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IMPACT OF MINIMUM WAGE ON INCOME DISTRIBUTION AND POVERTY IN RUSSIA

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Impact of minimum wage on income distribution and poverty in Russia

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Abstract

To the best of our knowledge, the influence of the minimum wage on poverty in Russia has never before been investigated. Russian data provide a unique opportunity for studying the poverty effects related to the minimum wage due to the significant increases of the minimum wage in recent years, almost complete coverage, and a high representation of full-time workers in poor households. This paper examines the effect of the minimum wage in Russia on the incidence of poverty and transitions into and out of poverty using data from the Russia Longitudinal Monitoring Survey of Higher School of Economics (RLMS-HSE) for the years 2006 to 2011. The results indicate slight poverty-reducing effects of the minimum wage in Russia.

JEL Codes: J31, J38

Keywords: minimum wage, poverty, Russia

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NON-TECHNICAL SUMMARY

The minimum wage is among the popular tools of anti-poverty policies. However, an increase in the minimum wage could have negative welfare effects because it could reduce employment and raise unemployment. As unemployed individuals, as a rule, make up the largest portion of the population that is defined as poor, the effect of minimum wage could be poverty-increasing.

Empirical studies of minimum wage effect on poverty in other countries show contradictory results. Several studies have found significant poverty-increasing effects, while other studies have found significant poverty-decreasing effects and some studies do not find any effects at all.

This paper, to my knowledge, is a first attempt to assess minimum wage effect on poverty in Russia. The federal minimum wage in Russia is determined on a monthly basis by the federal act, and it covers all categories of workers with full-time jobs independent of their age, gender, citizenship, or place of work. Until 2007, the federal minimum wage was increased one time per year, and these increases were relatively modest. There was a large increase, however, in September 2007, when the minimum wage nearly doubled, increasing from 1,100 to 2,300 roubles in nominal terms. The next increase, in January 2009, was also significant when the nominal minimum wage increased to 4,330 roubles. In real terms the federal minimum wage from December 2006 to December 2009 grew by a factor of 2.85.

Since September 1, 2007 regions were permitted to use a new mechanism to form their own standards. According to the amendments, the regional minimum wage could be determined through the special tripartite regional minimum wage agreement between regional trade unions, regional associations of employers, and regional state officials. The regional standard could not be lower than the federal standard.

For the purposes of this study, the author has collected the database for all regional minimum wages from 2007 to 2011. To obtain these data, the author retrieved information from regional law

databases and websites of regional offices of the State Labor Inspection, regional governments, and regional trade unions.

This paper uses the data of the longitudinal household survey Russia Longitudinal Monitoring Survey of Higher School of Economics (RLMS-HSE). The panel character of the survey makes it possible to assess transition effects from poor to non-poor and vice versa. The study exploits two major increases in the federal minimum wage and numerous substantial increases in regional minimum wages.

The study uses three different indicators of welfare to determine poor households: income, consumption, and total household expenditures. The poor are determined by calculating the per capita welfare indicator for each household in the sample and comparing it with the poverty line. All persons from households with the value of an indicator less than the poverty line are considered to be poor. The poverty line is the official poverty line determined at the regional level in the 4th quarter.

The main finding suggests that minimum wage increases result in only slight reductions of income poverty. This result is robust to the different adjustments to the economy of scale.

1. Introduction

The minimum wage is considered by many politicians to be an effective anti-poverty tool (Sabia and Burkhauser, 2010). From a theoretical view, the minimum wage's efficiency is not obvious as it can result in not only increasing the incomes of low-wage workers but also in reducing employment. In total, these opposite effects can either decrease or increase the level of poverty.

Empirical studies of minimum wage effect on poverty show contradictory results. On the one hand, several studies have found no beneficial effects or even *poverty-increasing* effects of minimum wage in the United States (Burkhauser and Sabia, 2007; Neumark and Wascher, 2002; Sabia, 2008; Sabia and Burkhauser, 2010), New Zealand (Maloney and Pacheco, 2011), Brazil (Neumark et al., 2006). On the other hand, other studies have found significant *poverty-decreasing* effects in the United States (Card and Krueger, 1995), Honduras (Gindling and Terrell, 2010), Nicaragua (Alaniz, Gindling, and Terrell, 2011). The differences in the empirical results could be attributed to different causes. For example, in the United States and other developed countries low-paid workers rarely represent poor families (Neumark and Wascher, 2008). Furthermore, investigations of poverty effects in developing countries must address various data problems. For example, Neumark and Wascher (2008, p. 180) note that evidence of poverty-reducing effects in the Honduras may be biased because the sample represents only working individuals.

This paper, to my knowledge, is a first attempt to assess minimum wage effect on poverty in Russia. The case of Russia is of special interest for several reasons. First, in recent years the minimum wage in Russia has been significantly increased, thus affecting a large portion of the population. The federal minimum wage was increased by 109 percent in September 2007 and by an additional 88 percent in January 2009. In real terms the federal minimum wage from December 2006 to December 2009 grew by a factor of 2.85.[2] Second, the minimum wage covers workers of

[2] Calculated by author using Rosstat (the official Russian statistical agency) data on the consumer price index.

all ages and occupations from all industries. Therefore, changes in the minimum wage influence almost all low-paid workers. Third, before the huge minimum wage increases, there were a significant number of workers among the poor citizens of Russia. Most studies regarding the effects of minimum wage on poverty in developed countries address the fact that low-wage workers rarely represent poor families (Neumark and Wascher, 2008, p. 145). Russian data give an excellent opportunity to assess more clearly the poverty effects of the minimum wage.

The longitudinal household survey Russia Longitudinal Monitoring Survey of Higher School of Economics (RLMS-HSE) provides a unique opportunity for studying the poverty effects of the minimum wage as it contains an extensive list of individual and household characteristics. The panel character of the survey makes it possible to assess transition effects from poor to non-poor and vice versa. This paper uses the 2006 to 2011 rounds of the RLMS-HSE and, thus, exploits two major increases in the federal minimum wage and numerous substantial increases in regional minimum wages. The total number of involved individuals in these rounds exceeds 10,000.

The aim of this paper is to assess the impact of minimum wage on poverty in several ways. The paper finds the direction and size of the minimum wage effect on the probability of being poor. The paper also estimates the effect of minimum wage on the transition from poor to non-poor and from non-poor to poor. The poor are determined by calculating the welfare indicator per capita and comparing it with the regional poverty line. Our findings suggest that an increase in the minimum wage in Russia has led to a relatively small reduction of income poverty.

The paper is organized as follows. Section 2 reviews the main results in theoretical and empirical literature and attempts to explain the contradictions in the results. Section 3 presents the distinguishing features of minimum wage setting in Russia. Section 4 provides a description of data and contains descriptive statistics of minimum wage workers in the sample. Section 5 presents the methodology description. Section 6 provides a discussion of endogeneity issues. Section 7 is devoted to a regression analysis of minimum wage impact on poverty incidence and poverty transitions. Section 8 concludes by presenting the main results and directions for future research.

2. Literature review

Economic theory of minimum wage is mainly concentrated on its employment effects. According to classical economic theory an increase in the minimum wage reduces employment and raises unemployment (Brown, 1999, p. 2103). As unemployed individuals, as a rule, make up the largest portion of the population that is defined as poor, the effect of minimum wage could be poverty-increasing. The literature provided various models devoted to relaxing the assumptions and extensions of the classical model, thus suggesting that the interaction between minimum wage and employment is more complicated (see review in Brown, 1999; Neumark and Wascher, 2008).

