

THE EFFECT OF DEVALUATION
ON POVERTY IN TRANSITION
COUNTRIES

by

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Abstract

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In 2014 and after some transition countries had change in exchange rate regime, denomination, etc. What it common, is that most of them had significant devaluation. At the same time, countries in transition are those, who have a real problem – poverty. In this work, we discussed main factors of poverty, relationship between poverty and devaluation, but also sources, through which devaluation affects poverty on micro level. It was found that devaluation has almost insignificant negative effect on poverty, but the effect differs among households with different level of education of household's head, decreasing the base effect in all cases. It is worth to mention, that the effect is manifested to a greater extent in former Soviet Union countries and Mongolia.

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Chapter 1

INTRODUCTION

In 1990's most transition countries appeared to face some difficulties during their path. Huge decrease in real GDP, hyperinflation and high level of unemployment are the main features of that time. These emphasized has led many people to poverty. Even though many transition countries recovered from these macroeconomic instabilities in early 2000's, such occasions like world crisis in 2008, brought them back. The consequences of the crisis had an extremely negative impact on the economies of most countries of the world, especially countries with economies in transition. Eastern European countries had a huge drop in GDP drop in 2009, from -5% up to -20% (Kattel 2010). As a result, the economic boom of the early 2000s in transition countries was leveled.

In 2014 and after, in many countries with economies in transition, the national currency devalued. The examples for this can be Ukrainian Hryvna after turning to floating exchange rate (Gorodnichenko 2019); Belarus, which also implemented floating exchange rate in 2015 and even turned to denomination in 2016; The Russian ruble, which for the period from June 2016 to February 2018 devalued by 55.4% against the dollar (Hovhannisyan 2019), etc. In this regard, it is interesting to determine the consequences of such a phenomenon. Also, for transition countries is common the question of poverty, which is one of the indicators of economic development. Moreover, the topic of poverty has recently been relevant, as an example, the last Nobel Prize in economics was awarded to researchers in this field (Michael Kremer, Esther Duflo and Abhijit Banerjee, who received award

for Experimental Approach to Reducing Global Poverty). In this regard, the aim of this research is to determine the effect of devaluation on poverty.

In the research, we use data from two surveys, which include household information for 2010 and 2016. In addition, to determine the level of devaluation, we use information provided by the World Bank. The idea is to study the medium-term cumulative effect of devaluation on poverty. So, we would like to answer a question: is devaluation affects poverty, through what? And what is the magnitude?

In chapter 2 a discussion of recent researches on the topic is provided. Chapter 3 is a methodology part. Data sources description and some descriptive statistics are provided in chapter 4. The results of estimation and its discussion are provided in chapter 5. Chapter 6 concludes.

Chapter 2

LITERATURE REVIEW

There is no doubt that poverty is a phenomenon that is present absolutely in all countries of the world. Therefore, our first step is to analyze different approaches to define poverty in modern economic discourse. (Revenga et al. 2002:11) quotes that poverty affects persons, families, or groups of people whose resources (material, cultural and social) are limited to the extent that they exclude them from the minimally accepted lifestyle of the countries where they live. Poverty is also determined by the availability of individual resources to meet basic needs.

One of the most initial steps in our research is to understand the nature of poverty. Is poverty being something about incomes, or maybe we may consider it in terms of basic needs and the ability of a particular household to satisfy them. Even more, we can think about poverty as something relative (ability to fulfill needs of a household/individuum compared to the bulk of population). There are many ways to define the poverty, as well as measures of it. Later in this section we will consider some of them.

First of all, we would like to determine how to measure poverty in transition. The problems of the first measure are that in many countries in transition there is a high level of non-market income (shadow economy), seasonal earnings. As a rule, they are difficult to adequately assess, which can distort the results of the study. There are different approaches to measure poverty, for instance (Hagenaars and de Vos 1988) consider the following measures of poverty: basic needs approach, food/income ratio, fixed costs/income ratio, total expenditure/income ratio,

relative deprivation with respect to various commodities, subjective minimum income definition, subjective minimum consumption definition, official minimum.

