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Mazol, Aleh

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Determinants of poverty with and without economic growth. Explaining Belarus's poverty dynamics during 2009-2016.

Aleh Mazol

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Abstract

This paper studies the incidence and determinants of poverty in Belarus using data from yearly Household Budget Surveys for 2009-2016. The poverty is evaluated from consumption perspective applying the cost of basic needs approach and using food and absolute poverty lines. During last two years, absolute poverty in Belarus has increased twofold and reached 29% of the population. Household size, number of children, lonely mothers and labor status of the household members are among the key determinants of household welfare and poverty. Moreover, living in rural areas and in Brest, Gomel and Mogilev regions increases the likelihood of being poor and negatively relates with welfare. Therefore, public policy directed towards the provision of better family planning, education as well as more diverse possibilities for financial investment, labor market reform targeted for productive job creation, increased non-agricultural employment opportunities for rural residents and additional location specific efforts in Brest, Gomel and Mogilev regions should be among the strategies for poverty reduction in Belarus.

Belarusian Economic Research and Outreach Center (BEROC) started its work as joint project of Stockholm Institute of Transition Economics (SITE) and Economics Education and Research Consortium (EERC) in 2008 with financial support from SIDA and USAID. The mission of BEROC is to spread the international academic standards and values through academic and policy research, modern economic education and strengthening of communication and networking with the world academic community.

1. Introduction

Poverty reduction and general wellbeing are public policy goals commonly pursued by the Belarusian government today. Since 2000, Belarus's economic growth not only has noticeably enhanced the average standard of living in Belarus, but also has raised substantial number of Belarusians out of poverty. According to official estimates, the poverty rate in Belarus has decreased from 41.9% of the population in 2000 up to 5.2% in 2010 and currently hovers around 6% (during 2011-2016).[1] This was a remarkable result achieved in a very short period.[2]

However, economic downturns may introduce considerable survival problems for many households. For example, according to the World Bank, in some countries the poverty rate may reach 50% because of an economic crisis (World Bank, 2000a; 2005).[3] In this regard, small increase in the official poverty during periods of economic crises in the country (2009, 2011 and 2015-2016) casts doubt on Belarus's record in poverty reduction.

Moreover, both the construction and the assessment of the anti-poverty policies are dependent on precise appraisal of the actual degree of poverty. Even an estimated error of only a few percentage points would have notable consequences: hundreds of thousands of people in Belarus would be wrongly classified as non-poor, weakening the government's anti-poverty policy.

In this regard, the official methodology to measure poverty[4] (uses the definition of family income – disposable income, that is compared to poverty threshold – national poverty line) suffers from several drawbacks.

First, largest share (over 60%) of calories in the budget of the subsistence minimum (MSB) used to define poverty threshold in Belarus comes from rye bread, cereals, milk, dairy products, eggs and fat that are the cheapest source of calories. Therefore, it would be relatively easy to construct a poverty line that satisfies a minimum caloric requirement and is consistent with comparatively low level of household income, thus achieving low incidence of poverty in Belarus.

Second, the share of cost of non-food items in the MSB should be estimated at the level of total food cost of households around the food poverty line (i.e. low-income families), in comparison with current more austere definition of using total cost. Poverty levels and changes are clearly sensitive to

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[1] Belstat.

[2] The largest reported decline in poverty was in 2001, from 41.9% in 2000 to 28.9% occurred on the background of a relatively modest yearly growth performance (4.7% of GDP).

[3] The main paths for transmission of the adverse effects to the economy were reductions in social spending and government transfers, the impairment of savings affected by hyperinflation and subsequent devaluation of the national currency, and overall corrections to the labor market (World Bank, 2000a; 2005).

[4] Official poverty measurement is based on comparison of per capita disposable income of household with national poverty line, which is the average per capita budget of the subsistence minimum (MSB) of a family of four containing two adults and two children. The MSB is a minimum set of goods and services needed to guarantee the sustainability of the family, preservation of health of its members, as well as compulsory payments and contributions. The MSB of a family of four is based on 42 food items and hundreds of other non-food items categorized under the following categories: clothing and footwear; home amenities; sanitary, hygiene and medical products; housing; and communications and services. The cost of non-food goods and services is defined as a fixed share of 77% of the cost of the food goods. The MSB is calculated on a quarterly basis by the Ministry of Labor and Social Protection of the Republic of Belarus in the prices of the last month of the quarter.

where the poverty line is set (i.e. the higher is the share of non-food goods, the higher is the poverty threshold).

Third, poverty threshold is not adjusted for geographic differences in the cost of living, since the official poverty measurement does not consider regional variations in calorie diet and also does not take into account regional differences in food and non-food prices. Official price index, such as CPI, reflect the increase in cost of living for an average household.

Fourth, using an income measure for assessing poverty is problematic due to a controlled income policy in Belarus including administrative wage increases and subsequent corrections in pensions. Wages and pensions account for approximately three quarters of disposable income of households in Belarus.

Fifth, another odd consequence of applying income aggregate would be to place wrongly younger households above the poverty line. For example, young renters who have above average incomes, but pay a substantial proportion of what they do earn in rent are one such group. Moreover, income is sensitive to volatile shocks and with the possibility of households to smooth their consumption through time using borrowings, savings, and mutual insurance, consumption measures are considered much more reliable and more theoretically sound (Ravallion, 1996; Deaton, 1997).

Finally, the inconsistency in the official poverty measurement in Belarus can be attributed also to constant changes in the national poverty line over time due to normative considerations. For example, before 2014 the cost of non-food items in the MSB was calculated using predefined norms, while after – as a share.

Therefore, the main goal of the research is to determine and measure poverty in Belarus more accurately in order to present improved evidence for public policy intervention. Correspondingly, this paper has several broad objectives. First, to provide a descriptive characterization of poverty in Belarus by undertaking a detailed analysis of the factors influencing welfare and poverty at the household level; and by determining which regions and areas of Belarus have highest levels of poverty. Second, it aims to contribute to the literature of poverty studies. To date, there has been very little analysis of poverty dynamics in Belarus – for example, studies that examine the welfare movements of households over time. Third, this paper is the first study that tries to shed light how financial and economic downturns happened in 2011 and 2015-2016 in Belarus adjusted poverty status of households in Belarus.

The paper uses data from yearly Household Budget Surveys in Belarus for 2009-2016 and applies a poverty measurement methodology based on food and absolute poverty lines skipping issues related to capabilities, social exclusion and participation (Laderchi et al., 2003) and constructing a household welfare aggregate comparable over time and across different regions of Belarus. In particular, the welfare measure is based on household consumption, deflated to take into account differences in purchasing power over time and regions of residence and corrected per person nutrition requirements among households of different size and demographic composition.

Next, in order to identify food and absolute poverty lines in Belarus the cost of basic needs approach is used.[5] This method stipulates a minimum consumer basket (including food and non-food items) adequate for basic consumption needs. In this way, the research adopts the approach of previous studies of poverty dynamics and follow next microeconomic assumptions: first, human behavior follows utility maximization model; second, expenditures display the marginal value people place on goods; and, third, expenditure data can be considered as a proxy for consumption as a welfare measure (Laderchi et al., 2003).

Finally, the paper emphasizes on several common associations of poverty found both for developing and transition countries. For instance, the poverty is typically higher in households with single parent, in households where the number of dependants related to income earners is on average higher, and in large households (Milanovic, 1996; Lokshin & Popkin, 1999). Additionally, other factors that usually define poverty in less developed countries including the evidence of higher poverty for the elderly in the region (Milanovic, 1996; Klugman et al., 2002), the evidence that households with low educated heads or main income earners were most probably to be in poverty (World Bank, 2000a, 2005), the influence of unemployment (World Bank, 2000a, 2005) will also be studied.

The empirical strategy of the research consists of the following steps and methods: (1) setting the food and absolute poverty lines using the cost of basic needs approach; (2) estimating poverty measures based on Foster-Greer-Thorbecke's poverty indices; (3) analyzing the determinants of welfare and poverty using OLS and probit regressions.

The main results of the research are:

- During 2009-2011, poverty at the national level stayed almost unchanged reaching 32.6% of the population. During 2012-2014 there was a substantial decrease in incidence of poverty (by 18 percentage points) caused mostly by the strong growth of household incomes (by 39%). In contrast, economic crisis in 2015-2016 was associated with a twofold increase in incidence, depth and severity of poverty in Belarus.
- The analysis also shows that considerably more poverty exists in the rural areas of Belarus than in urban areas. A poverty incidence for the nation's rural areas over 2009-2016 is approximately 10.5 percentage points (or 44%) higher than the national average, while that of the urban areas is nearly 4 percentage points (or 16%) below national average.
- The results indicate presence of large regional differences in poverty. In particular, a poverty incidence for Grodno region in 2016 is roughly 3% below the national average, that for the Brest and Mogilev regions are 31% and 21% higher than this average, correspondingly.
- Among factors that substantially decrease household welfare and increase poverty at the household level in Belarus are family size, the number of children in a household, presence in

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[5] Unlike the official methodology the cost of basic needs approach meets the following four requirements: (1) conformity with national recommendations for minimum nutritional intakes; (2) tailoring to family size and both gender and age calorie needs; and (3) reflection of market prices with poverty lines adjusted to take into account price differentials into account.

the household of economically inactive members. Moreover, lonely mothers in Belarus appear to be noticeably more vulnerable to macroeconomic shocks than full families both from welfare and poverty perspectives. Additionally, one of the most important determinants of welfare and poverty in all samples is spatial location of household. Poverty highly discriminates against living in rural areas, Brest, Gomel and Mogilev regions.

- Finally, on average, large positive influence on consumption expenditure and negative on the chance of getting poor have savings and access to landplot.

The rest of the paper is structured as follows. Section 2 presents the literature review. Section 3 describes the methodology used in the research and guides the empirical analysis. Section 4 discusses the data used. Section 5 presents and interprets the results of the analysis. Finally, Section 6 concludes and develops some implications for public policy intervention.

2. Literature Review

2.1. Theory

Poverty by itself means the absence of an acceptable minimum level of material welfare. There are four main objectives to measure poverty (Srinivasan, 2001). First, its assessment is necessary to describe the extent of poverty in a particular point of time or geographical location for governmental accountability and monitoring the fulfillment of public programmes. Second, measurement is required to study the determinants of poverty. Third, in order to develop an effective poverty-alleviating strategy in the country the correct identification of the socio-economic characteristics of individuals and households that move in and out of poverty is crucial. Finally, these characteristics play a significant role in the understanding of the influence of economic crises on households, which will help to develop better policies that would protect their welfare (Dollar & Kraay, 2002; Ravallion, 2001; Ravallion, 2005).

Correspondingly, in the last case poverty becomes one of the defining issues for the state, because economic downturns may introduce substantial survival problems for many households. For example, according to the World Bank, in some countries the poverty rate may reach 50% because of an economic crisis (World Bank, 2000a; 2005). Consequently, the investigation of determinants and dynamics of poverty has received additional attention in studies concerning developing economies that constantly suffer from economic and financial shocks (e.g. Bane & Ellwood, 1986; Layte & Whelan, 2003).

The key effects of economic downturns on households contain increase in unemployment, cuts in social spending and public transfers, loss of financial savings because of rising inflation and a sharp devaluation of the national currency due to financial instability that often accompanies or precedes economic crises. As a result, the labor market adjusts to falling demand for labor, caused, first, by the decline in production, and, second, as a consequence of the inefficient use of labor resources in previous years (Adam, 1982). These adjustments to labor market happen through a decline in real wages, a fall in employment and rise in unemployment. Moreover, these changes are accompanied

by the sectoral and occupational reallocation of labor jointly with the additional corrections in the relative level of wages (Jackman, 1998), which subsequently causes drop in households' consumption.

In addition to above direct effects of the economic fluctuations on households, there are also indirect effects originating from the financial instability that by itself generates growth instability. This situation occurs because financial shocks destabilize investments (the level of investment depends on the availability of finance) and, consequently, the rate of economic growth. Moreover, financial instability leads to a volatility of relative prices since the prices of different goods or services are not influenced in the same proportion: prices of tradable goods are determined by foreign prices and the nominal exchange rate, while prices of non-tradable goods are subject to the domestic supply and demand. Both the instability of investment and the real exchange rate lead to growth volatility, which may increase or prolong corrections to welfare of households.

Moreover, due to asymmetry between periods of decreasing and rising of aggregate income, caused by periods of expansion and contraction in the economy, poor households may be more exposed to cyclical fluctuations of economic growth than the rich ones (de Janvry & Sadoulet, 2000). This asymmetry is possibly the result of several factors that can vary from one country to another. From one hand, the less skilled and poorest workers lose their jobs first and when the expansions starts they were unemployed for a longer period. This is so-called the effect of delay, when the former unemployed are the last to be hired. Second, since prices rarely decrease during recessions, they most common increase during expansions. The poor households are supposed to depend more on state determined income (such as pension, state subsidies or direct transfers) than the rich ones, which is only party corrected for inflation (Easterly & Fischer, 2001).