Less attention in economic theory is devoted to the direct impact of minimum wage on poverty. Fields and Kanbur (2007) provide a theoretical framework for three different poverty effects: rising, falling, and unchanging. They take income sharing within the household into account, and identify four factors that determine poverty effects: the ratio of the minimum wage to the poverty line, the elasticity of the labor demand, the frequency of income-sharing, and the depth of poverty. In a succeeding paper, Fields et al. (2008) investigate yet another factor – the composition of households – and conclude that the following factors determine the direction of the poverty change: wage differentiation, employment in high-wage and low-wage jobs and the elasticity of labor demand with respect to the minimum wage.

Until recently, there have been few empirical studies on the effects of minimum wage on poverty. However, the literature in this area is now growing rapidly. The first empirical studies were based on US evidence. Only recently have studies on the effects of minimum wage in other countries, mainly Latin America, begun to emerge. These studies present contradictory findings. The following review is structured according to the methodological differences in estimation

strategies.[3] All studies are divided into simulation studies and studies devoted to regression analysis on cross-country, cross-regional (e.g., by state), cross-municipal (e.g., by metropolitan area) and micro (individual and household) levels. The results are presented in Table 1.

Table 1. Empirical studies of minimum wage impact on poverty

Type of analysis	Studies
Simulation studies	The USA (Burkhauser and Finegan, 1989; Mincy, 1990; Bluestone and Ghilarducci, 1996; MaCurdy and McIntyre, 2000; Burkhauser and Sabia, 2007) Canada (Campolieti, Gunderson, and Lee, 2012) The UK (Gosling, 1996; Metcalf, 1999; Sutherland, 2001) Germany (Muller and Steiner, 2008) Australia (Leigh, 2007) New Zealand (Maloney and Pacheco, 2011) Brazil (Ramos and Reis, 1995; Neri et al., 2000) Indonesia (Bird and Manning, 2008) South Africa (Pauw and Leibbrandt, 2012)
Cross-country analysis	22 developing countries (Lustig and McLeod, 1997) 18 Latin American countries (McLeod and Lustig, 2011)
Regional-level analysis	The USA (Card and Krueger, 1995; Addison and Blackburn, 1999; Gunderson and Ziliak, 2004; Wu, Perloff, and Golan, 2006; Burkhauser and Sabia, 2007) Canada (Sen, Rybczynski, and Van De Waal, 2011; Campolieti, Gunderson, and Lee, 2012)
Municipality-level analysis	Brazil (Neumark, Cunningham, and Siga, 2006), Colombia (Arango and Pachon, 2004)
Micro-level analysis	The USA (Neumark and Wascher, 2002; Neumark, Schweitzer, and Wascher, 2005; Sabia, 2008; Sabia and Nielsen, 2013) New Zealand (Maloney and Pacheco, 2011) Brazil (Foguel et al., 2000) Honduras (Gindling and Terrell, 2010) Nicaragua (Alaniz, Gindling, and Terrell, 2011)

Studies with regression of aggregate indicators of poverty on minimum wage are attributed to cross-country, regional-level and municipality-level analyses according to the unit of observation. Cross-country studies are rare due to a lack of data for such studies. Lustig and McLeod (1997) report poverty-decreasing effects of minimum wage using data from 22 developing countries. Contrary to these results, in a subsequent study, McLeod and Lustig (2011) show poverty-increasing effects using data from 18 Latin American countries.

While the regional-level literature is larger, it is mainly represented by US studies. In earlier research, Card and Krueger (1995, p.307) find a modest poverty-reducing effect in the US.

[3] Such an approach is used by Dube et al. (2010) in reviewing studies of minimum wage effects on employment. Dube et al. highlight that methodological differences could explain much of the variation in results and thus divide the literature into local case studies and state-level panel studies. However, I use the original approach and divide the literature by methodology.

Addison and Blackburn (1999) find poverty-decreasing effects for teenagers and junior high school dropouts in the US. Gundersen and Ziliak (2004) provide evidence of a negative impact of the US minimum wage on poverty rate and a statistically insignificant effect on poverty depth as measured by the squared poverty gap. Wu, Perloff, and Golan (2006), using different indicators of income inequality, find, in some cases, insignificant effects and, in some cases, inequality-increasing effects for the US. Burkhauser and Sabia (2007) do not find any significant effect of the US minimum wage on overall poverty rate and poverty rate among single mothers. Sen, Rybczynski, and Van De Waal (2011) find poverty-increasing effects for Canadian provinces, while Campolieti, Gunderson, and Lee (2012) do not find any significant effect of the minimum wage on poverty for Canadian provinces.

There are also a few studies that incorporate municipal-level analysis. Such analysis represents an estimation of minimum wage effects on income distribution. Arango and Pachon (2004) provide mixed evidence of poverty effects in Colombia, including an increase in the gap between the poor and the non-poor. Neumark et al. (2006) find no beneficial effects related to minimum wage in Brazil.

Another significant part of the empirical literature is represented by simulation studies. Such studies simulate the distribution of workers affected by the minimum wage increase across different income groups, and take into account employment effects. Mincy (1990) finds poverty-reducing effects in the US, while MaCurdy and McIntyre (2000) uncover only slight changes in income distribution due to minimum wage increases in the US. Bluestone and Ghilarducci (1996) support an increase of minimum wage in the US but criticize minimum wage for its low target efficiency. Burkhauser and Sabia (2007) do not find any significant decline of poverty rate in the US even assuming no disemployment effects. Using Canadian data Campolieti, Gunderson, and Lee (2012) show that the minimum wage is not an effective tool for the poverty alleviation. Gosling (1996) and Sutherland (2001) reveal only small effects of minimum wage on income distribution in the United Kingdom. Metcalf (1999) show that the main benefits of the minimum

wage introduction will go to middle-income households. Muller and Steiner (2008) simulate possible consequences of the potential introduction of a minimum wage in Germany and conclude that minimum wage is not an effective poverty-reducing tool. Leigh (2007) receives contradictory results for Australia depending on the simulation assumptions. Ramos and Reis (1995) reveal that the effects of an increase in the minimum wage in Brazil are small. While Pauw and Leibbrandt (2012) discover some poverty-reducing effects of minimum wage in South Africa, they conclude that minimum wage is not an effective anti-poverty tool. Using simulation analysis Bird and Manning (2008) show that only a small share of poor households in Indonesia benefits from an increase in the minimum wage, while others are penalized by higher prices. Simulation studies, however, are criticized for the simplicity of their assumptions (Addison and Blackburn, 1999; Neumark and Wascher, 2008). For example, a large part of such studies assumes constant employment effects for workers from different categories or for parts of the family income distribution (Neumark and Wascher, 2008).

The main group of interest in this study is represented by the micro-level studies that employ an econometric technique. Such methodology allows for the direct examination of minimum wage effects using large databases. We describe studies using microdata in more details in Tables A1 and A2 of the Appendix.