The authors define three different categories of definitions:

- A. Poverty is having less than an objectively defined, absolute minimum.
- B. Poverty is having less than others in society.
- C. Poverty is feeling you do not have enough to get along.

Consider the first category into which the first four measures of measurement fall:

Basic needs approach: according to this method, the minimum is determined on the basis of basic needs, such as food, shelter and clothing. The poverty line is calculated on the basis of the minimum costs necessary to meet these needs.

Food/income ratio - this measure is based on Engel's law, according to which, with an increase in income, its share spent on food decreases. With food costs that exceed one-third of household income, such a household is considered as poor.

Fixed cost / income ratio - the fixed costs of households are taken into account for this method, for example, rental housing, tuition, etc. It is common knowledge, that fixed costs increase with rising energy prices. For example, in Denmark, a household is considered poor if its fixed cost to income ratio is 0.5.

Total expenditure/Income ratio – this method considers a person as poor in case if his total expenditures cannot be covered by his income, such that he need to borrow money or spend his savings. So, we can conclude that by the first category definitions we have a case of absolute poverty. But poverty can also be relative, thus we can consider the second category of definitions. It is presented by Relative deprivation with respect to various commodities approach, which defines a household as poor in case that it doesn't have certain commodities that are

common in the society, they are living in. It is worth to mention, that this method has a vulnerability, because for example young couples may have less possession than other but not necessarily being poor.

The last group consists of 3 different approaches and while the first and the second group of definitions consider absolute and relative poverty respectively, the third group can be both absolute or relative. The first definition is “Subjective minimum income definition”, the idea is that in a household survey, it indicates sufficient and insufficient income for their situation. In the future, the geometric mean values of these two quantities will be taken, which ultimately form the subjective minimum income that can be used as a base for comparison with the real income of the household to determine whether it is poor. It is important here to indicate that the assumption that sufficient and insufficient income is associated with the same level of wealth for all households.

Subjective minimum consumption definition – in this method, households are asked what their basic needs are and what minimum income they need to meet these basic needs. After the survey, you can form a subjective minimum based on which you can compare it with the real costs of the household to meet this need and determine whether the household is poor. Most often, the need for food is considered.

The last one is official minimum – it is an indicator that is determined by the state and is a good measure for comparison. When working with data from more than one country, it may be difficult to find relevant information on the cost of living for all countries of individuality. All in all, methods provided by (Hagenaars and de Vos 1988) can be useful in defining poverty, but there are some other approaches to be considered.

It is also worth highlighting such methods of assessing the level of poverty as 1 or 2 dollars a day. The methodology of the approach is quite obvious from the name, it's enough to see if the daily income of a household exceeds \$ 1 or \$ 2 a day, if not, we can consider this household as poor. However, since each household may differ in the number of participants, it will therefore be more objective to compare the average income for each household member with values of 1 or 2 dollars. It is also worth noting that this method may incorrectly determine the level of poverty when examining several groups of countries, since different countries have different levels of prices, social benefits, etc. Therefore, the level of 1/2 dollar per day or 30/60 dollars per month per person in some countries can reach 90 or more percent of the population, but due to the high level of prices, many residents will not be able to satisfy even basic needs with their income.

Since this paper is about transition countries, we would like to explore the recent approaches of measuring poverty in transition, and, using this information, complete our methodology. (Brück et al. 2010) provides an example of measuring poverty Ukraine in during transition. For empirical analysis, they used data from household surveys conducted by the Kyiv Institute of Sociology in 1996 and 2004. During the study, they calculated an absolute and extreme poverty lines using the "basic cost method". It is clear that in 1996 10.9% of households were below the extreme poverty line and 20.8% below the absolute. For 2004 data - 6.1% and 23.2%, respectively. They used OLS and probit estimation and determined that some characteristics of households are highly correlated with well-being. For example, gender, education, land availability was highlighted as well as geographical factor. Also, they determined that households in the West had greater consumption and income than the average households in other regions in 1996, but in 2004 this advantage was leveled.