Furthermore, the poverty is mostly concentrated in rural areas. Governments generally do not correct for growth of international prices for exports of agricultural products for the rural households, while they pass the price drop on them due to budget constraints. As a result, since they receive no benefit from the insurance scheme, the decrease in the incomes of poor people can lead them to worry less about their health, the education of their children, which in the long-run harms their human capital and overall human development of the country.

Therefore, the above issues rise questions of how household may cope with economic crises. According to one strand of literature, namely the life-cycle theory, households use wealth accumulation to smooth consumption over their life cycle (Ando & Modigliani, 1963). Subsequently, any unpredicted changes in their wealth, following crisis, may cause households to reconsider their consumption plans (Modigliani, 1971; Aron et al., 2010; Muellbauer, 2010; Carroll, Otsuka & Slacalek, 2011), although in the short-run such shocks do not fully pass to consumption. Households that expect the occurrence of the crisis will tend to smooth consumption and nutrition plans, which contain spending in the form of livestock and other assets (Dercon, 1996), attempt to diversify incomes by exploitation of a landplot (Barrett, Reardon & Webb, 2001; Dercon & Krishnan, 1996).

The second direction of economic studies concentrates on precautionary savings and asset levels investigating the vulnerability of households to economic and financial shocks. In accordance with this theory, risk-averse individuals facing with the uninsurable risks accumulate wealth to protect themselves against shocks (Deaton 1992; Carroll, 1997). However, other empirical studies show that many households possess few or no assets and no savings and that they are very exposed to shocks (Caner & Wolff, 2004). Additionally, it was identified the scarcity of assets among certain population groups (Oliver & Shapiro, 1995; Conley, 1999; Havemann & Wolff, 2004; Bucks, Kennickell & Moore, 2004; Sherraden, 2005).

Furthermore, households' assets may be scarce not due to their inability to accumulate wealth, but due to influence of shocks that decrease their savings (Deaton, 1992). Households may rely on their relatives and friends to deal with unpredicted economic and financial shocks (Briggs, 1998; Sarkasian & Gerstel, 2004; Henley, Danziger & Offer, 2005; Harknett & Knab, 2007). Finally, other activities that households can engage when facing shocks may be the increase in their home production of goods in order to reduce their expenditure (Aguiar & Hurst, 2005). This heterogeneity in behavior of households may indicate differences in their economic circumstances and opportunity (e.g., education), differences in financial capabilities (Lusardi, 2009).

2.2. Empirical research

Past studies in developing countries has shown that households experience poverty caused by economic downturns differently: richer households are poor for shorter periods of time or experience one episode of poverty, while poorer families face with long-lasting poverty or have multiple poverty episodes (Bane & Ellwood, 1986; Gottschalk et al., 1994; Rank & Hirschl, 2001).[6]

Correspondingly, it was found that periods of recessions decrease the income of the poor greater than the periods of economic expansions increase. For example, de Janvry and Sadoulet (2000), studying economic indicators of twelve countries in Latin American countries between 1970 and 1994, have found that economic growth on average has decreased poverty both in urban and rural areas, but the negative effects of the recessions on poverty was found to be stronger than the positive effects of economic growth.

Next, existing research has identified several fundamental factors of poverty in developing countries. For instance, it was considered that the level of poverty is higher among families with many children, incomplete families and families with a higher than average number of dependents relative to the number of people receiving income (Milanovic 1996; Lokshin & Popkin, 1999). However, the evidence of higher poverty risk for the elderly is scarce (Milanovic 1996; Klugman, Micklewright & Redmond, 2002).

Regarding transition countries, the empirical studies defined that households with low educated heads or main income providers were more likely to fall into poverty (World Bank, 2005). Concerning the CIS[7] countries this factor showed less relative influence in the 1990s in comparison

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[6] This effect holds also for developed countries.
[7] **CIS** – The Commonwealth of Independent States.

with the countries from the Central Europe, but its influence has increased since 2000 (World Bank, 2000a; 2005). Finally, Gustafsson and Nivorozhkina (2004) investigated the evolution of poverty and its determinants during transition period, but concentrating only on one city. However, generally the existing studies on the dynamics and determinants of poverty in the CIS countries remain scarce.

The results from studies concerning transition countries that used consumption expenditure and the basic needs concept showed that 24.5% of Lithuanian population in 2010 was below absolute poverty line (Sileika, 2011). In Italy the consumption-based measure of absolute poverty was 9.3% in 2013 (Campiglio, 2017). A similar study for Ukraine showed that 23.2% of its population were consumption poor in 2004 (Bruck et al., 2010); for Russia, Croatia, Hungary, Poland, Latvia, Azerbaijan, Bulgaria and Slovenia – 14.1%, 12.5%, 17.3%, 10.1%, 12.4%, 78.9%, 67.5% and 3.5%, correspondingly, in 2010 (Scare & Druzeta, 2014).

Previous empirical studies of poverty in Belarus mostly comes from several reports accomplished by the World Bank (World Bank, 1996; 2004; Cojocaru & Matytsin, 2017) and by the IPM Research Center (2017).

Cojocaru and Matytsin (2017) using the international poverty lines (IPL)[8] (for example, equaled to PPP[9] 10 US Dollar/day threshold) showed that the poverty incidence in Belarus dropped from 82% in 2003, to less than 10% in 2014, before increasing to 12.3% in 2015 (Cojocaru & Matytsin, 2017). However, the IPL measures for determining national level of poverty unable to reflect local circumstances such as spatial price differences and the consumption patterns of the poor, as well as the country and time-specific composition of households.

Study accomplished by the IPM Research Center showed a static picture based on 2013-2016 yearly household data. According to their estimates, the rate of absolute poverty in Belarus equaled 4.8% of the population in 2013 and gradually reached 6.7% in 2016, which is only by one percentage point higher than the official estimate. However, the IPM Research Center's approach to poverty estimation in Belarus relied mostly on the same official methodology.[10]

3. Methodology

There are two main methods in the poverty literature to explain the concept of household welfare: the monetary and the non-monetary approaches.

The monetary approach to poverty defines welfare in terms of utility (Ravallion, 1994). However, given that utility cannot be directly estimated, financial resources of a household (expenditure or income) are used to estimate welfare. These measurements reflect a narrow vision of welfare

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[8] The IPL is used by the World Bank as a common standard for all countries (Ravallion et al., 2008). The basic idea is to assure that two people who possess the same purchasing power over commodities are classified consistently as either poor or non-poor regardless of whether they live in same or different countries.

[9] **PPP** – Purchasing Power Parity – the common unit of measurement established by the International Comparison Programme (ICP) based on collected prices of comparable goods in countries around the world.

[10] Modifications: (1) corrections to poverty threshold dependent on age structure of the household; and (2) calculation of the poverty level accomplished based on annual averages and not on quarterly (IPM Research Center, 2017).

(Deaton, 2003), because unable to account for non-quantifiable dimension of household wellbeing, for example non-market goods and services (Ravallion, 1996).

The non-monetary approach defines, first, the basic needs concept (Asselin & Dauphin, 2001) and, second, the notion of capability (Sen, 1992). In the first case, poverty is estimated based on the cost of basic needs (or cost of living for particular household) and using predetermined poverty lines (Chen & Ravallion, 2004, 2010). The poor are those households, who are deprived of a basic set of commodities (food, water, health, education, housing, energy etc.), that are essential for obtaining good standards of living (Asselin & Dauphin, 2001). Therefore, the basic needs concept is less abstract than pure monetary approach and combines both monetary and non-monetary variables making it possible to evaluate goods and services directly in terms of human welfare and favors targeted public policy. The capability approach underlines the concept of "functionings" that takes into account various things that every individual in the household may value doing or being, such as being adequately nourished, being healthy, taking part in social life and so on. However, according to Sen (1992) the set of individual capabilities cannot be directly observed and must be determined based on presumption. This subjective approach grounds on a value judgment as to what it means to be poor. It uses data from self-reported assessments of living conditions and determines poverty using an individual perception of own well-being (see World Bank, 2000; Deaton, 2008).

Hence, in order to take into account the non-monetary aspect of household welfare and to get a broader view for policy implementation the basic needs approach is used to analyze and measure poverty in Belarus. This approach estimates poverty using quantifiable dimensions of welfare and based on objective data provided by each person and/or household in a whole (for example, income or expenditure).

In this study, consumption expenditure is used to measure welfare. This choice is motivated by several considerations. First, consumption expenditure shows household's ability to obtain goods and services. Second, the data collected on consumption are more accurate than the income data taking into account that people may have reasons to hide part of their earnings (Ravallion, 2001) and that measured consumption patterns vary less in comparison with estimated income patterns (Deaton, 1997). For example, an increased income only raises household welfare if it is consumed, while past income (savings) or borrowings can also be used for consumption purposes. Third, income is sensitive to volatile shocks and with the possibility of households to smooth their consumption through time using borrowings, savings, and mutual insurance, consumption measures are considered much more reliable and more theoretically sound (Ravallion, 1996; Deaton, 1997). Therefore, consumption expenditure data are supposed to depict household welfare more accurately in comparison with income, because can be viewed as realized welfare, whereas income is more a measure of potential welfare.

In the whole, the empirical strategy to evaluate the incidence of poverty among Belarusian households and its determinants over 2009-2016 involves the following steps and methods: (1)

setting the food and absolute poverty lines; (2) estimating poverty measures; (3) analyzing the determinants of welfare and poverty using OLS and probit regressions.

3.1. Determining the poverty lines

In order to define the poor households in Belarus using the cost of basic needs method two household-specific poverty lines are estimated: the food poverty line and absolute poverty line (see Kakwani, 2003). The *food poverty line* represents the monetary amount needed to cover expenditure on required calorie intake of a particular household taking into account its age and gender composition and adjusting for differences in regional food prices (Deaton, 1997; Lanjouw et al., 2004). The *absolute poverty line* augments the food poverty line with a non-food allowance. This non-food part is estimated based on the share of non-food expenditures in total consumption expenditures in a given year of those households close to the poverty threshold. Thus, the absolute poverty line capture both food and non-food expenditures and can evaluate poverty more precisely.

Following Ravallion (1994) and Kakwani (2003), the food and absolute poverty lines for each studied Belarusian household are determined using next five steps:

Step 1: Specifying the calorie requirement. Depending on the age and gender of all household members from Belarusian Household Budget Surveys for 2009-2016 the required per capita calorie requirement for each household is defined. For these purposes, the official list of 20 categories of people (based on age and gender) with different calorie requirements ranging from 110 to 3050 kcal per person per day is used (see Table A1).

Step 2: Calculating the cost of calories for Belarusian regions. The cost of a calorie separately for each region of Belarus is determined using the national basic need food basket[11] (see Table A2) and average regional prices[12] of each of its items. First, the expenditure on each food item is defined multiplying the quantities of each food item in the food basket by average regional market price in each region of Belarus in a particular year. Second, the total cost of the food basket for each region is determined as a sum of all expenditures on the food basket. Third, the food quantities from national food basket are converted into calorie equivalents using a nutritional conversion table (see Table A2). Finally, the cost of a calorie for each region of Belarus is determined dividing the total cost of the national food basket for a particular region by the total number of calories from this food basket.

Step 3: Determining food poverty lines for regions. The estimated nutritional requirements for each household living in a particular region (Step 1) and the calorie cost at the regional level (Step 2) are used to determine the food poverty line for each studied household: the quantity of calories from food basket for each household is divided by 365 (number of days in the year) and multiplied by the cost of a calorie for a particular region and by number of days in the month (30).

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[11] A basic need basket of food items is determined to estimate the cost of food consumption.
[12] Regional average yearly market prices for food items in the basic need food basket are obtained from Belstat.

Step 4: Estimating non-food poverty lines for regions. The calculation of the non-food poverty line is accomplished based on the official Engel ratio (see Table A3), which shows the share of food monthly expenditure of poor population in Belarus.

Step 5: Calculating absolute poverty lines for regions. The absolute poverty line for each household is determined as the sum of their corresponding food and non-food poverty lines in the region.

The food and absolute poverty lines are estimated individually for each year of 2009-2016 and then deflated to 2009 values using national food and nonfood CPIs (for higher precision and comparability across years).

3.2. Poverty measures

To evaluate the incidence of poverty in time the Foster-Greer-Thorbecke (FGT) methodology is used. Accordingly, three poverty measures are calculated: the headcount index, the poverty gap index and the poverty severity index (Foster et al., 1984; Ravallion, 1992; Haughton & Khandker, 2009).

The *headcount index* (P_0) is the most commonly-used poverty measure. P_0 represents the percentage of the population living in households with consumption (or income) per member of the family below the poverty line, i.e. the proportion of poor of the total population:

$$P_0 = \frac{N_P}{N},$$
(1)

where N_P is the number of poor in a population N.

However, the headcount index takes into account only the proportion of a population that is considered as poor. It does not defines the severity (intensity) of poverty or the distribution (depth) of poverty among the poor.