Neumark and Wascher (2002) investigate the impact of minimum wage in the US on transitions between different parts of the income distribution using the Current Population Survey (CPS). They use a binary logit model and multinomial logit model (for different income-to-needs categories). The dependent variables in their models are binary variables indicating household transitions into or out of poverty. They also estimate lagged effects and find that minimum wage raises the probability that poor families will move out of poverty but also raises the probability that non-poor families fall into poverty; thus, the overall effect is not poverty-reducing.

In a subsequent paper, Neumark and Wascher (2005) apply a nonparametric difference-in-difference estimator to investigate the impact of the US minimum wage on density at each income-

to-needs ratio. Using the same dataset as in their previous work, Neumark and Wascher find that the minimum wage causes an increase in the proportion of families with income-to-needs between 0.5 and 1.5, thus indicating evidence of poverty-increasing effects of minimum wage.

Sabia (2008) uses a subsample of single mothers from the CPS in the US. Using a linear probability model on pooled data from 1991 to 2004, he does not find any significant impact of the minimum wage on poverty. Some coefficient estimates in his empirical findings are large and negative (for example, for working single mothers who are high school dropouts) but still statistically insignificant at the 10 % level.

Sabia and Nielsen (2013) use the data from the Survey of Income and Program Participation (SIPP) in the US to investigate the impact of minimum wage on the probability that an individual will be poor and the probabilitiy that an individual will transition into or out of poverty. Sabia and Nielsen use different measures of poverty, including poverty lines measured as 100, 125, and 150 % of poverty-thresholds as well as consumption-deprivation measures. They find no significant effects of minimum wage on poverty for the overall population but find some poverty-increasing effects for younger, less-experienced and less-skilled individuals.

Maloney and Pacheco (2011) find only small effects of minimum wage on the income distribution in New Zealand. Devoting their attention to the teenage minimum wage, their variables of interest are the interactions between the logarithm of real age-relevant minimum wage and the age-specific dummy variable. They investigate the impact of minimum wage on the probability of being in a given household income decile using a multinomial logit model. The only statistically significant result is the increasing probability of a minimum wage worker being in decile two.

Gindling and Terrell (2010) and Alaniz et al. (2011) investigate the effects of industry-specific minimum wages in Honduras and Nicaragua, respectively. To capture the minimum wage effects, both papers reduce the sample to currently employed individuals and to individuals who worked before the minimum wage increase. Both papers examine the impact of minimum wage on the probability that the worker's household will be poor. The second paper also examines the

impact of minimum wage on the probability that a worker's household will transition into or out of poverty. Gindling and Terrell (2010) discover modest poverty-reducing effects in the Honduras, while Alaniz et al. (2011) find that raising the minimum wage increases the probability that a poor family will move out of poverty in Nicaragua.

In spite of the high degree of contradiction in the empirical findings the classification by methodology reveals some remarkable patterns. The majority of simulation studies show that a simulated increase in the minimum wage has only a slight effect on poverty. Regional-level studies significantly differ in their estimates of minimum wage effects but they also differ in poverty measures. Cross-country studies are too scarce for general conclusions. The micro-level studies show insignificant or poverty-increasing effects for developed countries (Neumark and Wascher, 2002; Neumark, Schweitzer, and Wascher, 2005; Sabia and Nielsen, 2013 Maloney and Pacheco, 2011) and poverty-reducing effects for developing countries (Gindling and Terrell, 2010; Alaniz et al., 2011). The differences in the results for the Honduras and Nicaragua could be caused by sample reduction in these cases.

There are several studies devoted to the minimum wage effects in Russia that should be mentioned in the context of this study. The impact of minimum wage on poverty in Russia, to the best knowledge of this author, has not been investigated yet. Using the results of the Population Survey on the Problems of Employment, Kobzar (2009) investigates the impact of minimum wage on employment, informal employment and unemployment. Lukiyanova (2011) studies minimum wage effects on wage distribution using data from a survey administered to a large establishment by the Russian Statistical Office (Rosstat) in 2005, 2007, and 2009. The variable of interest in this paper is federal minimum wage corrected by regional price variation. She finds a compression of lower tail wage inequality due to minimum wage increases. Using quarterly region-level data from 2001 to 2010, Muravyev and Oshchepkov (2013) reveal adverse effects of regional minimum wages in Russia. They find that an increase in the regional minimum wage results in an increase in youth unemployment and informal employment.

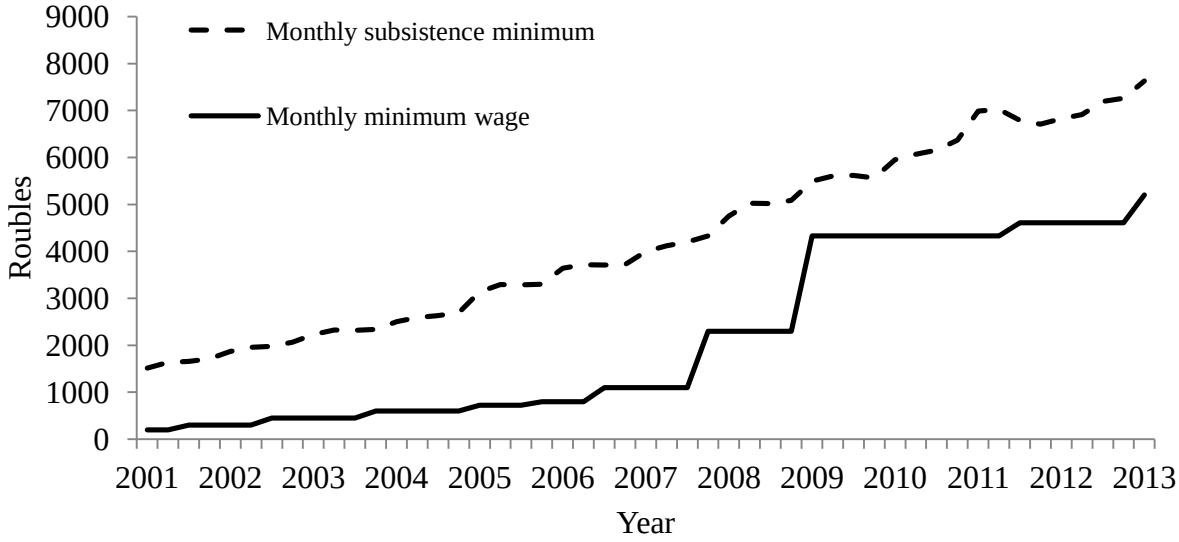
3. Minimum wage setting in Russia

The federal minimum wage in Russia is determined on a monthly basis by the federal act, and it covers all categories of workers with full-time jobs independent of their age, gender, citizenship, or place of work. Remarkable exceptions are regional coefficients ("northern wage multipliers") that were used to increase minimum wages above the federal level in the northern, Ural, Siberian and far eastern regions until 2007. Since 2007, regional coefficients may be included in the statutory minimum wage.