Income distribution is also one of the key factors, which affects poverty. Change in the mechanism of setting wages in Post-Soviet time (in Soviet the wages were set and fixed by the state), increased the inequality of income distribution (Gorodnichenko and Sabirianova 2005; Munich et al. 2005). Speaking about transition countries, it is worth to mention that in 90th many countries faced the process of mass privatization of state enterprises. (Commander et al. 1999; Milanovic and Branko 1999; Birdsall and Nellis 2003). Speculators, managers of enterprises benefited a lot during this process. Speculators bought vouchers almost for free, when managers could use their informal property rights in order to maximize their incomes and power (Alexeev 1999). Also, privatization affected wages distribution among types of enterprises. It is observed, that private enterprises on average provided higher incomes than state ones, comparing the workers with the same characteristics such as level of education, work experience and position (Brainerd 2002).

Poverty in transition countries can be considered as a combination of characteristics divided into 5 different dimensions: insufficient food and clothing, bad housing quality and limited access to utilities, health and healthcare, psychological effects, social exclusion (Bezemer 2006). In other words, poor individuals live in the worst housings, they are lack money for satisfying such basic needs as food and clothing. These first features are quite similar to above mentioned ones but the extension is considering the fact that poor people were restricted to healthcare. That is the reason why some transition countries had extremely high level of illness cases, especially tuberculosis. Many people were unable to complete the treatment, some of them weren't able even to start. In Kyrgyzistan, only 29 % of the poor have access to a hospital, compared to 46 % for the non-poor (Scott 2001).

That's why in our research we have decided to work with available data to explore, how and through which sources devaluation affects poverty in transition countries. The direction of this relationship and its statistical significance.

Chapter 3

METHODOLOGY

The purpose of the research is to determine how the devaluation of the national currency affects poverty in developing countries.

The main hypotheses that will be tested during the study:

1. Does devaluation increase poverty?

Since devaluation is the key variable of interest in our study, it is important to mention, how do we define it. As we work with data for years 2010 and 2016, our approach is to calculate the devaluation levels during this period. The base currency for us is United States dollar (USD). Therefore, using the data for exchange rates (World Bank 2020), we determined the size of devaluation in percent in all transition countries between 2010 and 2016.

As for the econometric model, we decided to do linear probability model estimated using OLS, with similar regressors to Brück et al. model. It contains some socio-demographic and socio-economic variables. Our dependent variable will be binary variable which is an indicator whether household is poor. In addition to OLS estimation we decided to use some more sophisticated estimation – MLE and chose probit model.

For our analysis, we decided to chose the following measure of poverty, which depends on how household assess itself. The choice is determined by the data that is available. There is a question from LiTS II/III: “Please imagine a ten-step ladder where on the bottom, the first step, stand the poorest 10% people in our country, and on the highest step, the tenth, stand the richest 10% people in our country. On which step of the ten is your household today?”. The set of possible answers is from 1 to 10. Where 1 – the lowest level, 10 – the highest. Therefore, in our analysis we define household as poor, if the answer is 1. Also, we will try the same model with additional 10%, by defining household as poor, if the answer is 1 or 2. The idea is that many people they might not understand their real level of welfare, or they may try to pretend not as poor as they really are.

In our analysis we have data, which represents the information among different countries. For this reason, we need do our estimation with clustered standard errors at country level.

3.1. Basic linear probability model

First step of our analysis is a simple linear probability model with demographic variables and some regions controls. Using this model, we would like to observe, which factors affects poverty and what is the effect of devaluation. Our model can be represented with the following equation:

$$\begin{aligned}
 \text{Poor}^i = & \alpha_0 + \alpha_1 * h_{ch}^i + \alpha_2 * \text{Devaluation } \%^j + \alpha_3 * \\
 & \text{FSU and Mongolia} + \alpha_4 * \text{Southern Europe} + e^i
 \end{aligned}
 \tag{1}$$

Where,

h_{ch} – vector of household characteristics.