The *poverty gap* (P_1) measures the depth of poverty and determines the mean distance below the poverty line as a proportion of that line – the mean is taken over the whole population and non-poor are counted as having a zero gap. P_1 reflects the minimum cost for poverty elimination, that is how much transfer to the poor would be necessary to increase their expenditures (or incomes) up to the poverty line. P_1 is calculated as follows:

$$P_1 = \frac{1}{N} \sum_{i=1}^{q} \left[\frac{z - y_1}{z} \right],$$
(2)

where z is the poverty line and y_1 is the consumption of the poor, arranged in ascending order.
The *poverty gap* index is more accurate than the headcount index because its sensitivity to the distance from the poverty line.

The *poverty severity* (P₂) is a weighted sum of poverty gaps, i.e. the mean squared proportionate poverty gap. The poverty severity measure help to build conclusions about the distribution of poverty among the poor, that is whether it is equally distributed or not. P_2 is calculated as follows:

$$P_2 = \frac{1}{N} \sum_{i=1}^{q} \left[\frac{z - y_1}{z} \right]^2, \tag{3}$$

Due to squaring of the poverty gaps, poverty severity index considers households that are more distant from poverty line with the greater significance. In this way, this measure is more sensitive to the changes in the bottom of distribution of income or consumption.

3.3. OLS and probit regressions

In this study, the static regression analysis is used to model the determinants of household welfare and poverty (see Ravallion (1998) and Haughton and Khandker (2009)). Correspondingly, it consists of two approaches. The first approach is to apply OLS estimation procedure regressing the natural logarithm of per capita consumption against a series of independent variables – factors that determine households' welfare. The OLS econometric model is specified as follows:

$$\ln C_j = \beta_0 + \sum_{i=1}^{n} \beta_i X_{ij} + \varepsilon_j, \tag{4}$$

where C_j represents a per capita consumption for household j, X_{ij} denotes the value of explanatory variable i for household j, β_0 and β_i are parameters to be estimated, ln defines natural logarithm, and ε_j denotes a random error term. The list of used explanatory variables is presented in Table 1. Eight separate models are estimated, for each year of 2009-2016.

A second approach is to run probit regression to make inferences about poverty status and to determine the contributions of predefined factors on household's probability of being poor. A household is determined to be poor ($p_i = 1$) if its real consumption per capita C_i is below the calculated real absolute poverty line APL_i in the respective year. In other case it is determined to be non-poor ($p_i = 0$).

The probit model is expressed as follows:

$$Prob(p_i = 1) = F\left(\delta_0 + \sum_{i=1}^{n} \delta_i X_{ij} + u_j \right), \tag{5}$$

where p_j represents the probability that the j-th household is poor, δ_0 and δ_i are parameters to be estimated, X_{ij}'s are the explanatory variables presented in Table 1, and u_j is a random error term that is assumed to be uncorrelated with the explanatory variables. The same as for the OLS model, eight separate equations are estimated for 2009-2016.

The key commonality between these two approaches is that the determinants of household welfare and poverty may be generally grouped into household characteristics (composition of a household), human capital, livestock (or landplot) ownership, financial assets ownership, economic shocks to

labor market, and fixed geographical factors (Klugman & Kolev, 2001; Gustafsson & Nivorozhkina, 2004). The definition of consumption variable, as well as other variables used in the study are presented in Table 1 and discussed below.

Table 1. Description of variables

Variable	Variable description
Consumption	The household consumption measure captures average monthly household food expenditure (26 different food items including alcohol and eating out), expenditure on daily non-food items (25 non-food items, e.g. soap, cosmetics, clothes, kitchen utensils, tobacco) as well as payments for services, rent and utilities.
Household size	Number of household members, that currently and usually living together and sharing a common household budget.
Number of 0-6 years aged	Number of 0 to 6 years old members in the household.
Number of 7-12 years aged	Number of 7 to 12 years old members in the household.
Number of 13-17 years aged	Number of 13 to 17 years old members in the household.
Number of pension aged	Number of household members in pension age.
Households with only women and children	Dummy variable identifying households consisting only of lonely mothers and children.
Average years of schooling	Average adjusted years of schooling of all household members aged 15 and above. The calculation of variable is based on the highest educational level obtained by respondents and the number of years of schooling typically required to achieve this level. The variable is calculated using the conversion scheme by Gorodnichenko and Sabirianova Peter (2005).
Access to land	Indicates households having potential access to land or a garden plot.
Inactive	Indicates that the household has at least one economically inactive member, i.e. household member that is out of the labor force.
Village	Dummy variable indicating households residing in rural areas and villages.
Town	Dummy variable indicating households residing in urban settlements and towns up to 100000 inhabitants.
City	Dummy variable indicating households residing in cities of 100,001 inhabitants and more.
Minsk	Dummy variable indicating households residing in Minsk city.
Brest region	Dummy variable indicating households residing in the oblasts belonging to this geographical macro region Brest region.
Gomel region	Dummy variable indicating households residing in the oblasts belonging to this geographical macro region Gomel region.
Grodno region	Dummy variable indicating households residing in the oblasts belonging to this geographical macro region Grodno region.
Minsk region	Dummy variable indicating households residing in the oblasts belonging to this geographical macro region Gomel region.
Mogilev region	Dummy variable indicating households residing in the oblasts belonging to this geographical macro region Mogilev region.
Vitebsk region	Dummy variable indicating households residing in the oblasts belonging to this geographical macro region Vitebsk region.

The household composition is controlled by including the size of the household and numbers of persons in different age groups in the household (number of persons aged below 6, aged 6-12, 13–17, persons in pension age). I also added a categorical variable defining households comprising only of females and children. These variables serve as important indicators in a transition context of the economic crisis, because they influence the distribution and importance of different incomes sources, including wages, social transfers to families or pensions. For example, economic recession often leads to an increase in the gender wage gaps (Brainerd, 2000), reduction of child care facilities and increasing costs for child care (Lokshin, 2004).

Additionally, the age composition of the household shows the life cycle status of the household and has an extra sense in the context of the transition of the economic shocks: different age groups are related with different experience of economic problems. For example, the age of the household head may capture work experience and stage in the life cycle associated with growth in income and asset ownership and supposed to positively influence the household welfare and to negatively relate with the probability of being poor. However, taking into account the life-cycle hypothesis, the relationship between age and poverty may be nonlinear, suggesting that poverty is relatively higher at a young age, decreases at middle age, and then increases again at an old age. Therefore, to account for above issues the squared age head was included into both OLS and probit regressions.

The physical, financial and human capital variables are used in the analysis, because the absence of assets can be directly connected to the consequences and/or additional causes of poverty due to potentially low returns (and their volatility) to these assets (World Bank, 2000b). Moreover, these variables may serve as another example of improving the welfare of the household. For example, it was found that families in rural areas of developing countries typically depend on agricultural income obtained from end-use of environmental resources (Ellis, 2000). Furthermore, the poorer households rely more on agricultural income in comparison with relatively richer families (Angelsen et al., 2014). Thus, inclusion of such variables in poverty analysis may help to understand poverty more properly. However, one of the consequences of the economic shocks for households is the possible loss of these assets or its deadweight spending in the attempt to sustain previous level of consumption, which can lead to additional loss of wealth.

In this regard, the average years of schooling of all household members in the working age (15-74) is used as a proxy for human capital. The educational level of a household is supposed to influence its ability to obtain and evaluate the needed information in order to handle with economic problems or to faster find suitable job from vacancies currently available on the labor market (Zimmerman and Carter, 2003). The variable indicating whether a household owned or used any land in the last 12 months and the variable indicating whether a household possesses deposits in banks in the last 12 months are used as proxies for productive and financial assets of the household.

Additionally, in order to assess the current status of the household, as well as its exposure to negative shocks in the labor market, the regression models in this paper incorporate such a variable as presence of inactive member in a household. When studying the influence of the macroeconomic shocks of the labor market on the welfare of households the next question is of a particular importance: does the influence of shocks on households during the economic downturn grow and how its degree is linked with the absence of a particular adult member of a household in a labor force? It is supposed that the possibility to be influenced more due to economic or financial crisis (for example, through a labor market shock) is higher in the early stages of crisis. In contrast, it is assumed that in a period of economic growth and with the development of labor market institutions the frequency and strength of shocks decrease.

The last ten variables in the research analysis (see Table 1) represent geographical controls (rural areas, towns with population up to 100000 residents, cities with population more than 100000 residents, Minsk city, and macro-regions of Belarus) included to capture unobserved factors driving the sizable regional disparities in consumption. Furthermore, such indicators will capture not only the spatial structure of Belarus, but also will serve as the indicators for the diffusion of shocks and growth patterns at the regional level of Belarus (between the center and the periphery).

4. Data

The data used in this research are pooled cross-sections from 2009 to 2016 of the yearly Belarusian Household Budget Surveys (BHBS)[13] obtained from the National Statistical Committee of the Republic of Belarus (Belstat). The data in each cross-section is adjusted for outliers and missing values and contains on average 5000 households.

All eight surveys use the same sampling strategy and designed to be representative of the total Belarusian population. Each observation includes sampling weights inversely proportional to the probability of being sampled and corrections for unit non-response to the interview.

These surveys consist of household and individual questionnaires that contain important overall data about households[14] including decomposition of expenditures and income by categories, detailed data on consumption of food items, the size, age and gender composition of households, living conditions. The income and expenditure data are collected quarterly using a diary filled by households and survey questions asked by interviewers and represents monthly averages for the particular year.

The data on individuals that form studied households (approximately 14000 observations for each yearly cross-section) comprise of age information, socioeconomic status, sources of income (for example, wages, pensions etc.), information on their level of education, number of children, labor status.

The main variable for the research is the household consumption (household expenditures) used as the welfare measure. The consumption variable consists of data on actual household expenditure (measured using nominal unit prices) on approximately twenty six food items (alcohol, eating out etc.), on around twenty five items of daily non-food items (tobacco etc.), expenditures for grown and produced at home food, along with payments for services, rent and utilities during the last thirty days. Overly, the consumption variable capture the same information from all eight surveys, thus, allow to perform intertemporal comparisons of households' wefare in Belarus.

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[13] Belarusian Sample Household Living Standards Surveys for each year of 2009-2016 are abbreviated as follows: BHBS-09, BHBS-10, BHBS-11, BHBS-12, BHBS-13, BHBS-14, BHBS-15 and BHBS-16.
[14] According to surveys, a household consists of all persons who live together in the same dwelling and share at minimum some mutual expenses and income.

The consumption data are in nominal terms; therefore, converted into real terms using annual food and nonfood CPI indices. Accordingly, the monthly food and non-food expenditure of the households available from the survey data are divided by household size and deflated by the corresponding national level food CPI and non-food CPI to arrive at the real monthly per capita expenditure of the households (sum of food and non-food parts) in each survey.

The descriptive statistics of data are displayed in Table 2 and 3. Examples of estimated food and absolute poverty lines are presented in Table A4 and A5.

Table 2. Descriptive statistics of variables, 2009-2012

Variable	2009			2010			2011			2012		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Consumption	603787.70	29487.68	5867745.00	681605.70	84978.86	4073936.00	665245.00	90971.82	4826126.00	817617.50	108201.50	9292001.00
Household size	2.59	1	8	2.54	1	8	2.55	1	10	2.44	1	9
Household size squared	8.17	1	64	7.95	1	64	7.97	1	100	7.32	1	81
Age of head	51.00	19	92	51.44	19	93	50.40	19	93	51.60	19	92
Age of head squared	2836.43	361	8464	2878.97	361	8649	2773.51	361	8649	2897.47	361	8464
Number of children of age 0-5	0.17	0	3	0.17	0	4	0.21	0	4	0.18	0	3
Number of children of age 6-12	0.19	0	4	0.19	0	3	0.24	0	4	0.20	0	3
Number of children of age 13-17	0.18	0	3	0.16	0	3	0.16	0	4	0.14	0	3
Number of pensioners	0.46	0	3	0.49	0	3	0.45	0	3	0.50	0	3
Average years of schooling (15-72)	11.63	4	19	11.81	4	19	11.28	4	19	12.48	4	19
HH with only woman and children	0.04	0	1	0.04	0	1	0.05	0	1	0.05	0	1
Inactive	0.24	0	1	0.23	0	1	0.14	0	1	0.16	0	1
Access to landplot	0.79	0	1	0.77	0	1	0.79	0	1	0.79	0	1
Savings	0.67	0	1	0.72	0	1	0.57	0	1	0.64	0	1
Minsk region	0.16	0	1	0.17	0	1	0.16	0	1	0.16	0	1
Brest region	0.16	0	1	0.15	0	1	0.14	0	1	0.16	0	1
Vitebsk region	0.14	0	1	0.14	0	1	0.15	0	1	0.14	0	1
Grodno region	0.13	0	1	0.13	0	1	0.13	0	1	0.13	0	1
Gomel region	0.16	0	1	0.17	0	1	0.17	0	1	0.16	0	1
Mogilev region	0.12	0	1	0.13	0	1	0.12	0	1	0.12	0	1
Village	0.36	0	1	0.37	0	1	0.36	0	1	0.32	0	1
Town	0.24	0	1	0.24	0	1	0.26	0	1	0.26	0	1
City	0.28	0	1	0.27	0	1	0.25	0	1	0.30	0	1
Minsk	0.12	0	1	0.13	0	1	0.13	0	1	0.13	0	1
Observations			4535			5006			4949			4803

Source: authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.