According to the Russian Labor Code (Trudovoi Kodeks) adopted in 2001, the amount of the minimum wage must exceed the subsistence minimum of a working adult. However, since the inception of the Labor Code, the federal minimum wage has always been lower than the subsistence minimum. The dynamics of these two indicators at the national level is presented in Figure 1, which shows the large gap between the minimum wage and the subsistence minimum throughout the whole period. Until 2007, the federal minimum wage was increased one time per year, and these increases were relatively modest. There was a large increase, however, in September 2007, when the minimum wage nearly doubled, increasing from 1,100 to 2,300 roubles in nominal terms. The next increase, in January 2009, was also significant when the nominal minimum wage increased to 4,330 roubles. While these increases reduced the gap between the minimum wage and the subsistence minimum, they did not eliminate it. Further increases were much smaller. For example, in June 2011, the nominal minimum wage was increased to 4,611 roubles, and in January 2013, it increased to 5,205 roubles.

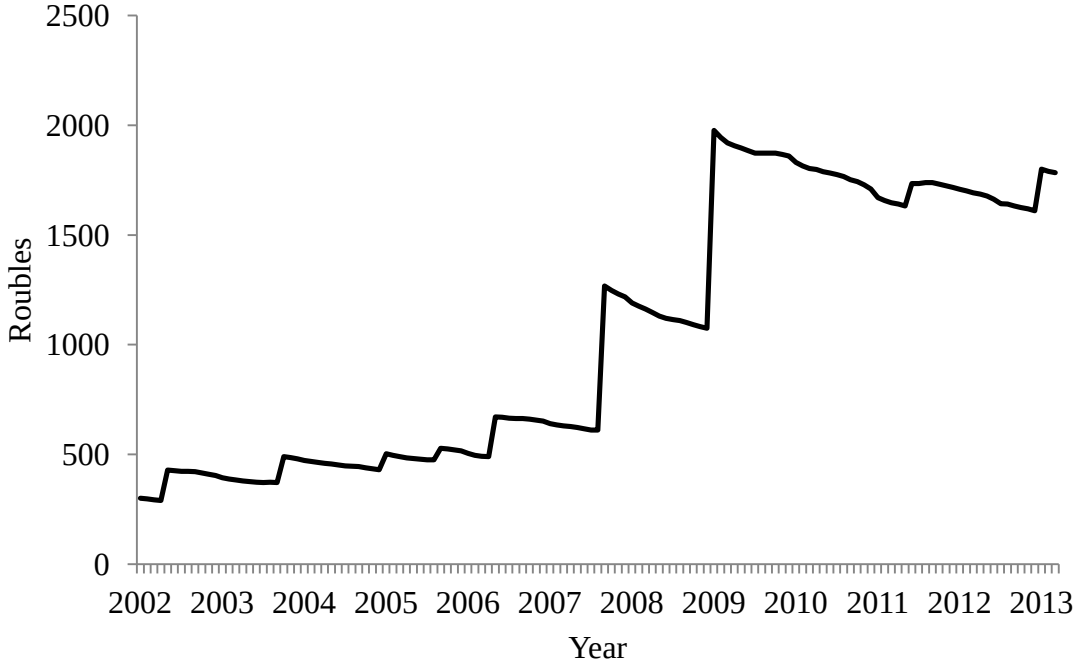
In Figure 2, the federal minimum wage is presented in real terms, deflated to January 2002 prices using data from the monthly consumer price index (CPI). The figure illustrates the increasing trend of the real minimum wage in the 2000s. The maximum value of the real minimum wage was reached in January 2009, after the second major increase.

Figure 1. The monthly federal subsistence minimum of a working adult and the monthly federal minimum wage in Russia



Notes: The national monthly subsistence minimum is determined quarterly by the government of the Russian Federation. All data are in nominal terms.
Source: Created by author, *source of data*: Rosstat.

Figure 2. Real monthly federal minimum wage in Russia



Notes: The federal minimum wage is deflated to January 2002 prices.
Source: Created and calculated by author, *source of data on CPI*: Rosstat.

For a long time, the federal minimum wage had been the sole standard for almost all Russian regions. However, since September 1, 2007, after the Labor Code amendments, regions were permitted to use a new mechanism to form their own standards. According to the amendments, the regional minimum wage could be determined through the special tripartite regional minimum wage agreement between regional trade unions, regional associations of employers, and regional state officials. The regional standard could not be lower than the federal standard. Private firms have the right to refuse to join the agreement up to 30 days after its signing if they send a written refusal and cited valid reasons.

By the time the amendments were incorporated, regional agreements were not a new practice in Russia. Tripartite regional agreements were introduced in Russia in the early 1990s. Linking the minimum wage in the region to the subsistence minimum of a working adult had become common practice in these documents. However, while such agreements covered the broad aspects of labor relations, the minimum wage norm, as a rule, was ignored (Remington, 2011). The 2007 amendments introduced a special type of regional agreement devoted exclusively to the setting of a minimum wage.[4]

For the purposes of this study, the author has collected the databases for all regional minimum wages from 2007 to 2011. To obtain these data, the author retrieved information from regional law databases and websites of regional offices of the State Labor Inspection, regional governments, and regional trade unions. There are two variants regarding the setting of regional minimum wages in Russia. The first variant links minimum wage to the subsistence minimum of a working adult. In this case, the regional minimum wage changes every quarter following the changes in the regional subsistence minimum. The second variant is the setting of a fixed minimum wage in the region. The number of regions with different types of minimum wages is shown in Table 2. The setting of regional agreements regarding fixed minimum wages was popular in 2008 when the number of regions with such agreements grew to 36. The decline in the number

[4] For more information on the regional minimum wages in Russia, see (Remington, 2011; Muravyev and Oshchepkov, 2013)

of such agreements during the next year was caused by the significant increase in the federal minimum wage in January 2009. The new federal minimum wage automatically led to expirations of regional agreements with lesser values of minimum wages.

Table 2. Number of regions with different types of minimum wage

Type of minimum wage	2007	2008	2009	2010	2011
Regional level based on the subsistence minimum	24	21	23	19	16
Regional fixed level	14	36	16	20	28
Federal level	44	25	43	43	38
Total	82	82	82	82	82

Notes: All data are presented in the beginning of the 4th quarter of the corresponding year. The table contains the data for all Russian regions. The only exception is Nenets autonomous okrug, which is covered by the regional agreement of Arkhangelsk Oblast. The number of regions with minimum wages at the federal level includes regions with regional minimum wages equal to the federal level as well as regions without regional minimum wage.
Source: Calculated on data collected by author

Considering all periods, the highest regional minimum wage was observed in Moscow, though high levels of minimum wages were also observed in some northern and eastern regions, such as Khanty-Mansi Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Sakhalin Oblast, and Magadan Oblast. The regional minimum wage is not always the same for all working individuals in the region, and it often differs for private and public sectors. In some cases, regions set a lower minimum wage for some industries, such as agriculture. Minimum wage differs by local districts in several large regions, including Amur Oblast, Irkutsk Oblast, Krasnoyarsk Krai, and the Republic of Karelia.

4. Data

The main source of data is the Russia Longitudinal Monitoring Survey (RLMS-HSE).[5] This is a nationally representative panel household survey conducted every year. The households come

[5] Source: "Russia Longitudinal Monitoring Survey, RLMS-HSE", conducted by HSE and ZAO "Demoscope" together with Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS. (RLMS-HSE sites: http://www.cpc.unc.edu/projects/rlms-hse, http://www.hse.ru/org/hse/rlms)

from 32 different regions and all federal districts in Russia.[6] The RLMS-HSE has two types of samples: a representative sample and a panel sample. This paper uses the panel part of the sample for Rounds 15 through 20 covering the years 2006 to 2011. However, the representative part of the sample is also used for certain descriptive statistics. For the purposes of the analysis, household and individual data are merged into one sample. Over all periods, the number of individuals involved in this survey exceeds 10,000, and the number significantly increases in Rounds 19 and 20.

