170)
East Siberia	0.163(0.112)	-0.067(0.143)	0.521(0.171)***
Time trend	-0.034(0.005)***	-0.030(0.006)***	-0.040(0.008)***
Constant	-5.651(0.412)***	-6.068(0.501)***	-4.003(0.771)***
Log likelihood	-11962	-7529	-4307
Number of observations	36917	21236	15681

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table A1b Marginal effects for the probability of employment equation

Variable	Dependent variable: LFP; Marginal effect (SE)		
	All	**Women**	**Men**
BMI	0.001 (0.001)*	0.001 (0.001)	0.002 (0.001) **
Gender	0.055 (0.004)***	-	-
Age	-0.001 (0.0002)***	-0.003 (0.0004)***	-0.001 (0.0003)***
University education	0.053 (0.004)***	0.095 (0.007)***	0.021 (0.003)***
High education	0.010 (0.004)**	0.021 (0.008)**	0.002 (0.003)
Married	0.015 (0.004)***	-0.023 (0.006)***	0.076 (0.011)***
ln(Household size)	-0.039 (0.006)***	-0.055 (0.011)***	-0.020 (0.005)***
Children 6	-0.004 (0.012)	-0.070 (0.022)***	0.017 (0.013)
Children18	0.005 (0.009)	-0.025(0.018)	-0.004(0.009)
ln(Non-labour income)	-0.006 (0.001)***	-0.008(0.001)***	-0.004(0.001) ***
Unemployment rate	-0.289 (0.035)***	-0.326(0.063)***	-0.233(0.036)***
North and Northwest	0.024 (0.007)***	0.030(0.016)*	0.016(0.005)***
Central	-0.005 (0.010)	-0.014(0.019)	0.002(0.008)
Volga	-0.017 (0.011)	-0.021(0.019)	-0.011 (0.010)
North Caucasus	-0.061 (0.016)***	-0.096(0.030)***	-0.023(0.013)*
Ural	0.012 (0.008)	0.007 (0.017)	0.011 (0.006)*
West Siberia	-0.030 (0.015)**	-0.061(0.031)**	-0.008 (0.012)
East Siberia	0.014 (0.008)*	-0.010(0.022)	0.019 (0.004)***
Time trend	-0.003 (0.0005)***	-0.004(0.001)***	-0.002 (0.0004)***

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table A2 Random effect GLS estimates of the wage equation

Variable	Dependent variable: ln*w*; Coefficient (SE)		
	All	**Women**	**Men**
BMI	0.027 (0.017) *	-0.0004 (0.020)	0.062 (0.034) *
BMI_sq	-0.0004 (0.0003)	0.00003 (0.0003)	-0.001 (0.001)
Gender	0.255 (0.025) ***	-	-
Age	0.026 (0.007)***	0.033(0.009)***	0.016(0.010)
Age_sq	-0.0004 (0.0001)***	-0.0004 (0.0001)***	-0.0003 (0.0001)**
University education	0.253 (0.035)***	0.260 (0.046)***	0.257(0.056)***
High education	0.015 (0.024)	0.031(0.032)	-0.008(0.035)
Manager	0.106(0.026) ***	0.166(0.031) ***	0.012(0.048)
Foreign firm	0.353(0.043) ***	0.352(0.066) ***	0.346(0.056)***
Private firm	0.158 (0.019) ***	0.164 (0.025)***	0.157 (0.028)***
Unemployment rate	-0.422(0.280)	-0.922(0.344)**	0.111(0.477)
North and Northwest	-0.107(0.065)*	-0.176(0.082)**	-0.025(0.105)
Central	-0.450(0.044) ***	-0.470(0.056)***	-0.433(0.070)***
Volga	-0.573(0.044) ***	-0.580(0.056) ***	-0.574(0.071) ***
North Caucasus	-0.530 (0.051)***	-0.535 (0.063)***	-0.531(0.081)***
Ural	-0.412 (0.046)***	-0.419(0.058)***	-0.404(0.074)***
West Siberia	-0.517 (0.066) ***	-0.555 (0.082)***	-0.470 (0.107) ***
East Siberia	-0.351 (0.057)***	-0.367(0.073)***	-0.332(0.090)***
Time trend	0.035 (0.006) ***	0.048(0.007)***	0.022(0.010)**
Mills ratio	-1.568(0.131) ***	-0.957(0.165)***	-2.143(0.218) ***
Constant	1.491(0.268)***	1.435(0.322)***	1.793(0.510)***
Wald chi2	3271	1564	1785
Number of observations	19777	11046	8731