Table 3. Descriptive statistics of variables, 2013-2016

Variable	2013			2014			2015			2016		
	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max
Consumption	950281.00	104946.20	32100000.00	985179.00	163999.00	12100000.00	965235.40	112406.40	9002931.00	902845.40	118078.20	23500000.00
Household size	2.38	1	9	2.39	1	8	2.30	1	10	2.27	1	11
Household size squared	7.05	1	81	7.13	1	64	6.56	1	100	6.40	1	121
Age of head	51.66	19	95	51.24	19	90	52.64	19	95	52.83	19	96
Age of head squared	2901.73	361	9025	2859.97	361	8100	2997.31	361	9025	3001.89	361	9216
Number of children of age 0-5	0.19	0	5	0.20	0	4	0.15	0	3	0.14	0	3
Number of children of age 6-12	0.18	0	3	0.21	0	4	0.19	0	4	0.20	0	4
Number of children of age 13-17	0.13	0	3	0.13	0	3	0.12	0	5	0.13	0	7
Number of pensioners	0.51	0	3	0.63	0	3	0.68	0	3	0.70	0	3
Average years of schooling (15-72)	12.63	4	19	12.78	4	19	12.58	4	19	13.17	4	19
HH with only woman and children	0.05	0	1	0.05	0	1	0.04	0	1	0.05	0	1
Inactive	0.17	0	1	0.17	0	1	0.15	0	1	0.15	0	1
Access to landplot	0.78	0	1	0.76	0	1	0.77	0	1	0.77	0	1
Savings	0.70	0	1	0.69	0	1	0.64	0	1	0.60	0	1
Minsk region	0.15	0	1	0.15	0	1	0.16	0	1	0.16	0	1
Brest region	0.15	0	1	0.15	0	1	0.15	0	1	0.15	0	1
Vitebsk region	0.15	0	1	0.14	0	1	0.14	0	1	0.14	0	1
Grodno region	0.13	0	1	0.13	0	1	0.12	0	1	0.12	0	1
Gomel region	0.16	0	1	0.16	0	1	0.16	0	1	0.16	0	1
Mogilev region	0.12	0	1	0.12	0	1	0.12	0	1	0.12	0	1
Village	0.32	0	1	0.32	0	1	0.30	0	1	0.31	0	1
Town	0.24	0	1	0.23	0	1	0.19	0	1	0.19	0	1
City	0.31	0	1	0.31	0	1	0.36	0	1	0.35	0	1
Minsk	0.13	0	1	0.14	0	1	0.15	0	1	0.15	0	1
Observations			4971			5123			5350			5367

Source: authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.

5. Empirical analysis

5.1. Growth and poverty dynamics in Belarus, 2009-2016

As noted earlier, the data analyzed in the paper refers to eight years: 2009-2016. However, in order to provide a context, estimated trends in several economic indicators relating to a longer period of 2000-2016 are presented in Table 4 and briefly reviewed below.

Table 4. Descriptive statistics for Belarus, 2000-2016

Year	GDP per capita growth (%/year)	Real wage (thousand BYN 2000)	Real wage growth (%/year)	Gross fixed capital formation growth (%/year)	Inflation$_{CPI}$ (%/year)	Current account balance (% of GDP)	External balance of goods and services (% of GDP)	Money supply growth – M2 (%/year)
2000	6.3	58.9	13.0	2.3	168.6	-3.6	-3.2	124.9
2001	5.3	76.3	29.6	-2.3	61.1	-4.3	-3.5	101.2
2002	5.7	82.4	7.9	6.7	42.5	-2.2	-3.7	57.1
2003	7.8	85.0	3.2	20.6	28.4	-2.6	-3.8	67.9
2004	12.2	99.8	17.4	19.9	18.1	-5.2	-6.4	65.5
2005	10.1	120.7	21.0	19.5	10.3	1.5	0.7	60.1
2006	10.7	141.6	17.3	31.6	7.0	-3.8	-4.2	45.5
2007	9.1	155.7	10.0	16.4	8.4	-6.7	-6.3	27.7
2008	10.6	169.7	9.0	23.8	14.8	-8.2	-7.7	26.1
2009	0.4	169.8	0.1	5.0	12.9	-12.5	-11.3	1.8
2010	8.0	195.3	15.0	17.5	7.7	-14.5	-13.2	25.8
2011	5.7	199.0	1.9	13.9	53.2	-8.2	-1.0	62.1
2012	1.8	241.8	21.5	-11.3	59.2	-2.8	4.5	59.4
2013	1.0	281.5	16.4	9.6	18.3	-10.0	-3.1	18.1
2014	1.6	285.0	1.3	-5.3	18.1	-6.6	-0.8	16.4
2015	-4.0	278.7	-2.2	-15.9	13.5	-3.3	0.1	-1.1
2016	-2.8	268.1	-3.8	-16.7	11.8	-3.6	-0.1	19.4

Source: World Bank WDI database, IFS database, author's calculations using Belstat time series.

After growing rapidly in the 2000s, Belarus's economy stagnated in the 2010s: first, in 2011-2014 due to domestic financial crisis triggered by sharp and large devaluations of Belarusian ruble in 2011,[15] and second, in 2015-2016 due to domestic economic crisis (Mazol, 2017).

As the Table 4 shows, from 2000 to 2010 the average annual growth rate of GDP per capita equaled 7.8%. The basis for this growth was a strong export performance in such traditional commodities as petroleum, potash fertilizers and agricultural products.[16] After that, over the period 2011-2016 the average annual growth was only 0.6%.[17] This period of economic downturn was characterized by high inflation, slump in fixed capital investment, persistent and high negative

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[15] The substantial financial shocks of 2011 had a significant and lasting impact on the economy over the rest of the studied years.

[16] The economic model of this period also heavily relied on underpriced energy resources from Russia, with an annual average size of the imputed subsidy of over 13% of GDP (World Bank, 2012).

[17] The existing model of economic development has reached its limits and could not ensure the sustainability of economic growth without accomplishment of structural reforms.

current account balance (see Table 4), extensive government ownership of productive enterprises (generate approximately 70% of GDP)[18] and direct inference of the state in the economic process.

Moreover, the period from 2000 to 2014 also observed a significant increase in real wages in Belarus. As the Table 4 indicates, the real average monthly wages rose from 58900 Belarusian rubles (in constant 2000 prices) in 2000 to 285000 Belarusian rubles in 2014 or by 384% (12% per year on average). This increase in wages reflects growth in social spending that helped to reduce poverty and inequality (see Mazol, 2016). However, it also build a significant ground for macroeconomic imbalances[19] that coupled with expansionary monetary policy promoting fixed investment (see Table 4), an appreciation in the real exchange rate, subsidized prices for key inputs (including energy and utilities) and favored treatment for state-owned enterprises in access to "cheap" finance targeted at their production growth led to financial crisis in 2011, subsequent recession in 2012-2014 and economic crisis in 2015-2016 (Dobrinsky et al., 2016).

Turning to poverty, trends in its incidence (headcount index) based on absolute poverty line are illustrated in Figure 1. Subsequently, as can be seen from the graph, the timeline of poverty analysis for Belarus can be subdivided into three periods: 2009-2011, 2012-2014, and 2015-2016.
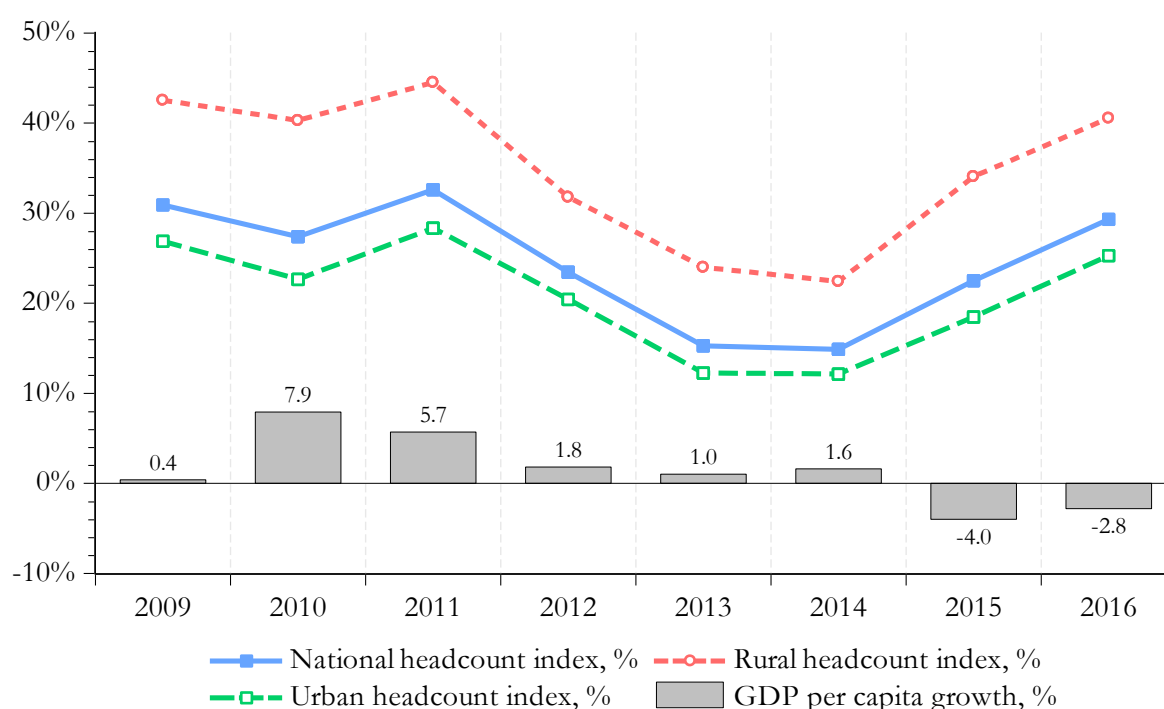
Figure 1: Incidence of absolute poverty and GDP per capita growth in Belarus

Source: authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Estimates reflect weighted household data.

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[18] The state sector in Belarus dominates especially in the manufacturing sector, whereas the private sector concentrate mostly in retail trade and business services.
[19] Forced growth of wages resulted in significant increase of unit labor costs (real wage growth outperformed productivity growth), competitiveness losses and was one of the main sources of inflationary pressure in the economy of Belarus (Dobrinsky et al., 2016).

During the first period (from 2009 to 2011), absolute poverty at the national level increased from 30.9% to 32.6%. Incidence of absolute poverty for rural and urban areas in 2011 reached 45% and 28% of the population, correspondingly. In the spatial dimension, the highest level in the incidence of absolute poverty in 2011 was in Brest, Gomel and Mogilev regions – 38.9%, 39.4% and 40.9%, correspondingly (see Table A6).

From 2009 to 2011, the depth and strength of absolute poverty stayed almost unchanged, as it is apparent from the dynamics of poverty gap index and poverty severity index (see Table 5). The poverty gap index decreased from 13.2% to 13% for rural areas, while it increased for urban areas – from 6.2% to 6.4%. The dynamics of poverty severity index followed the same pattern – slightly decreasing for rural areas and increasing for urban areas. However, overly the above figures indicate the seriousness of absolute poverty in Belarus during the first studied period especially for rural areas.
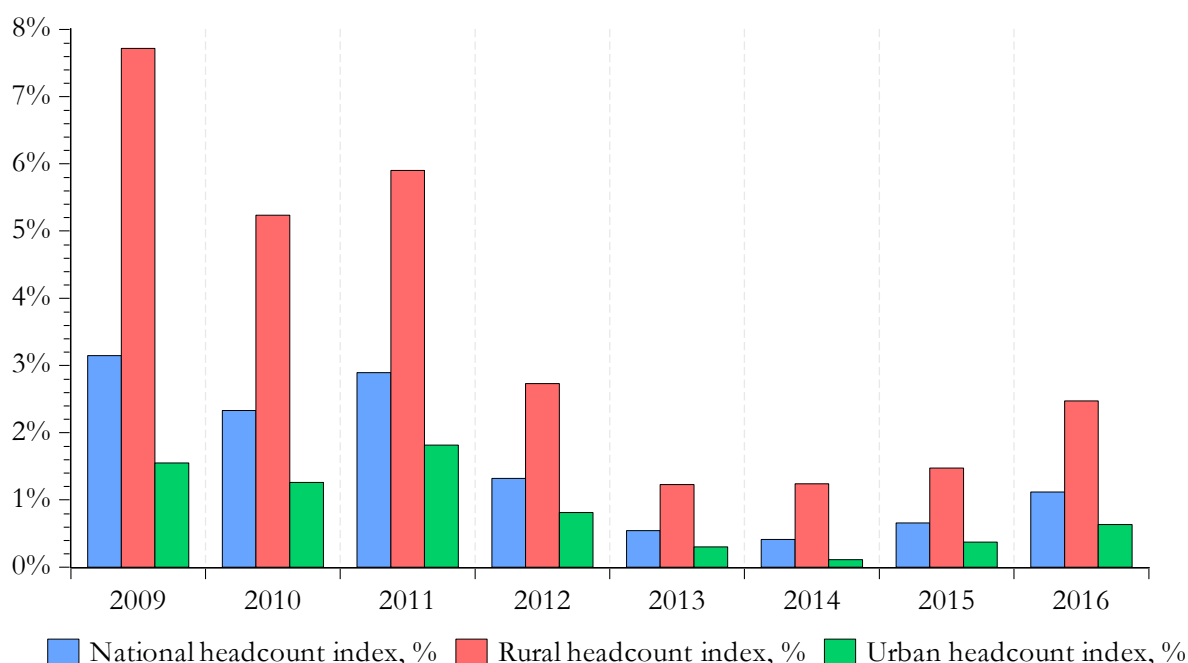
Table 5. Poverty measures based on absolute poverty line by area and year in Belarus