This study uses three different indicators of welfare to determine poor households: income, consumption, and total household expenditures. Income is the official indicator in Russia for measuring poverty. The official Russian statistical agency Rosstat determines a poor household by comparing monthly household income with the sum corresponding to each household member's minimum value for monthly subsistence. There is no adjusting for economy of scale. A similar approach is used by government agencies for the determination of recipients of social aid.[7] On the other hand, consumption is considered to be a more appropriate measure of poverty than current income because consumption is much closer to permanent income, while income could be underestimated in surveys (Blundell and Preston, 1998; Haughton and Khandker, 2009).[8]

Each indicator is determined monthly. Income per capita is calculated by dividing the total household income from all sources during the last month by the number of household members. Because there is no measure of total expenditures or total consumption in the RLMS-HSE, we summarize food expenditures during the last week multiplied by 4.286 (30/7), expenditures on durable items during the last quarter divided by 3 and monthly expenditures on utilities, fuel, services, and rent. Monthly consumption per capita is calculated by dividing the household consumption by the number of household members. Total expenditures are calculated by adding gifting and transfers to other households to the total consumption. It is worth noting that

[6] The RLMS-HSE is representative at the national level but not at the regional level.
[7] For the alternative measures of poverty in Russia, using the RLMS-HSE data see (Ferrer-i-Carbonell and Van Praag, 2001; Denisova, 2012)
[8] Gorodnichenko et al. (2009) show a substantial underreporting of income in Russia in the RLMS data for 1998-2004.

households could increase expenditures before the minimum wage increment but just after its announcement. However, this is not a case because the study uses annual survey data while legislation usually occurs a few months before the increase. Moreover, Aaronson, Agarwal, and French (2012) show that US households increase spending within one-quarter of a minimum wage increase and not sooner than that.

To identify the poor this study uses an absolute approach. The poor are determined by calculating the per capita welfare indicator for each household in the sample and comparing it with the poverty line. All persons from households with the value of an indicator less than the poverty line are considered to be poor. The poverty line is the official poverty line determined at the regional level in the 4th quarter. This poverty line reflects the monthly subsistence minimum in the region. This minimum is determined quarterly (posteriori after the end of the quarter) by the regional government.

Two different types of equivalence scales are used to account for the economy of scale. The first is the square root equivalence scale, according to which the household income is adjusted by dividing the total household income by the square root of the number of household members. The second is the (1, 0.7, 0.5) equivalence scale. In this case, the number of household members is weighted using the following weights: 1.0 for the first adult, 0.7 for other adults, 0.5 for children.

The variable *Poor* is added for each individual in the sample. It is a binary variable equal to 1 if this individual belongs to a poor household and equal to 0 if the individual belongs to a non-poor household. Let ***k*** denote individual, ***i*** denote household, ***r*** denote region, ***t*** denote year. For individual *k* from household *i* living in region *r* at time *t*, the status of poor is determined as follows:

$$Poor_{kirt} = \begin{cases} 1 \; if \; x_{it} < PL_{rt} \\ 0 \; if \; x_{it} \geq PL_{rt} \end{cases},$$

where *x* is income, consumption, or expenditures per capita, and *PL* is poverty line.

An important issue regarding the validity of the analysis is the compliance of the private sector with minimum wage laws and agreements. The high level of noncompliance indicates that

the minimum wage could have little or no impact on labor outcomes. Hence, it is difficult to consider minimum wage as a factor of poverty. The noncompliance with minimum wage is assessed by the share of full-time workers with wages below the different types of minimum wage using the RLMS-HSE representative sample. The results are presented in Table 3. As the RLMS-HSE provides data on the after-tax wage, for the correctness of analysis the monthly wage of the individual is multiplied by 1/(1–0.13) ≈ 1.149.[9] When comparing with federal standards, the results suggest almost perfect compliance with federal minimum wage but a noncompliance with the federal minimum wage multiplied by the regional coefficient in northern and eastern regions since 2008.[10] The calculated shares for the regional fixed level are usually lower than shares for the subsistence minimum level, thus indicating that regional agreements with a fixed amount of minimum wage are more enforceable than regional agreements with minimum wage based on the subsistence minimum. Overall, noncompliance is very modest, thus indicating strong enforcement of minimum wage agreements.

Table 3. Percentage of workers with a wage below the minimum wage by different minimum levels

Minimum level	2006	2007	2008	2009	2010	2011
Federal level*	0.7	0.0	1.4	3.0	2.2	1.7
Federal level multiplied by regional coefficient**	1.0	0.4	3.0	7.8	5.4	3.9
Regional level based on the subsistence minimum	…	4.2	4.3	5.5	6.1	5.8
Regional fixed level	…	3.5	4.2	6.6	5.3	4.6

Notes: Calculated by author using the weighted RLMS-HSE data (representative sample), only for private sector workers, average working hours per week ≥ 35. To obtain before-tax wage data the after-tax wage is multiplied by 1/(1–0.13) ≈ 1.149.
(*) Except northern and eastern regions; (**) only for northern and eastern regions.

The possibility that minimum wage can reduce poverty largely depends on whether low-wage workers are concentrated in poor households. Thus, it is important to investigate the distribution of low-wage workers across income groups. Low-wage workers are determined as workers with monthly wages between the minimum wage and twice the minimum wage:

[9] Russia has a flat income tax rate of 13 percent.
[10] This noncompliance results from including regional coefficients in the minimum wage since 2007.

$$Minwage_{rt} < Wage_{krt} < 2Minwage_{rt},$$

where k is the subscript for individual, r is the subscript for region, t is the subscript for year. The upper boundary of the interval equals two because the largest increases in minimum wage are close to this value. The workers receiving the wage in this interval are those supposedly most affected by the minimum wage increase.

Table 4. Percentage of low-wage workers by household income category

	2006	2007	2008	2009	2010	2011
Low-wage workers living in poor households	58.9	44.7	40.5	25.4	35.8	31.0
Low-wage workers living in near-poor households	28.8	42.7	43.7	51.3	46.1	50.1
Low-wage workers living in non-poor households	12.3	12.6	15.8	23.3	18.1	18.9

Notes: Calculated by author using the merged RLMS-HSE data (representative sample), both private-sector and public-sector workers, average working hours per week ≥ 35, age of workers between 15 and 72. The near-poor families are non-poor families with per capita income no more than twice the poverty line.

Table 4 indicates that a large segment of low-wage workers live in poor households. In 2006, almost 60 percent of low-wage workers represented poor households. In 2011, the share of poor workers among low-wage workers was to 31 percent, but the share of near-poor workers was nearly half of all low-wage workers. These values are lower than those for Latin American countries where the share of low-wage workers living in poor households is approximately 60 percent for Nicaragua (Alaniz, Gindling, and Terrell, 2011) and 70 percent for the Honduras (Gindling and Terrell, 2010) and Colombia (Arango and Pachon, 2004). However, this is noticeably higher than in many developed countries[11]. Moreover, many low-wage workers live in near-poor households. This category is vulnerable to poverty, thus the minimum wage changes in Russia, unlike in the United States, can potentially affect the large number of poor households.