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table A3a Random effect Tobit estimates of the sick-leave days equation

Variable	Dependent variable: SLD; Coefficient (SE)		
	All	**Women**	**Men**
BMI	-2.041 (0.450)***	-1.127 (0.549)**	-3.767 (0.846)***
BMI_sq	0.035 (0.008)***	0.021 (0.010)**	0.064 (0.016) ***
Gender	-0.310 (0.559)	-	-
Age	-0.224 (0.191)	0.187 (0.258)	-0.805 (0.288) **
Age_sq	0.003 (0.002)	-0.003 (0.003)	0.010 (0.004) **
University education	0.124 (0.815)	0.944 (1.080)	-0.965 (1.282)
High education	-0.220 (0.645)	0.112 (0.904)	-0.643 (0.922)
Married	1.007(0.650)	0.123 (0.790)	3.661 (1.256) ***
ln(Household size)	-5.395 (1.010)***	-5.286 (1.314)***	-5.313 (1.609) ***
Children 6	-0.260 (2.168)	0.430 (2.840)	-2.787 (3.534)
Children18	2.057 (1.657)	0.763 (2.105)	2.243 (2.775)
ln(Non-labour income)	0.137 (0.099)	0.217 (0.120)*	-0.051 (0.176)
Unemployment rate	-18.147 (6.856)**	-13.413 (9.137)	-24.558 (10.394)**
North and Northwest	2.080 (1.510)	1.595 (1.977)	2.446 (2.336)
Central	-0.160 (1.193)	-0.012 (1.529)	-0.516 (1.894)
Volga	-0.954 (1.206)	-1.175 (1.552)	-0.963 (1.908)
North Caucasus	-2.099 (1.378)	-2.766 (1.803)	-1.278 (2.136)
Ural	-0.501 (1.248)	-0.461 (1.608)	-0.806 (1.969)
West Siberia	-0.922 (1.448)	-0.819 (1.881)	-1.311 (2.259)
East Siberia	0.465 (1.375)	0.963 (1.801)	-0.414 (2.129)
Time trend	-0.642 (0.087)***	-0.686 (0.113)***	-0.565 (0.135)***
Constant	15.610 (6.882)**	-4.097 (8.593)	48.365 (12.335)***
Log likelihood	-14882	-8446	-6422
Number of observations	30206	16577	13629

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table A3b Marginal effects for the sick-leave days equation

Variable	Dependent variable: SLD; Marginal effect (SE)		
	All	**Women**	**Men**
BMI	-0.015 (0.005)***	-0.001 (0.006)	-0.038 (0.008) ***
Gender	-0.047 (0.085)	-	-
Age	-0.001 (0.002)	-0.002 (0.003)	-0.004 (0.003)
University education	0.019 (0.124)	0.146 (0.168)	-0.143 (0.188)
High education	-0.034 (0.098)	0.017 (0.139)	-0.096 (0.138)
Married	0.152 (0.098)	0.019 (0.121)	0.531 (0.177)***
ln(Household size)	-0.820 (0.153)***	-0.813 (0.202)***	-0.793 (0.240)***
Children 6	-0.039 (0.330)	0.066 (0.437)	0.416 (0.528)
Children18	0.313(0.252)	0.117(0.324)	0.335(0.414)
ln(Non-labour income)	0.021(0.015)	0.033(0.018)*	-0.008(0.026)
Unemployment rate	-2.759(1.042)**	-2.064(1.405)	-3.667(1.550)**
North and Northwest	0.324(0.241)	0.250(0.314)	0.375(0.368)
Central	-0.024(0.181)	-0.002(0.235)	-0.077(0.280)
Volga	-0.144(0.181)	-0.179(0.236)	-0.143 (0.281)
North Caucasus	-0.313(0.202)	-0.415(0.265)	-0.187(0.312)
Ural	-0.076 (0.188)	-0.071 (0.246)	-0.120 (0.290)
West Siberia	-0.139(0.216)	-0.125(0.285)	-0.193(0.328)
East Siberia	0.071(0.211)	0.150(0.282)	-0.062(0.315)
Time trend	-0.098(0.013)***	-0.106(0.017)***	-0.084(0.020)***

* Significant at 10%, ** Significant at 5%;*** Significant at 1%