Year / Poverty measure	2009	2010	2011	2012	2013	2014	2015	2016
Headcount index (P_0), %								
National	30.917	27.387	32.581	23.431	15.272	14.874	22.483	29.297
Rural	42.524	40.277	44.505	31.768	23.974	22.398	34.058	40.547
Urban	26.861	22.645	28.324	20.405	12.225	12.114	18.450	25.271
Poverty gap (P_1), %								
National	8.027	6.850	8.160	5.586	3.374	3.272	5.240	7.078
Rural	13.185	11.551	12.988	8.406	6.056	5.583	8.878	11.233
Urban	6.225	5.121	6.436	4.563	2.435	2.425	3.973	5.591
Poverty severity (P_2), %								
National	3.170	2.555	3.090	2.003	1.167	1.082	1.853	2.529
Rural	5.914	4.756	5.334	3.252	2.261	2.068	3.324	4.387
Urban	2.211	1.746	2.289	1.550	0.784	0.720	1.340	1.865

Source: authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Estimates reflect weighted household data.

The dynamics of food poverty based on corresponding food poverty line during 2009-2011 is illustrated in Figure 2. Determining food poverty as the consumption expenditure necessary to cover the cost of the minimum nutritional requirement (basic need food items), food poverty at the national level decreased from 3.1% in 2009 to 2.9% in 2011. However, this drop corresponds only to rural area, while urban area showed increase in incidence of food poverty. Nonetheless, food poverty disproportionally affected rural households. The ratio of food poverty headcount indices for the rural and urban areas ($P_0^{rural} / P_0^{urban}$) was 4.8 in 2009, 4.0 in 2010, and 3.3 in 2011. The highest regional levels in the incidence of food poverty in 2011 were in Gomel and Mogilev regions – 4.9% for both regions (see Table A3).

Figure 2: Incidence of food poverty in Belarus

Source: authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Estimates reflect weighted household data.

The dynamics of corresponding poverty gap and poverty severity indices of food poverty share the same pattern of headcount index (see Table 6) – decreasing at the national and rural levels, and slightly increasing at the urban level.

Table 6. Poverty measures based on food poverty line by area and year in Belarus

Year	2009	2010	2011	2012	2013	2014	2015	2016
Poverty measure								
Headcount index (P_0), %								
National	3.147	2.329	2.890	1.320	0.541	0.411	0.656	1.116
Rural	7.718	5.236	5.901	2.729	1.225	1.239	1.472	2.473
Urban	1.549	1.259	1.815	0.809	0.301	0.108	0.372	0.631
Poverty gap (P_1), %								
National	0.683	0.371	0.540	0.223	0.078	0.041	0.114	0.144
Rural	1.833	0.996	1.093	0.501	0.161	0.120	0.274	0.322
Urban	0.280	0.141	0.343	0.122	0.049	0.011	0.058	0.081
Poverty severity (P_2), %								
National	0.216	0.095	0.168	0.059	0.017	0.006	0.034	0.030
Rural	0.626	0.282	0.344	0.124	0.028	0.020	0.087	0.066
Urban	0.072	0.026	0.105	0.036	0.014	0.001	0.015	0.017

Source: Authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Estimates reflect weighted household data.

The second period (from 2012 to 2014) was characterized by a sharp poverty reduction (see Figure 1). For example, the absolute national poverty headcount ratio has plummeted from 32.6% in 2011 to 14.9% in 2014, rural poverty dropped by 22.1 percentage points or almost by half and urban poverty decreased by 16.2 percentage points. Correspondingly, the depth and strength of absolute poverty decreased as well: the poverty gap index by 4.9 percentage points and the poverty severity index by 2 percentage points.

Within each year of the second period, absolute poverty rates lowered as the measure of household income becomes more significant (see Figure 3). As graph shows, the real per capita household income increased by 39% from 2011 to 2014. However, the headcount ratio remains higher in the rural than in the urban area, the two ratios were not converging – the ratio (P_0^{rural}/P_0^{urban}) increased from 1.6 in 2011 to 1.9 in 2014 (see Table 6). All these suggest the existence of the disintegrated labor market in Belarus during second period, and indicates that non-agricultural sources of income are not the same in the two areas.
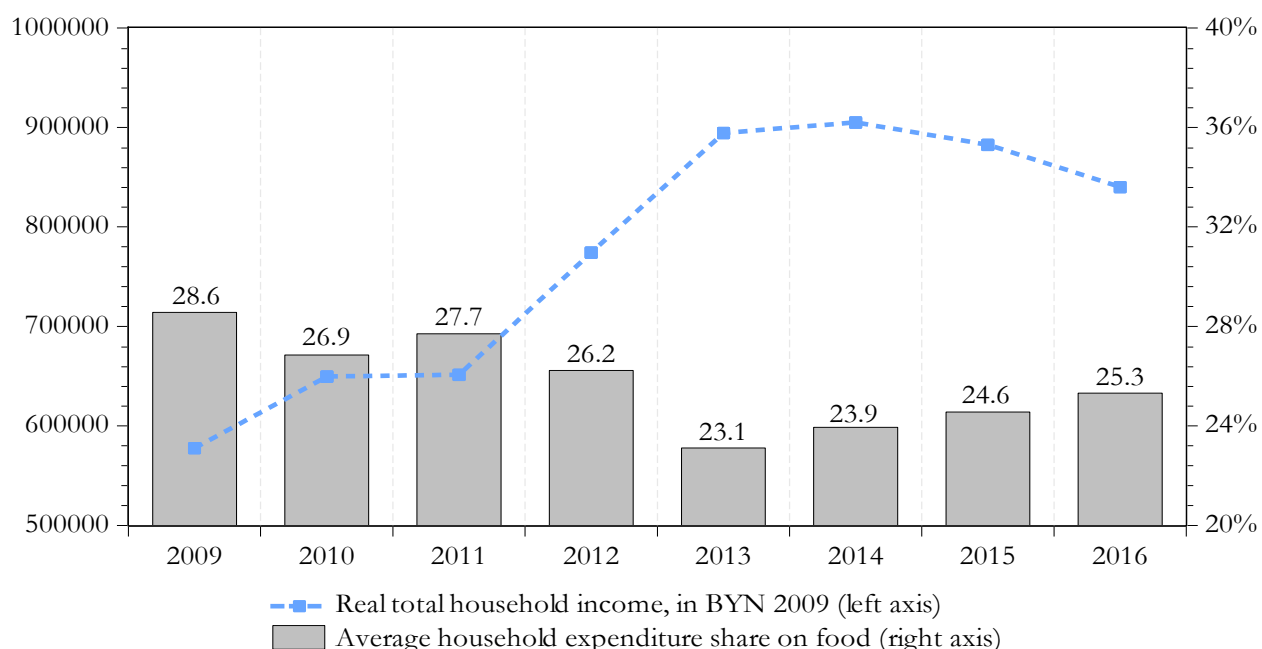
Figure 3: Household income and expenditure share on food in Belarus

Source: authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Real total household income is the household average real monthly per capita income received by all household members and comprises monetary income as well as the monetary value of income received in the form of goods and services (the monetary assessment of in-kind payments obtained by the respondents)[20]. Estimates reflect weighted household data.

In the spatial dimension, the highest levels in the incidence of absolute poverty in 2014 were in Brest, Gomel and Mogilev regions – 18.3%, 18.4% and 25.0%, correspondingly (see Table A6).

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[20] Household income is the sum of labor earnings [a. any payments after taxes from main and additional jobs of all household members in the form of money, goods or services + b. income from sale of own produced products, including food and animals not included in a.], **capital earnings** [income from capital investment + income from sale of personal property (assets) + income from renting apartment(s)/house(s) or other personal property], g**overnment transfers** [any type of pension (retirement pension, pension for years of service, disability pension, loss of provider pension) + unemployment benefits + child benefits + other forms of social support (maternity benefits, low-income family benefits, etc.) + stipends], p**rivate transfers** [help and gifts from relatives and friends in the form of money, goods or services + alimony] **+ other income.**

The estimates of food poverty also showed substantial improvement: its incidence dropped from 2.9% in 2011 to 0.4% in 2014 (see Table 6). The same happened for rural and urban areas: the headcount ratio declined and equaled 1.2% for rural areas and 0.1% for urban areas in 2014. The progress in food poverty showed all regions of Belarus. Finally, during the second period, the depth and strength of absolute and food poverty also decreased substantially at national level, both for urban and rural areas and for all Belarusian regions (see Table A2 and A3). This is not surprising, since rapid increase in real per capita household income in Belarus led to rise in calorie intake and, thus, real per capita household expenditure.

In turn, the third period saw a sharp rise in the incidence of poverty. From 2015 to 2016, the headcount ratio for absolute poverty increased by 14.4 percentage points (see Table 5). As a result, in 2016 the share of expenditure-poor households in Belarus reached 29.3% or almost the same as in 2009 and 2011. The incidence of food poverty was growing moderately – from 0.4% in 2014 to 1.1% in 2016 (see Table 6).

Moreover, during the third period not only urban and rural disparity for poverty widened – 25.3% in urban vs 40.6% in rural areas in 2016 and for extreme poverty – 0.6% vs. 2.5%, but also regional variations in both absolute and extreme poverty were also large (see Table A6 and A7). Brest and Mogilev regions showed 38.3% and 35.6% of incidence of absolute poverty, respectively, while only 12.3% of households in Minsk city were observed to be overly poor. The same holds for depth and strength of absolute poverty.

The significant increase in poverty in 2015-2016 was due to a combination of several factors, including the household income decline in comparison with its growth in previous years, the increasing need to spend more on food necessities (see Figure 3) and the growth in food and especially non-food price levels (see Figure 4).
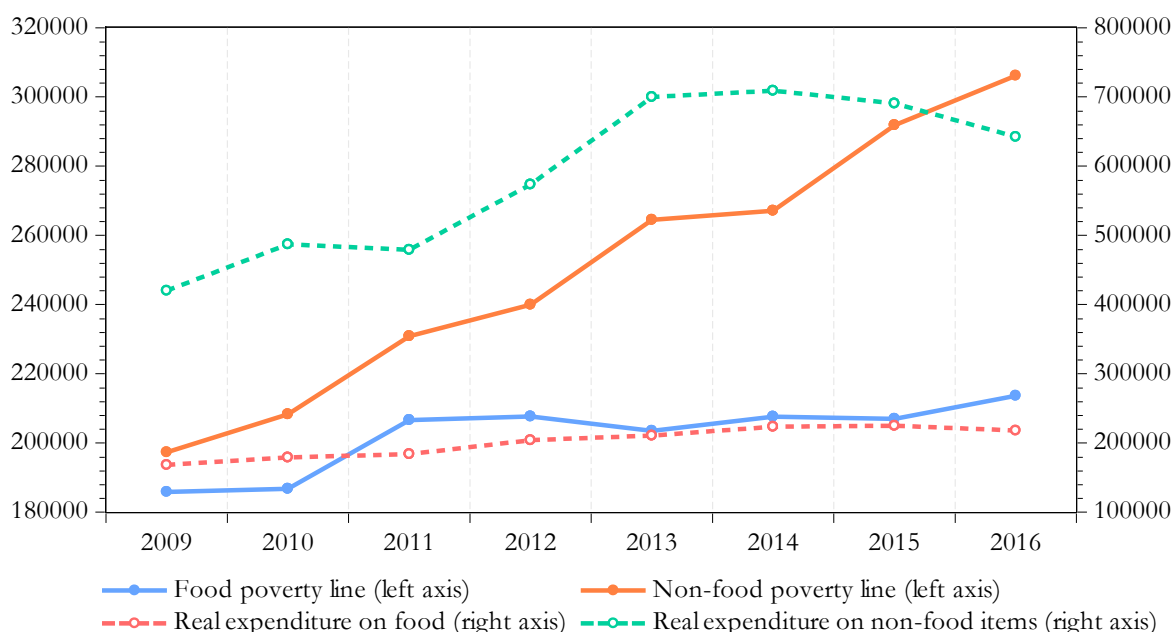
Figure 4: Real monthly average per capita household expenditure on food and non-food items and real monthly standardized food and non-food poverty lines, 2009-2016

As the Figure 4 shows, starting from 2015 there has been a rapid increase in the real cost of non-food budget for Belarusian households, while cost of food budget have remained almost the same in real terms. Correspondingly, the non-food poverty line increased from 267074 Belarusian rubles in 2014 to 306156 Belarusian rubles in 2016 or by 14.6%, while the food poverty line increased only by 2.9%.