Devaluation % - size of devaluation for the period 2010 – 2016 in the country of i 's household

FSU and Mongolia, Southern Europe – regional dummies

i – number of the household

j – number of the country

e – error term

3.2. Extended linear probability model

As an extension of the model (1), we would like to explore, how devaluation affects different types of households. In other words, does devaluation increase the probability of household to be poor, considering the structure of household and level of education of household's head. To do this, we add the cross-terms in equation (1), so that our extended linear probability model can be represented with the following equation:

$$\begin{aligned} Poor^i = & \alpha_0 + \alpha_1 * h_{ch}^i + \alpha_2 * Devaluation \%^j + \alpha_3 * \\ & Devaluation \%^j * h_{ch}^i + \alpha_4 * FSU \text{ and Mongolia} + \alpha_5 * \\ & Southern \text{ Europe} + e^i \end{aligned} \quad (2)$$

Where,

h_{ch} – vector of household characteristics for interaction

3.3. Probit model

For robustness check, we decided to build a probit model, which will have exactly the same regressors as (2).

3.4. Description of variables

Speaking about the vector of household characteristics (h_{ch}) it is worth to mention the set of variables. We included dummies for educational level of household's head (no primary education, some secondary education and some higher education). As for the base we have primary level of education. There also present regressors for the size of household ($\log_household_size$, share of children, share of age 15-25, share of age 41-pension, share of pensioners (men age 60+, women age 55+)). We decided to use logarithmic specification for household size as in the Brück at al. model. The next group of variables are controls for structure and gender – households with only children (age < 15) and women; female headed households. Controls for urban status and access to land were also implemented. Finally, we included variables for age of household's head using quadratic specification and control for households with members of former communist party.

Also, from the model one can observe two variables – “FSU and Mongolia” and “Southern Europe”. These are regional dummies. Since we would like to explore the effect of devaluation across different regions, we decided to add them to them

model. We will compare the effect with Eastern Europe region. It is worth to mention, that Estonia, Latvia and Lithuania were excluded from the “FSU and Mongolia” region, since their economies significantly differs from ones from FSU.

Previously in this chapter we mentioned the vector h_{ch} . This vector is a shortened version of h_{ch} , it contains the continuous variables for the structure of the household (share of children, women, retired, etc.), controls for education level and urban status. Using this vector and interacting it with Devaluation, we would like to find out how devaluation affects different groups of households.

Chapter 4

DATA

4.1. Data description

The main source of data is life in transition survey (LiTS II and LiTS III). LiTS II was conducted in 2010 and LiTS III was conducted in 2016. The survey for 2010 consists of 38864 observations of households from 35 countries, while the one for 2016 has information about 51206 households from 34 countries. This data will be necessary for household characteristics, and also it will help us to determine, which households are poor under certain measures and which characteristics lead to poverty.

According to the data, provided by World Bank, it is observed that some of the countries from sample experienced major devaluation around and after 2014.

4.2. Descriptive statistics

In the previous chapter we introduced the set of households' characteristics. In this chapter, we provide some descriptive statistics of this characteristics (Table 1 for year 2010, Table 2 for year 2016).

Table 1. Households characteristics (2010). Source: LiTS II, author's calculations

Variable	Mean	Standard deviation	Min	Max
Number of household members	3.07	1.61	1	12
Number of females	1.62	0.99	0	8
Number of children	0.52	0.87	0	7
Age of the household head	50.73	15.55	16	94
Household income, \$	681.02	701.41	3.02	20743.1
No primary education, %	0.02409	0.153	-	-
Secondary education, %	0.6674	0.471	-	-
Higher education, %	0.1882	0.391	-	-
Share of children	0.121	0.1886	0	1

TABLE 1 – Continued

Variable	Mean	Standard deviation	Min	Max
Share of young (15-25)	0.1624	0.241	0	1
Share of aged 41-retirement age*	0.248	0.3081	0	1
Share of retired	0.2765	0.3885	0	1
Households with only women and children	0.01	0.098	-	-
Number of observations	20006			

* - retired age is assumed to be 55 for women and 60 for men

Table 1 represents the descriptive statistics for LiTSII (2010), and from the table one can observe means, standard deviations, minimum and maximum of the variables from our analysis.