[11] Sabia and Nielsen (2013) report for the US that only 13 percent of minimum wage workers live in poor families in 2005.

5. Methodology

The first model is devoted to assessing the impact of minimum wages on the poverty rate. A similar model was used by Gindling and Terrell (2010) and Alaniz et al (2011). However, the distinguishing feature in this study is that it includes all individuals in the sample, while other papers concentrate only on currently or previously employed individuals.[12] The effect of minimum wage is estimated by a pooled probit model based on panel data:

$$Poor_{kirt} = 1[\alpha_0 + X_{kt}\beta + H_{it}\theta + \gamma lnMinwage_{rt} + \varepsilon_{kirt} \geq 0] \quad (1)$$

where k indexes individuals, i households, r regions, and t years, α_0, β, θ, and γ are regression parameters, X_{kt} is a vector of individual control variables, H_{it} is a vector of household control variables, ε_{kirt} is an error term. The variable of interest is *lnMinwage*, the natural log of the real monthly minimum wage in region r at year t. The coefficient γ is an estimate of the effect of an increase in the monthly minimum wage on the probability of individual k to become poor. Control variables include the following: adjusted years of education; age; age squared; number of children in household; number of adults in household; logarithm of social transfers (to control for the possibility of poverty reduction due to pro-poor policy); logarithm of other household income (to control for the possibility of poverty reduction due to favored economic circumstances); dummy variables for gender, urban/rural location, region, and marital status. To obtain robust statistical inference standard errors clustered by household are used.

The minimum wage variable is determined as follows. For 2006, the minimum wage for the northern and eastern regions is equal to the federal minimum wage multiplied by the regional coefficient, while for other regions, it is equal to the federal minimum wage. Since 2007, the fixed amount of the minimum wage in current regional agreements is used for regions with such agreements, and the federal minimum wage is used for other regions. As described herein, the

[12] As Neumark and Wascher (2008) note, such an approach ignores minimum wage effect on job opportunities for those who enter the labor force. Neumark and Wascher also criticize usage of cross-industry variation in minimum wages to study its poverty effects.

regional minimum wage in Russia may differ by sector, industry, and local district. For such regions, the weighted-average level of the regional minimum wage is used. To obtain the real minimum wage value the nominal minimum wage is divided by the regional CPI.

I also use a panel probit model with random effects:

$$Poor_{kirt} = 1[\alpha_0 + X_{kt}\beta + H_{it}\theta + \gamma lnMinwage_{rt} + c_k + u_{kirt} \geq 0] \quad (2)$$

Another approach takes advantage of panel characteristics of the data and estimates probabilities of transition across different parts of income distribution. Every year, a significant number of Russian households moves from being poor to being non-poor and vice versa.[13] Large inflows and outflows to and from poverty in Russia provide an opportunity to use an alternative approach to the minimum wage effect estimation. The methodology of assessing minimum wage effects on poverty transition was originated by Neumark and Wascher (2002). In this article, the estimation procedure is closer to Alaniz et al. (2011) and involves two separate models. The dependent variable in model (3) is a binary variable indicating whether a non-poor individual change his status to poor or not, and the dependent variable in model (4) is a binary variable indicating whether a poor individual change his status to non-poor or not.

Model (3) is:

$$InPov_{kirt} = 1[\alpha_0 + X_{kt}\beta + H_{it}\theta + \gamma lnMinwage_{rt} + \varepsilon_{kirt} \geq 0] \quad (3)$$

where $InPov_{kirt}$ equals 1 if the household *i* of individual *k* was **non-poor** in year *t* and became **poor** in year *t+1*, and equals 0 if the household *i* of individual *k* was **non-poor** in year *t* and remained **non-poor** in year *t+1*:

$$InPov_{kirt} = \begin{cases} 1 \; if \; Poor_{kirt} = 0, Poor_{kirt+1} = 1, \\ 0 \; if \; Poor_{kirt} = 0, Poor_{kirt+1} = 0, \end{cases}$$

Model (4) is:

$$OutPov_{kirt} = 1[\alpha_0 + X_{kt}\beta + H_{it}\theta + \gamma lnMinwage_{rt} + \varepsilon_{kirt} \geq 0] \quad (4)$$

[13] High income mobility in Russia is documented in several studies (Bogomolova and Tapilina, 1999; Denisova, 2007; Lokshin and Popkin, 1999; Lokshin and Ravallion, 2000; Lukiyanova and Oshchepkov, 2012). In recent years, some moderation of income mobility is observed (Gorodnichenko et al., 2010).

where $OutPov_{kirt}$ equals 1 if the household *i* of individual *k* was **poor** in year *t* and became **non-poor** in year *t+1*, and equals 0 if the household *i* of individual *k* was **poor** in year *t* and remained **poor** in year *t+1*:

$$OutPov_{kirt} = \begin{cases} 1 \; if \; Poor_{kirt} = 1, Poor_{kirt+1} = 0, \\ 0 \; if \; Poor_{kirt} = 1, Poor_{kirt+1} = 1, \end{cases}$$

All control variables in models (3) and (4) are the same as in model (1).

6. Endogeneity issues

Three potential endogeneity issues could arise during the estimation process. Firstly, there could be spurious regression due to the possible adjustment of the regional minimum wage with the price index in some regions. Secondly, regional minimum wage changes could be endogenous to the poverty rate in a region. Thirdly, the models do not take into account the intraregional migration which could be related to regional minimum wages.

The first problem with the models is the possible adjustment of the regional minimum wage with the price index in some regions. Thus, the presence of individuals from such regions could cause spurious results from econometric estimation. This problem could arise in the case when the regional minimum wage is based on the subsistence minimum. Thus, the entire sample is divided into two subsamples. The subsample (I) includes regions where minimum wage is adjusted to the cost of basic needs. The subsample (II) includes regions where minimum wage is a fixed value. The models are estimated using the subsample (II) although some results from estimating the models on the subsample (I) and the entire sample are also presented.

The same problem of spurious regression could also present for regions with fixed minimum wages if these fixed levels frequently change following the price index. The author carefully investigated regional agreements in regions represented in the RLMS-HSE and found the following regions with fixed minimum wages related to basic needs (the ratio of minimum wage to basic needs is shown in parentheses): Amur Oblast in 2008 (1.0), Kurgan Oblast in 2011 (0.9).

Therefore, the sample is reduced to exclude individuals from regions in years when such an adjustment is observed.

Secondly, minimum wage changes could be endogenous to the poverty rate. The potential endogeneity will lead to biased estimates of the parameters of interest. As noted by Neumark and Wascher (2008), the problem of the endogeneity is underinvestigated in the minimum wage literature and most studies in this area ignore the possibility of the endogeneity. We check the presence of endogeneity using region-level econometric analysis of minimum wage determinants. The fixed value of the minimum wage is regressed on the official poverty rate controlling for demographic, climatic, economic, and political factors. The results do not allow to reject the null hypothesis of no effect of the official poverty rate on the regional minimum wage. However, the possible endogeneity of regional minimum wage changes to the poverty rate in a region needs the further investigation in future research.