Furthermore, as income fell (by 7.2% over the 2015-2016), the share of food items in total expenditure increased (see Figure 3) and real non-food expenditure decreased. This is because household income was not enough to cover both expenditures on food and non-food items. As a result, due to 2015-2016 economic crisis the cost of meeting the non-food essentials has increased so fast (see Figure 4) that it has squeezed the non-food budget, leaving insufficient purchasing power for non-food items.

Finally, in order to be consistent with the results above Figure 5 displays the cumulative distribution functions of real monthly per capita household expenditure for five surveys with the 2009 as the base year. The figure shows a shift in the whole distribution of household expenditure in Belarus from one year to the next, except for that of 2016, which demonstrates the downward dynamics and tends to that of 2012.
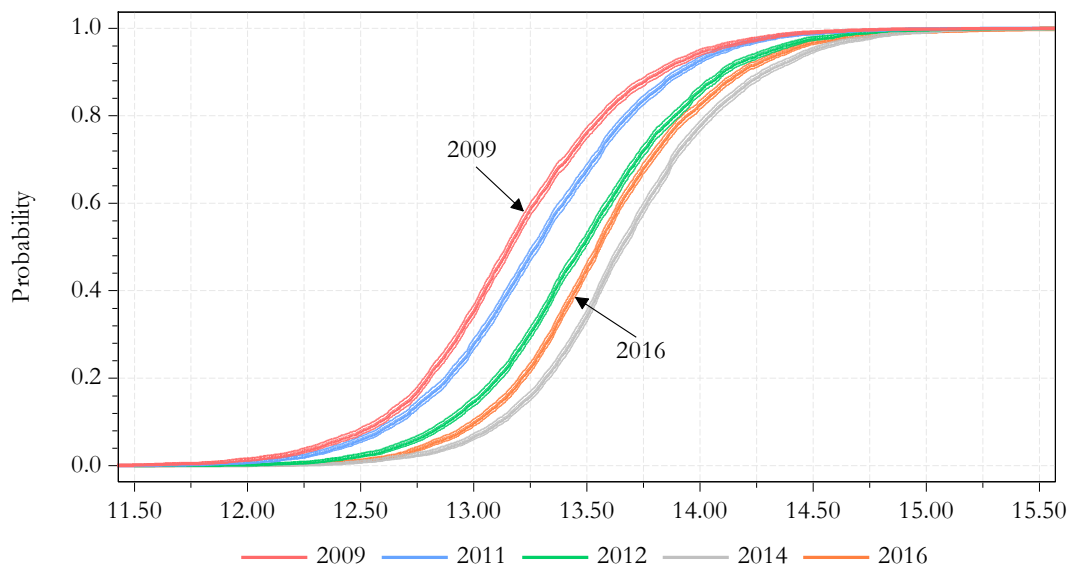
Figure 5: Cumulative distribution functions of real monthly per capita household expenditure for 2009, 2011, 2012, 2014 and 2016

5.2. OLS regression results: determinants of welfare

Table 7 presents the regression results for the correlates of household welfare in 2009 -2016 measured by the log of real household per capita consumption in terms of 2009 Belarusian rubles. Because the dependent variable is in the log form, the calculated regression coefficients for

continuous variables measure the percentage change in household per capita consumption due to a unit increase in the independent variable. For categorical (dummy) variables, the percentage change in per capita consumption due to the change in the considered binary variable from a value of 0 to 1 was estimated as follows: $100 \cdot (e^a-1)$, where a denotes the calculated coefficient for the considered independent variable (Giles, 2011).

Table 7. OLS estimates of log of household per capita consumption (welfare)

Variable	2009		2010		2011		2012		2013		2014		2015		2016	
Household size	-0.098***	[0.024]	-0.110***	[0.023]	-0.139***	[0.022]	-0.185***	[0.021]	-0.179***	[0.025]	-0.133***	[0.022]	-0.195***	[0.027]	-0.215***	[0.023]
Household size squared	0.007*	[0.004]	0.011***	[0.003]	0.015***	[0.003]	0.020***	[0.003]	0.021***	[0.004]	0.008**	[0.004]	0.018***	[0.004]	0.025***	[0.004]
Age of head	0.011***	[0.004]	0.003	[0.003]	0.006*	[0.003]	0.006*	[0.003]	0.007**	[0.003]	0.015***	[0.003]	0.009	[0.006]	0.014***	[0.004]
Age of head squared * 10³	-0.141***	[0.038]	-0.074***	[0.028]	-0.107***	[0.032]	-0.094***	[0.029]	-0.117***	[0.030]	-0.188***	[0.029]	-0.130***	[0.050]	-0.180***	[0.032]
Number of children of age 0-5	-0.217***	[0.021]	-0.197***	[0.021]	-0.240***	[0.022]	-0.181***	[0.020]	-0.169***	[0.020]	-0.120***	[0.024]	-0.119***	[0.029]	-0.161***	[0.025]
Number of children of age 6-12	-0.205***	[0.019]	-0.206***	[0.017]	-0.195***	[0.017]	-0.212***	[0.018]	-0.198***	[0.019]	-0.163***	[0.022]	-0.189***	[0.026]	-0.210***	[0.021]
Number of children of age 13-17	-0.067***	[0.018]	-0.079***	[0.020]	-0.080***	[0.020]	-0.040*	[0.021]	-0.069***	[0.022]	-0.041*	[0.024]	-0.096***	[0.030]	-0.100***	[0.025]
Number of pensioners	-0.079***	[0.014]	-0.043***	[0.013]	-0.023*	[0.013]	-0.065***	[0.014]	-0.047***	[0.014]	-0.010	[0.014]	-0.012	[0.013]	-0.005	[0.017]
Average years of schooling (15-72)	0.041***	[0.002]	0.039***	[0.002]	0.033***	[0.002]	0.039***	[0.002]	0.036***	[0.002]	0.038***	[0.002]	0.024***	[0.002]	0.047***	[0.002]
HH with only woman and children	-0.196***	[0.038]	-0.194***	[0.035]	-0.158***	[0.038]	-0.104***	[0.034]	-0.199***	[0.033]	-0.215***	[0.032]	-0.204***	[0.032]	-0.154***	[0.029]
Inactive	-0.070***	[0.019]	-0.093***	[0.019]	-0.102***	[0.023]	-0.144***	[0.021]	-0.131***	[0.020]	-0.108***	[0.021]	-0.106***	[0.024]	-0.096***	[0.022]
Access to landplot	0.089***	[0.018]	0.103***	[0.017]	0.087***	[0.018]	0.107***	[0.017]	0.059***	[0.017]	0.065***	[0.017]	0.087***	[0.019]	0.072***	[0.019]
Savings	0.124***	[0.016]	0.130***	[0.016]	0.152***	[0.014]	0.181***	[0.015]	0.183***	[0.016]	0.160***	[0.015]	0.155***	[0.014]	0.138***	[0.015]
Brest region (OV: Minsk region)	-0.122***	[0.025]	-0.057**	[0.024]	-0.095***	[0.025]	-0.173***	[0.022]	-0.133***	[0.023]	-0.148***	[0.026]	-0.126***	[0.024]	-0.089***	[0.024]
Vitebsk region	-0.072***	[0.027]	-0.048*	[0.025]	-0.074***	[0.026]	-0.152***	[0.024]	-0.126***	[0.024]	-0.137***	[0.025]	-0.071***	[0.023]	-0.079***	[0.022]
Grodno region	-0.049*	[0.026]	-0.024	[0.025]	-0.086***	[0.023]	-0.091***	[0.026]	-0.091***	[0.025]	-0.121***	[0.026]	-0.043*	[0.023]	-0.040*	[0.023]
Gomel region	-0.114***	[0.026]	-0.142***	[0.024]	-0.079***	[0.025]	-0.168***	[0.023]	-0.176***	[0.025]	-0.152***	[0.024]	-0.102***	[0.023]	-0.074***	[0.023]
Mogilev region	-0.169***	[0.027]	-0.159***	[0.026]	-0.169***	[0.028]	-0.158***	[0.024]	-0.193***	[0.026]	-0.188***	[0.026]	-0.121***	[0.024]	-0.096***	[0.022]
Town (OV: village)	0.082***	[0.019]	0.127***	[0.017]	0.091***	[0.017]	0.079***	[0.018]	0.090***	[0.018]	0.062***	[0.018]	0.072***	[0.018]	0.068***	[0.017]
City	0.200***	[0.019]	0.199***	[0.018]	0.167***	[0.018]	0.123***	[0.017]	0.136***	[0.018]	0.134***	[0.019]	0.175***	[0.017]	0.148***	[0.016]
Minsk	0.304***	[0.028]	0.331***	[0.026]	0.271***	[0.026]	0.179***	[0.025]	0.199***	[0.026]	0.215***	[0.029]	0.396***	[0.028]	0.321***	[0.025]
Constant	12.681***	[0.097]	12.976***	[0.089]	13.097***	[0.088]	13.248***	[0.089]	13.409***	[0.093]	13.190***	[0.095]	13.477***	[0.157]	12.988***	[0.116]
Observations	4535		5006		4949		4803		4971		5123		5350		5367	
R²	0.414		0.390		0.385		0.401		0.368		0.398		0.369		0.406	

Note: Results reflect weighted household data. Robust standard errors in square brackets. *** significant at 1%, ** significant at 5%, * significant at 10%.

The goodness-of-fit statistics R^2 indicate a reasonably good fit for all model specifications. The F-statistics are highly significant ($p < 0.001$), indicating that the explanatory variables jointly exert significant influence on household welfare. Furthermore, most of the estimated coefficients are strongly significant during all studied years.

As shown in Table 7, household size has a statistically significant and relatively large negative impact on welfare of household in Belarus during all years, meanwhile substantially increasing in 2012 – the year after the 2011 domestic financial crisis and in 2015-2016 – period of economic crisis. The coefficients of the households size are -0.185 in 2012, -0.195 in 2015 and -0.215 in 2016. This means that the increase in the size of the household decreases its real per capita expenditure (consumption) by 18.5% in 2012, by 19.5% in 2015 and by 21.5% in 2016. Moreover, the Belarusian households' size profile is concave (the coefficients for household size squared are positive).

The coefficients of the age of the household head are positive and significant for all studied years except 2010 and 2015. In turn, squared of household head is negative and significant. These mean that the older heads increase household welfare in Belarus, but as age of household's head increases the welfare of the household increases at a decreasing rate, reaches a maximum, and decreases at old age. These results confirm findings of the previous studies for other countries, in particular are consistent with life-cycle hypothesis of higher earning capacity with greater experience and smoothing of consumption over the life cycle. However, the magnitude of the age of the household head coefficients is relatively low (see Table 7), indicating that that Belarusian households headed by older individuals, holding other variables constant, will not tend to have substantially higher welfare than those headed by younger individuals.

The increase in the number of children in the Belarusian households has significant and relatively large negative effect on household per capita expenditure during all studied years. However, the impact is noticeably higher for children in the age of 0-5 and 6-12, than in the age of 13-17. Moreover, starting from 2012 the influence of number of children in the age of 6-12 on welfare of household is the highest one (see Table 7). These results may indicate, first, that the presence of more children in a Belarusian household implies a lower share of adult members in employment, which constraints the earning potential of that household. Second, Belarusian families with more children in the age of 6-12 bear larger cost burden (especially starting from 2012), such as the cost of education, health care or other costs concerning children than families with more children in the age of 0-5 (to a lesser extent) and in the age of 13-17 (to a greater extent).

As Table 7 displays, the increase in the number of household's members in the pension age in Belarus has significant negative effect on real household per capita consumption, but only in 2009-2013. Staring from 2014 the influence is insignificant.

Such factor as average years of schooling of the household is positively correlated with household per capita consumption. For example, a one-year increase in schooling resulted in 4.1% increase in per capita consumption in 2009, 3.9% in 2012 and 4.7% in 2016, suggesting that attainment of higher levels of education provides higher levels of household welfare. This is expected as an

increase in educational attainments increases the chances of one's absorption in the labor market and increased earnings. However, overly, the influence of level of education on household's welfare does not exceed 5% for all studied years, which is low in comparison with other correlates (and other countries, especially developed) suggesting the presence of educational inefficiency in the labor market of Belarus.[21]

The results also indicate that households with children, whose heads are lonely mothers gained substantially lower per capita consumption, for example, by 21.7% in 2009, by 11.0% in 2012 and by 16.8% in 2016. Therefore, in general, these findings suggest, first, that marriage is associated with significantly better economic welfare of members of the households including children (Waite, 1995), and, second, incomplete families should be treated as one of the primary goals for poverty alleviation policy in Belarus.

Households having economically inactive members were significantly worse off over the whole studied period and especially in 2012 and 2013 (after the 2011 financial crisis), when its magnitude reached -0.144 and -0.131, correspondingly; meaning 15.5% decrease in household per capita expenditure in 2012 and 14.0% – in 2013. Overly, the presence in the Belarusian family of at least one economically inactive member leads to a large decrease in welfare during all studied years.

Access to landplot and savings have a positive impact on real per capita household expenditure meaning that possession of additional physical capital (agricultural assets) and financial capital (bank deposits) help to increase welfare for Belarusian households. However, the effect of financial assets is diminishing in the last three years (2014-2016), while in the period of 2009-2013 it was increasing. These results may be explained due to influence of economic crisis in 2015-2016 preceded by recession, that, first, slowed down the growth of households' incomes in 2014 and, second, led to their decrease in 2015-2016. Additionally, the decrease in the positive influence of savings on welfare of households in Belarus possibly indicates the growing tendency to smooth consumption by Belarusian households through using their savings. However, the longer the crisis or subsequent economic stagnation, the lower the possibilities to smooth consumption – lower savings.

In the spatial dimension, the largest negative influence on welfare of household in Belarus showed residence in Brest, Gomel and Mogilev regions especially during 2012-2014. However, starting from 2015 the gap between six regions started to diminish resulted from economic crisis of last two years.

Finally, urban residence have a positive impact on real per capita expenditures (see Table 7). For example, households living in cities achieved 22.1%, 13.0% and 16.1% higher per capita consumption in 2009, 2012 and 2016 than rural households. This indicates insufficient employment opportunities, infrastructure, and quality of services in rural areas. Furthermore, it also implies that agriculture, though playing a crucial role as a source of rural livelihood in Belarus, has performed poorly during 2009-2016.

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[21] The availability of employment opportunities is an important part of the social contract in Belarus. The first objective of public policies in the labor market is the access to jobs for everyone as well as rising personal income through wage growth. The second one is the absence of significant wage differentials achieved using wage scale that regulates the salaries for every profession (Dobrinsky et al., 2016).

5.3. Probit regression results: determinants of poverty

As a final step, I estimated the determinants of the probability of the Belarusian households to be below the absolute poverty line using probit regression. Table 8 reports the marginal effects for all households and for all studied years. The marginal effect represents the change in the probability of being poor, when a dummy variable changes value from 0 to 1 or a continuous variable changes by one unit. The log-likelihood ratio (*LR*) tests show that there are significant relationship between the probabilities of being poor and the explanatory variables included in all eight models ($p < 0.001$).

The results in Table 8 highlight that household size and household size squared have coefficients with opposite signs and both are statistically significant. The coefficients for household size are positive suggesting that the probability of households in Belarus being poor increases with the size of the household. The squared term is negative and significant, indicating that the negative effect of household size decreases for bigger households. These relationships hold for all estimated models. Moreover, the effects are much larger in 2012, 2015-2016 than in the rest of the studied years. In the first case, this is a year after the financial crisis in Belarus. In the second case, these are the years of economic crisis.

Age of the household head and age squared show insignificant coefficients for all studied years, indicating that the level of household poverty in Belarus does not seem to be determined by the age of the head. Households with more children of age 6-12 are more likely to fall into poverty in Belarus. These results hold over all studied years and possibly indicate that such families bear significant burden, such as the cost of education, health care or other costs concerning children of age 6-12. Moreover, these may also mean that the higher the number of younger (school age) siblings, the greater will be the workload for the adult (working age) members of the households in Belarus, thus higher poverty. On the other hand, there is almost no significant effect on probability of being poor for households with more children over the age of 12 for all studied years except 2009. This may be due to the effect of household help, which means that older children also help in caring for younger siblings in the households. After all, older women are less likely to have younger kids in need of direct care.

The marginal effects from Table 8 show that the presence of household members in the pension age decreases the risk of poverty for the Belarusian households with statistically significant effects in 2010-2011 and in 2015-2016. Therefore, presence of more elders in the Belarusian family plays an important role for poverty insurance and especially in periods of financial and economic instability.

Next, the higher level of education have a negative, but small impact on the probability of being poor. A one-year increase in schooling resulted in 2.8 percentage points decrease in the probability of being poor in 2009, in 2.4 percentage points in 2012 and 3 percentage points in 2016. Hence, it seems that education in Belarus only slightly improves the skills of individuals leading to small growth of their possibility of obtaining a job and earnings capacity.

Table 8. Probit estimates of the determinants of poverty

Variable	2009		2010		2011		2012		2013		2014		2015		2016	
Household size	0.116***	[0.030]	0.094***	[0.022]	0.102***	[0.032]	0.162***	[0.024]	0.107***	[0.022]	0.070***	[0.023]	0.171***	[0.026]	0.222***	[0.024]
Household size squared	-0.009*	[0.005]	-0.006*	[0.003]	-0.006	[0.005]	-0.015***	[0.004]	-0.011***	[0.003]	-0.002	[0.003]	-0.014***	[0.003]	-0.021***	[0.004]
Age of head	0.0001	[0.004]	-0.002	[0.003]	0.005	[0.004]	-0.001	[0.003]	0.004	[0.003]	0.002	[0.003]	-0.001	[0.003]	-0.005	[0.004]
Age of head squared * 10^3	-0.001	[0.038]	0.016	[0.030]	-0.052	[0.035]	0.004	[0.031]	-0.039	[0.030]	-0.021	[0.031]	0.005	[0.031]	0.055	[0.037]
Number of children of age 0-5	0.057**	[0.023]	0.019	[0.018]	0.077***	[0.025]	0.001	[0.020]	-0.007	[0.019]	-0.036*	[0.018]	-0.039*	[0.021]	-0.023	[0.025]
Number of children of age 6-12	0.099***	[0.019]	0.086***	[0.015]	0.107***	[0.020]	0.083***	[0.018]	0.066***	[0.014]	0.048***	[0.014]	0.081***	[0.017]	0.076***	[0.022]
Number of children of age 13-17	0.062***	[0.019]	0.018	[0.017]	0.003	[0.022]	0.002	[0.019]	0.017	[0.017]	0.010	[0.017]	0.031	[0.021]	0.039	[0.024]
Number of pensioners	-0.015	[0.018]	-0.032**	[0.015]	-0.040**	[0.016]	-0.012	[0.015]	-0.010	[0.013]	-0.010	[0.013]	-0.027*	[0.015]	-0.057***	[0.018]
Average years of schooling (15-72)	-0.028***	[0.002]	-0.027***	[0.002]	-0.028***	[0.002]	-0.024***	[0.002]	-0.018***	[0.002]	-0.014***	[0.002]	-0.013***	[0.002]	-0.030***	[0.003]
HH with only woman and children	0.087**	[0.035]	0.118***	[0.031]	0.114***	[0.031]	0.036	[0.030]	0.083***	[0.025]	0.085***	[0.023]	0.089***	[0.027]	0.074**	[0.030]
Inactive	0.049**	[0.019]	0.061***	[0.017]	0.092***	[0.023]	0.099***	[0.018]	0.080***	[0.016]	0.070***	[0.015]	0.063***	[0.019]	0.080***	[0.022]
Access to landplot	-0.060***	[0.019]	-0.069***	[0.017]	-0.066***	[0.019]	-0.049***	[0.017]	-0.034**	[0.016]	-0.045***	[0.015]	-0.060***	[0.017]	-0.088***	[0.019]
Savings	-0.092***	[0.015]	-0.096***	[0.014]	-0.118***	[0.015]	-0.128***	[0.013]	-0.101***	[0.012]	-0.100***	[0.013]	-0.095***	[0.014]	-0.105***	[0.015]
Brest region (OV: Minsk region)	0.102***	[0.027]	-0.011	[0.023]	0.101***	[0.025]	0.119***	[0.023]	0.064***	[0.021]	0.057***	[0.021]	0.064***	[0.025]	0.066**	[0.027]
Vitebsk region	0.058**	[0.029]	0.008	[0.024]	0.058***	[0.027]	0.118***	[0.024]	0.048**	[0.023]	0.059***	[0.022]	0.055**	[0.024]	0.046	[0.029]
Grodno region	0.011	[0.029]	-0.013	[0.024]	0.040	[0.028]	0.019	[0.031]	-0.004	[0.023]	0.024	[0.025]	-0.023	[0.027]	0.008	[0.028]
Gomel region	0.081***	[0.027]	0.062***	[0.022]	0.082***	[0.026]	0.126***	[0.023]	0.090***	[0.022]	0.070***	[0.021]	0.058**	[0.025]	0.045*	[0.026]
Mogilev region	0.154***	[0.029]	0.115***	[0.024]	0.142***	[0.028]	0.104***	[0.025]	0.085***	[0.023]	0.111***	[0.022]	0.052*	[0.027]	0.085***	[0.028]
Town (OV: village)	-0.055***	[0.018]	-0.076***	[0.016]	-0.066***	[0.019]	-0.029	[0.017]	-0.060***	[0.015]	-0.039**	[0.015]	-0.076***	[0.020]	-0.066***	[0.020]
City	-0.138***	[0.019]	-0.125***	[0.017]	-0.117***	[0.019]	-0.085***	[0.017]	-0.090***	[0.015]	-0.074***	[0.015]	-0.141***	[0.016]	-0.125***	[0.018]
Minsk	-0.121***	[0.033]	-0.230***	[0.029]	-0.117***	[0.030]	-0.103***	[0.030]	-0.074***	[0.026]	-0.080***	[0.027]	-0.220***	[0.031]	-0.204***	[0.031]
Observations	4535		5006		4949		4803		4971		5123		5350		5367	
Pseudo R^2	0.213		0.239		0.220		0.235		0.214		0.263		0.238		0.256	

Note: Results reflect weighted household data. Robust z statistics in square brackets. *** significant at 1%, ** significant at 5%, * significant at 10%.

In contrast, the results of this study show that incomplete family is very important and significant determinant of poverty in Belarus. During 2009-2016, being a lonely mother with children increases the probability of being poor, for example, by 8.7 percentage points in 2009, by 11.4 percentage points in 2011 and by 7.4 percentage points in 2016.

As Table 8 shows, both access to landplot and savings reduce the probability of being poor for Belarusian families. Besides that, all coefficients for variable indicating presence of the inactive member in the household are positive and statistically significant indicating increase in the likelihood of being poor for such households in Belarus.

Furthermore, the probit results also indicate that, relative to rural areas, families in urban areas and especially in Minsk are less vulnerable to poverty. Moreover, in 2015-2016 the last link increased substantially, indicating more job and higher earnings opportunities in Belarusian capital in period of economic crisis. In turn, households living in rural areas mostly dependent on agriculture that do not have many employment opportunities. Therefore, the poverty alleviation strategies are more urgent in rural areas and in small cities of Belarus especially in years of economic turbulence.

Finally, poverty in Belarus has also a spatial dimension. Families living in Mogilev, Gomel and Brest regions have substantially higher probabilities of being poor than in the rest of Belarusian regions.

7. Conclusion

Poverty alleviation and development reflect economic and social progress in the country. Therefore, understanding the pattern of poverty and its driving mechanism through which poverty arises and expands can provide valuable insights into the design of pro-poor policies.

Consequently, this paper provides an assessment of poverty in Belarus based on household consumption expenditure and using eight waves of surveys to track the dynamics of poverty change across three development periods: 2009-2011, 2012-2014, and 2015-2016. It was assumed that different macroeconomic conditions followed each of these episodes have differential effects on poverty during the respective periods. The study used the cost of basic needs approach to calculate food and absolute poverty lines for each sampled household over eight years and across all regions of Belarus. An analysis of poverty was performed at the level of entire Belarus and its constituent parts based on Foster-Greer-Thorbecke's poverty indices and using OLS and probit regressions.

Several sets of conclusions can be drawn. First, during 2009-2011, poverty at the national level stayed almost unchanged. The 2011 financial crisis was associated with a slight increase in the incidence of poverty, but not the depth and severity of poverty. During 2012-2014 there was a substantial decrease in incidence of poverty (by 18 percentage points) caused mostly by the strong growth of household incomes (by 39%). In contrast, economic crisis in 2015-2016 was associated with a twofold increase in incidence, depth and severity of poverty in Belarus.

Second, the other outcome of the poverty measures undoubtedly points out that considerably more poverty exists in the nation's rural areas than in urban areas. For instance, the poverty incidence for the nation's rural areas over 2009-2016 is approximately 10.5 percentage points (or 44%) higher than the national average, while that of the urban areas is nearly 4 percentage points (or 16%) below national average. These suggest the presence of significant inequality, with poorer rural households falling to benefit from the more remunerative productive activities. The higher income households tend to be very concentrated in the urban centers of Belarus, where many of these productive activities are based. Moreover, high levels of poverty in rural areas possibly reflect the limited employment opportunities available to households in these areas.