The third problem is aroused by the fact that the RLMS-HSE does not track individuals and households when they change the region of residence. If the decision of interregional migration is related to the regional minimum wage changes than the results of the estimation could be biased. In their study of the longer-run minimum wage effects on employment and earnings in the USA, Neumark and Nizalova (2004) reveal some endogeneity between minimum wage and migration choices. The lack of the interregional migration data in the RLMS-HSE does not allow to apply the similar approach. We regress the binary variable of non-participation in future RLMS-HSE rounds on the dummy variable of being the low-wage worker. The latter variable is used to determine the individuals which are more likely to be influenced by the minimum wage differences. The results of the estimation show the positive and statistically significant effect of the status of the low-wage worker on the future non-participation. However, the non-participation could be related not only to migration but also to the refusal of the participation, or to other reasons.

7. Results

The results of the estimation of models (1), (2), (3) and (4) are reported in table 5. The table presents marginal effects and standard errors for the minimum wage variable. Three measures of welfare are used. All results are obtained from separate estimations of panel probit model with random effects and pooled probit model. All estimates are obtained from models with a full set of control variables except regional dummies.

Table 5. Impact of an increase in the minimum wage on different poverty outcomes by type of model

Dependent variables	Indicator for measuring poverty					
	income		consumption		expenditures	
	random effects (2)	pooled model (3)	random effects (4)	pooled model (5)	random effects (6)	pooled model (7)
Probability of being poor	-0.108*** (0.006)	-0.118*** (0.010)	0.049*** (0.010)	0.021* (0.012)	0.043*** (0.010)	0.017 (0.012)
Probability of transition into poverty	-0.033*** (0.005)	-0.043*** (0.009)	0.050*** (0.011)	0.031** (0.014)	0.046*** (0.011)	0.030** (0.014)
Probability of transition out of poverty	0.042** (0.019)	0.011 (0.024)	-0.105*** (0.014)	-0.093*** (0.018)	-0.094*** (0.014)	-0.087*** (0.018)

Notes: Each cell presents marginal effects of the minimum wage increase. Standard errors of marginal effects are in parentheses. Standard errors for pooled models are corrected for clustering on the household level. All models include a full set of control variables except regional dummies. No equivalence scale is used. All results are obtained by running regressions on a subsample of regions (II) where minimum wage is not based on the basic needs minimum.
(***) Significant at the 1 percent level; (**) significant at the 5 percent level; (*) significant at the 10 percent level.

The findings show the moderate income poverty-decreasing effects of minimum wage, which are statistically significant ($p < 0.01$). The results indicate that a 10% minimum wage increase will lead only to an approximately 1.1% decrease in the probability of living in income poverty. On the other hand, the models estimated on the basis of consumption welfare indicators show slight poverty-increasing effects. In these cases, the results indicate a decrease in the transition probability that an individual will transition out of poverty and an increase in the transition probability that an individual will transition into poverty as well as an increase in the probability that an individual will live in poverty.

The results obtained from models with random effects are reasonably close to the results from pooled models. Some differences are observed for the estimates of the contribution of different transition probabilities on overall income poverty. The results from the pooled models indicate that the income poverty-decreasing effects are mainly due to the decreasing transition probability that a non-poor individual will transition into income poverty. In this case the minimum wage has a statistically insignificant effect on the transition probability that a poor individual will transition from income poverty. In contrast, the results of running the random effects models show that both a decrease in the transition probability into poverty and an increase in the transition probability out of poverty account for income poverty-decreasing effects. However, in total, the random effects probit models and pooled probit models present the similar estimates of the effect of minimum wage on income poverty. Thus, the subsequent tables present the results only for pooled probit models.

Columns (3), (5), (7) of Table 6 present the pooled probit estimation results of models (1), (3), and (4) when regional dummies are added to control for region-specific effects. The inclusion of the regional dummies does not greatly change the results though the magnitude of the effects of the minimum wage on poverty measured by consumption and expenditure becomes larger.

Table 6. Impact of an increase in the minimum wage on different poverty outcomes by the presence of the regional dummies

	Indicator for measuring poverty					
	income		consumption		expenditures	
	(2)	(3)	(4)	(5)	(6)	(7)
Probability of being poor	-0.118***	-0.126***	0.021*	0.070***	0.017	0.061***
	(0.010)	(0.009)	(0.012)	(0.012)	(0.012)	(0.012)
Probability of transition into poverty	-0.043***	-0.032***	0.031**	0.121***	0.030**	0.105***
	(0.009)	(0.010)	(0.014)	(0.017)	(0.014)	(0.016)
Probability of transition out of poverty	0.011	0.017	-0.093***	-0.148***	-0.087***	-0.134***
	(0.024)	(0.025)	(0.018)	(0.019)	(0.018)	(0.020)
Regional dummies	no	yes	no	yes	no	yes

Notes: Each cell presents marginal effects of the minimum wage increase. Standard errors of marginal effects are in parentheses. All models include a full set of control variables. No equivalence scale is used. All results are obtained by running pooled probit on a subsample of regions (II) where minimum wage is not based on the basic needs minimum. (***) Significant at the 1 percent level; (**) significant at the 5 percent level; (*) significant at the 10 percent level.

Table 7 presents the results for a subsample of regions (I) where minimum wage is adjusted to the cost of basic needs compared to the results for a subsample of regions (II) where minimum wage is a fixed value, and for the combined sample. Running regressions on the combined sample produces inconsistent results as far as the estimates of model (1) contradict with the estimates of models (3) and (4). For example, the results for model (1) indicate that the minimum wage causes the reduction of the poverty measured by consumption however the source of this reduction is not clear because the results for model (3) indicate that the minimum wage increases the probability that an individual will transition into poverty and the results for model (4) indicate that the minimum wage decreases the probability that an individual will transition out of poverty. However, splitting the sample into two subsamples by the type of the minimum wage leads to the consistent results in both cases.

Table 7. Impact of an increase in the minimum wage on different poverty outcomes by subsamples

	Indicator for measuring poverty								
	income			consumption			expenditures		
	subsample I (2)	subsample II (3)	entire sample (4)	subsample I (5)	subsample II (6)	entire sample (7)	subsample I (8)	subsample II (9)	entire sample (10)
Probability of being poor	-0.148***	-0.126***	-0.272***	0.013	0.070***	-0.177***	-0.009	0.061***	-0.178***
	(0.015)	(0.009)	(0.006)	(0.017)	(0.012)	(0.007)	(0.017)	(0.012)	(0.007)
Probability of transition into poverty	-0.030*	-0.032***	-0.021***	0.057**	0.121***	0.078***	0.027	0.105***	0.060***
	(0.017)	(0.010)	(0.013)	(0.026)	(0.017)	(0.022)	(0.024)	(0.016)	(0.021)
Probability of transition out of poverty	0.101***	0.017	-0.081	-0.041	-0.148***	-0.158***	-0.017	-0.134***	-0.148***
	(0.039)	(0.025)	(0.032)	(0.029)	(0.019)	(0.025)	(0.031)	(0.020)	(0.026)

Notes: Each cell presents marginal effects of the minimum wage increase. Standard errors of marginal effects are in parentheses. All models include a full set of control variables and regional dummies. No equivalence scale is used. All results are obtained by running pooled probit.
(***) Significant at the 1 percent level; (**) significant at the 5 percent level; (*) significant at the 10 percent level.