Therefore, more immediately, attention needs to be paid to the reduction in urban-rural inequalities, given that poverty in Belarus is disproportionately a rural phenomenon and given that such inequalities are likely to be an important contributory factor to urban poverty as well (through the migration induced as a result). This raises the issue of whether government policy is sufficiently focused on the needs of rural households to overcome the already very strong tendencies toward urban concentration (78% of population).

Third, comparing to such urban-rural differences, however, some regional differences are also large. In particular, a poverty incidence for Grodno region in 2016 is roughly 3% below the national average, that for the Brest and Mogilev regions are 31% and 21% higher than this average, correspondingly.

Finally, besides describing the pattern of poverty, the second main objective of this paper was to identify some of the most important determinants of welfare and key contributory causes of poverty in Belarus at the household level. Such an analysis provides important general information, which is of value in working out at least some of the key priorities of a poverty alleviation strategy. Among factors that decrease household welfare and increase poverty are household size, the number of children in a household, presence in the household of economically inactive members. The next result is that lonely mothers appear to be substantially more vulnerable to macroeconomic shocks than full families both from welfare and poverty perspectives. By far one of the most important determinants of welfare and poverty in all samples is spatial location of household. Poverty highly discriminates against living in rural areas, Brest, Gomel and Mogilev regions.

In turn, on average, positive influence on consumption expenditure and negative on the chance of getting poor have savings and access to landplot. It is supposed that landplot experience increases household welfare, that is reduces the chance of not having adequate food and thereby falling below the minimum calorie intake.

Therefore, polices directed towards the provision of better family planning, education as well as more diverse possibilities for financial investment, increased non-agricultural employment opportunities for rural residents and additional location specific efforts in Brest, Gomel and Mogilev regions are important for reducing poverty in Belarus.

The further directions of poverty studies in Belarus should include several questions: How much of the differences have been and might be brought down by rapid economic growth? What has been the effectiveness of regional policies and efforts to increase the efficiency of use of regional resources? To what extent can policies to improve the mobility of resources reduce disparities?

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Appendix

Table A1. Calorie requirement by age and gender in Belarus

Age	Male	Female
0-3 months	115	115
4-6 months	115	115
7-12 months	110	110
1-3 years	1350	1350
4-6 years	1750	1750
7-10 years	2200	2200
11-13 years	2500	2400
14-17 years	2900	2500
18-29 years	3050	2400
30-39 years	2900	2350
40-59 years	2725	2300
60-74 years	2300	1975
75 years and more	1950	1700

Source: Ministry of Health of the Republic of Belarus.
Note: The calorie requirement for the different age and gender groups of population in Belarus was taken from the Resolution of the Ministry of Health of the Republic of Belarus of November 20, 2012 No. 180 "About approval of sanitary norms and rules "Requirements to food of the population: norms of physiological needs for energy and nutrients for different population groups of the Republic of Belarus" assuming coefficient of physical activity equal to 1.75.

Table A2. The composition of the consumer food basket for family of four members in Belarus

Item	The volume of annual consumption, kg				Nutritional value (kcal/100 g)
	Male (30-60 years)	Female (30-55 years)	Male (13 years)	Female (7 years)	
Rye bread	73.00	58.40	47.50	25.60	208.40
Wheat bread	47.50	38.30	47.50	40.20	233.60
Flour	9.10	8.40	9.10	8.00	325.10
Macaroni products	6.60	4.40	6.60	3.70	331.90
Rice	5.50	3.70	5.50	3.60	319.40
Semolina	0.00	0.00	2.90	3.60	360.00
Oatmeal	2.20	1.50	2.90	2.90	342.00
Buckwheat	2.20	1.80	3.60	3.60	343.00
Grain millet	1.80	1.10	2.90	2.20	378.00
Pearl barley	1.80	1.50	1.50	0.00	320.00
Legumes	2.60	1.80	2.60	2.20	291.90
Potatoes	127.80	102.20	102.20	83.90	57.60
Cabbage	29.20	21.90	25.60	25.60	21.36
Carrots	21.90	14.60	21.90	18.30	41.00
Beets	21.90	14.60	21.90	18.30	43.00
Greens	5.50	3.70	3.70	2.20	36.00
Cucumbers	18.30	16.40	11.00	7.30	16.00
Tomatoes	18.30	16.40	11.00	7.30	18.10
Other vegetables	18.30	16.40	11.00	7.30	30.50
Canned vegetables	9.10	5.50	11.00	3.70	62.52
Vegetable oil	8.00	6.60	8.00	5.80	899.00
Butter	11.00	8.00	11.00	7.30	717.00
Milk	65.70	65.70	91.30	120.50	58.50
Fermented milk products	54.80	54.80	54.80	54.80	56.00
Sour cream	5.50	4.70	6.60	5.50	213.70
Cheese	2.60	2.20	3.70	3.70	329.10
Cottage cheese	13.90	12.40	18.30	18.30	171.80
Margarine	1.10	1.10	0.00	0.00	743.00
Egg (pieces)	270.10	219.00	328.50	197.10	136.60
Sausage goods	13.50	9.50	5.50	3.70	294.60
Beef	21.20	17.50	31.00	23.70	159.00
Pork	9.10	6.60	8.80	6.60	329.00
Byproducts	2.60	1.80	4.40	2.60	119.40
Chicken	18.30	16.40	21.20	14.60	144.90
Fresh fish (fresh-frozen)	13.10	9.50	20.40	16.40	70.50
Salted fish (herring)	3.70	2.60	3.70	1.80	106.60
Fruit	40.20	40.20	69.40	54.80	40.40
Fruit juices	29.20	29.20	54.80	40.20	61.50

Sugar	25.60	23.70	23.70	20.10	379.00
Dried fruits	4.40	5.50	7.30	7.30	214.40
Tea	0.80	0.70	0.40	0.10	1.00
Salt	3.70	2.90	2.20	1.80	0.00
Pastry	18.30	11.00	18.30	9.10	432.80

Source: Ministry of Labor and Social Protection of the Republic of Belarus.

Note: The composition of the consumer food basket was taken from the Resolution of the Ministry of Labor and Social Protection of the Republic of Belarus of December 14, 2009 No. 146 "About approval of the composition of consumer baskets and annulment of some resolutions of the Ministry of Labor of the Republic of Belarus, Ministry of Labor and Social Protection of the Republic of Belarus". The nutritional value of the items from the consumer food basket was taken from the Resolution of the Ministry of Labor of the Republic of Belarus of December 31, 1998 No. 111 " About approval of the regulation on the calculation of the minimum consumer budgets for different social and demographic groups of population".

Table A3. Structure of low-income household expenditure by main groups of consumption expenditure in Belarus

Year	2009	2010	2011	2012	2013	2014	2015	2016
Food (% of total)	48.00	47.90	50.30	52.20	49.7	50.20	47.2	46.10
Non-food items (% of total)	52.00	52.10	49.70	47.80	50.30	49.80	52.80	53.9

Source: Social Conditions and Standard of Living in the Republic of Belarus, 2016. Statistical data book. 2016. 386 p.; Social Conditions and Standard of Living in the Republic of Belarus, 2017. Statistical data book. 2017. 381 p.; Social Conditions and Standard of Living in the Republic of Belarus, 2014. Statistical data book. 2014. 315 p.

Table A4. Food and absolute poverty lines by year in Belarus

Year / Area	2009	2010	2011	2012	2013	2014	2015	2016
Food poverty line	185810.9	186673.8	206581.3	207651.0	203480.4	207557.6	206890.2	213608.6
Absolute poverty line	383104.9	394891.4	437417.7	447560.1	467913.2	474631.8	498703.9	519764.3

Source: Authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.

Note: BYN, in constant prices (2009=100). Poverty lines presented in the table were defined for the comparison purposes and calculated per standardized person (assuming 2100 kcal/day).

Table A5. Absolute poverty lines by region and household composition in 2016

Region / Household composition	Brest region	Vitebsk region	Gomel region	Grodno region	Minsk city	Minsk region	Mogilev region
Family with one child	1001	995	955	905	996	1033	1010
Family with two children	1170	1174	1167	1131	1251	1205	1142
Single parent family	631	619	631	645	650	667	641
Family with only adults in working age	766	729	770	718	903	701	719
Family with only pensioners	500	502	505	494	541	500	529
Single family, working age	270	284	284	264	312	276	288
Single family, pensioner	225	234	226	227	246	231	241

Source: Authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.

Note: BYN (in nominal average prices).

Table A6. Poverty measures based on absolute poverty line by region and year in Belarus

Year Poverty measure	2009	2010	2011	2012	2013	2014	2015	2016
Headcount index (P_0), %								
Brest	39.021	28.166	38.980	29.837	18.457	18.308	30.052	38.313
Vitebsk	32.169	26.985	32.755	29.557	14.668	15.152	24.733	31.185
Gomel	36.699	37.785	39.436	34.904	23.469	18.348	27.358	33.063
Grodno	28.395	26.094	33.187	18.709	10.774	12.682	19.762	28.416
Minsk city	15.129	8.091	17.464	9.122	7.189	6.101	8.159	12.319
Minsk	26.940	29.951	31.227	18.050	12.365	11.397	23.906	30.342
Mogilev	43.483	40.507	40.990	26.473	21.793	25.037	25.662	35.571
Poverty gap (P_1), %								
Brest	10.426	7.471	9.854	7.288	3.438	4.602	7.767	9.827
Vitebsk	7.779	5.992	8.492	7.884	3.176	3.210	5.727	7.463
Gomel	10.885	10.147	11.026	9.732	5.858	4.288	6.855	8.949
Grodno	6.409	5.620	6.791	3.456	2.550	2.760	4.149	6.395
Minsk city	2.575	1.453	3.228	1.459	0.821	1.105	1.388	2.331
Minsk	7.275	7.129	8.509	3.497	2.656	2.336	5.014	6.406
Mogilev	12.500	11.809	10.769	6.418	5.902	5.180	6.343	9.285
Poverty severity (P_2), %								
Brest	4.103	2.866	3.673	2.683	1.000	1.628	2.875	3.790
Vitebsk	2.954	2.080	3.138	2.898	1.099	0.963	1.939	2.523
Gomel	4.779	3.967	4.483	3.805	2.180	1.510	2.674	3.442
Grodno	2.252	1.846	2.239	0.985	0.871	0.922	1.315	2.109
Minsk city	0.749	0.422	1.063	0.391	0.156	0.281	0.362	0.704
Minsk	2.948	2.573	3.279	1.071	0.920	0.752	1.731	2.125
Mogilev	5.068	4.790	4.357	2.402	2.281	1.707	2.234	3.374

Source: Authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Estimates reflect weighted household data.

Table A7. Poverty measures based on food poverty line by region and year in Belarus

Year	2009	2010	2011	2012	2013	2014	2015	2016
Poverty measure								
Headcount index (P_0), %								
Brest	3.648	2.698	3.665	1.937	0.193	0.973	0.765	2.466
Vitebsk	3.002	1.623	2.180	2.325	0.285	0.000	0.340	0.265
Gomel	5.656	4.427	4.877	2.421	1.674	0.805	1.715	2.307
Grodno	2.071	0.907	1.069	0.495	0.197	0.171	0.570	0.522
Minsk city	0.344	0.000	0.607	0.105	0.000	0.000	0.000	0.159
Minsk	2.643	2.110	3.436	0.288	0.405	0.496	0.307	0.567
Mogilev	5.457	5.170	4.931	1.977	1.118	0.373	0.956	1.484
Poverty gap (P_1), %								
Brest	0.767	0.367	0.486	0.366	0.033	0.107	0.199	0.320
Vitebsk	0.613	0.286	0.466	0.257	0.066	0.000	0.020	0.033
Gomel	1.422	0.715	0.719	0.478	0.192	0.099	0.274	0.334
Grodno	0.206	0.072	0.163	0.035	0.048	0.017	0.037	0.044
Minsk city	0.032	0.000	0.122	0.002	0.000	0.000	0.000	0.022
Minsk	0.645	0.388	0.801	0.054	0.046	0.033	0.066	0.061
Mogilev	1.227	0.861	1.196	0.402	0.188	0.017	0.203	0.179
Poverty severity (P_2), %								
Brest	0.243	0.093	0.130	0.095	0.006	0.017	0.074	0.056
Vitebsk	0.210	0.065	0.138	0.048	0.015	0.000	0.002	0.005
Gomel	0.484	0.154	0.185	0.131	0.031	0.020	0.071	0.090
Grodno	0.035	0.021	0.050	0.004	0.012	0.002	0.003	0.004
Minsk city	0.003	0.000	0.042	0.000	0.000	0.000	0.000	0.003
Minsk	0.218	0.120	0.291	0.010	0.005	0.002	0.014	0.010
Mogilev	0.350	0.238	0.401	0.140	0.064	0.001	0.073	0.033

Source: Authors estimates based on BHBS-2009, BHBS-2010, BHBS-2011, BHBS-2012, BHBS-2013, BHBS-2014, BHBS-2015, BHBS-2016.
Note: Estimates reflect weighted household data.