To summarize the findings, minimum wage has no noticeable poverty-decreasing effect on poverty in Russia. However, previous results were obtained without any adjustment for an economy of scale within the households. Table 8 shows the results with different types of equivalence scales.

Table 8. Impact of an increase in the minimum wage on the income poverty outcomes

	No equivalence scale (2)	The square root equivalence scale (3)	The (1, 0.7, 0.5) equivalence scale (4)
Probability of being poor	-0.126*** (0.009)	-0.066*** (0.006)	-0.113*** (0.008)
Probability of transition into poverty	-0.032*** (0.010)	-0.004 (0.006)	-0.012 (0.008)
Probability of transition out of poverty	0.017 (0.025)	0.226*** (0.039)	0.115*** (0.031)

Notes: Each cell presents marginal effects of the minimum wage increase. Standard errors of marginal effects are in parentheses. All models include a full set of control variables. All results are obtained from pooled probit on a subsample of regions (2) where the minimum wage is not based on the basic needs minimum.
(***) Significant at the 1 percent level; (**) significant at the 5 percent level; (*) significant at the 10 percent level.

The evidence of slight income poverty reduction due to a minimum wage increase is robust to different ways of accounting for the economy of scale, including no correction at all. The results in models with two types of equivalence scales are similar to each other compared to those in the model without an equivalence scale. The findings also show that an increase in the minimum wage decreases the transition probability of a non-poor individual into income poverty. However, this effect is statistically significant only if no equivalence scale is used. In the cases of the square root equivalence scale and the (1, 0.7, 0.5) equivalence scale, the findings indicate that an increase in the minimum wage raises the transition probability that a poor individual will transition out of income poverty. These effects are statistically significant. Poverty-reducing effects could be caused by reducing the transition probability of non-poor individuals into poverty, by increasing the transition probability of poor individuals out of poverty, or by both. In the case of no equivalence scale, the findings suggest that a poverty-reducing effect is explained by the decline in the transition probability of non-poor individuals into poverty. On the contrary, after adjusting for the economy of scale, the poverty-reducing effects are mostly attributed to the increase in the transition probability of poor households out of poverty.

The estimation reveals the opposite signs of the effect of minimum wages on poverty when income and consumption are used as measures of poverty. The differences in signs could be

consequences of measurement errors, income-consumption gaps or neglecting of the non-monetary component of the consumption. However, none of the estimates show the large poverty-reducing effects.

8. Conclusions

This paper investigated the effects of minimum wage on poverty in Russia using the RLMS-HSE data for the years 2006 to 2011. During this period, major increases in the minimum wage occurred. The main finding suggests that minimum wage increases result in only slight reductions of income poverty. This result is robust to the different adjustments to the economy of scale.

There is considerable scope for further research in this area. For instance, the lagged effects of minimum wage on poverty deserve special interest. Such effects could be poverty increasing, and in such an event they could diminish or even eliminate contemporaneous poverty-reducing effects. Transitions between different parts of income distribution are also of interest. It is important to know how the minimum wage affects the different social groups, especially the most vulnerable households such as single mothers. It is also important to investigate the channels through which the minimum wage influences the poverty. The decomposition of the minimum wage effects would help to predict the consequences of its future increases.

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Appendix

Table A1. Main findings of micro-level empirical studies

Country, study	Dependent variables	Variable of interest	Model	Data	Effect of minimum wage increase
The USA (Neumark and Wascher, 2002)	Probability of household transition into (1) or out of (2) poverty	State minimum wage divided by the price level for current year and prior year	Logit model, and multinomial logit model (for different income-to-needs categories)	Matched for two years annual data from 1986-1987 to 1994-1995	1) Raising the probability that poor families move out of poverty, 2) Raising the probability that nonpoor families fall into poverty
The USA (Neumark, Schweitzer, and Wascher, 2005)	Density at each income-to-needs ratio	Increase of state minimum wage in current year (contemporaneous effect) and prior year (lagged effect)	Nonparametric difference-in-difference estimator	Matched for two years annual data from 1986-1987 to 1994-1995	1) Little effect on proportion of families with income-to-needs between 0 and 0.5, 2) Increase in proportion of families with income-to-needs between 0.5 and 1.5, 3) Decrease in proportion of families with income-to-needs between 1.5 and
The USA (Sabia, 2008)	Probability of individual to be poor	Logarithm of state minimum wage	Linear probability model*	Pooled annual data from 1991 to 2004	No significant effects on poverty
The USA (Sabia and Nielsen, 2013)	Probability of individual to be poor, probability of individual transition into or out of poverty	Logarithm of state minimum wage	Weighted OLS model	Triannual data from 1996 to 2007	1) No significant effects on poverty 2) Some poverty-increasing effects for younger, less-experienced and less-skilled individuals
New Zealand (Maloney, and Pacheco, 2011)	Probability of being in given household income decile	Interactions between logarithm of real age-relevant minimum wage and age-specific dummy variable	Multinomial logit model	Annual data from 1997 to 2008	1) Raising the probability of minimum wage worker to be in the decile two, 2) Statistically insignificant effects for other deciles
Honduras (Gindling and Terrell, 2010)	Probability of worker to be poor	Logarithm of real size-of-firm-specific industry minimum wage	Probit model on pooled data	Biannual data between 2001 and 2004 (seven surveys from May 2001 to May 2004)	Modest poverty reducing effect
Nicaragua (Alaniz, Gindling, and Terrell, 2011)	Probability of worker's household to be poor; probability of worker's household transition into or out of poverty	Change in logarithm of real industry-specific minimum wage	Probit model on panel data	Annual panel data between 1998 and 2006	1) Decreasing the probability that household is poor if higher minimum wage applies to the household head, 2) Raising the probability that poor families moved out of poverty, 3) No statistically significant effect on the probability that nonpoor

families fall into poverty

* As noted in (Sabia, 2008), the logit and the probit models produce similar results

Table A2. Methodology of micro-level empirical studies

Country, study	Years	Definition of poverty line	Group of interest	Number of periods	Number of observations	Lagged effects (yes/no)
The USA (Neumark and Wascher, 2002)	1986-1995	Total family income less than the poverty line	Families	9	196,269	yes
The USA (Neumark, Schweitzer, and Wascher, 2005)	1986-1995	Income-to-needs approach (ratio of total family income to the poverty line)	Families	9		yes
The USA (Sabia, 2008)	1991-2004	Total family income less than the poverty line	Single female head of households aged 15 – 55 living with own children under 18	14	62,781	no
The USA (Sabia and Nielsen, 2013)	1996-2007	1) Total family income less than the 100, 125, and 150 % of poverty line. 2) Consumption-deprivation measures	Families		3,193,098	yes
Honduras (Gindling and Terrell, 2010)	2001-2004	Per capita earnings less than the cost of the basic basket of food – *extremely poor*. Per capita earnings less than the cost of the basic basket of food, and housing and education services, – *poor*.	Workers and those unemployed who work before	7		no
Nicaragua (Alaniz, Gindling, and Terrell, 2011)	1998-2006	Per capita consumption*	Workers and those unemployed who work before	9	27,000	no

* As noted in (Alaniz, Gindling, and Terrell, 2011), the study uses the FIDEG survey definition of poverty. As clarified in the FIDEG webpage the survey uses per capita consumption less than US$1.88 per day for determination of poor households