Unfortunately, there is no data for household income in LiTSII, for this reason we decided to define income as households' consumption and savings. There are presented data for savings and expenditures on food, beverage, tobacco, utilities, transport (monthly data), education, health, clothing (annual data). Since some observations didn't have data for consumption and savings, we decided to drop them. It is worth to mention, that all data presented is measured in local currencies.

Thus, we used data for exchange rates for 2010 and 2016 (World Bank 2020) to convert them in USD. Also, we took into account the fact that some countries in sample had denomination (Belarus, 1 ruble of 2016 = 10000 rubles of 2010) or changed their local currency for euro during 2010-2016 (Estonia, krona to euro).

There are also present some binary variables in Table 1. These are controls for level of education. In our analysis we consider 4 levels of education: no primary education, primary, secondary and higher education. As one can observe, there is no variable for primary level of education in Table 1, this is because in our analysis primary level of education is considered as the base level. Therefore, we will compare the effect of level of education with primary education. It is worth to mention, that the bulk of households' heads have some secondary education (66.74% of all households).

In the Section 3, one can observe that we have also some variables, related to the structure of households, such as: share of children, share of women and children in the household, share of young people (15-25 years old), share of people age from 41 to the retirement age, and finally, share of retired people in the household. As one can observe from the Table 1, we have a high share of retired people in the households from the survey. More than a quarter of households' members are retired. It is worth to mention, that there is a low share of households that consist only of women and children (approximately 1%).

Table 2. Households characteristics (2016). Source: LiTS III, author's calculations

Variable	Mean	Standard deviation	Min	Max
Number of household members	2.87	1.73	1	>10
Number of females	1.49	1.01	0	10
Number of children	0.51	0.91	0	7
Age of the household head	53.22	15.88	18	95
Household income, \$	728.86	1081.30	1.04	70705.97
No primary education, %	0.014	0.118	-	-
Secondary education, %	0.6487	0.478	-	-
Higher education, %	0.2396	0.427	-	-
Share of children	0.1153	0.1895	0	0.8571

TABLE 2 – Continued

Variable	Mean	Standard deviation	Min	Max
Share of young (15-25)	0.1198	0.2167	0	1
Share of aged 41- retirement age*	0.2428	0.3267	0	1
Share of retired	0.3402	0.4217	0	1
Households with only women and children	0.1957	0.3967	-	-
Number of observations			36861	

* - retired age is assumed to be 55 for women and 60 for men

Table 2 provides statistics for households' characteristics. It is worth to mention, that we didn't have such a problem, as in LiTSII, since there was present the data for household income in LiTSIII.

As one can observe from Table 2, average income in 2016 is slightly higher than in 2010 (728.86 \$ vs 681.02\$), which is approximately 7% difference. Taking in account that the interval is 6 years and the fact that some countries had a huge inflation during these years, this positive difference was totally "eaten" by time and inflation. This can be confirmed by the fact that only 3 countries from our analysis (Bosnia and Herzegovina, Slovenia and Croatia) had increase in CPI less than 7% (World Bank, 2020).

Speaking about education, we can see that in LiTSIII there is higher share of households' heads with higher education (23.96% vs 18.82%) and lower share of households' heads with no primary education (1.4% vs 2.4%). As in LiTSII, the bulk of our sample are households with heads who have some secondary education.

Besides the statistics for levels of education, income and number of members in each household, we also would like to consider the statistics for households' structure. From Table 1, one can observe, that we have approximately the same share of children and young people in households from the survey for year 2016 (on average 11.53% and 11.98% respectively). These numbers are less than the corresponding from the survey for year 2010. On the opposite, we observe, that share of retired in the households from LiTSIII is higher than in LiTSII (on average 34.02% vs 27.65%). And there are also present much more households with only women and children (19.57% vs 1%).

As for the part of our analysis, we would like to observe the relationship between devaluation and change in level of poverty in time. For this issue we created a scatter plot, where on X-line we have size of Devaluation, % and on Y-line located change in poverty, % (Figure 1). Due to the extremely high level of Devaluation in Belarus (500% +) it was excluded from the graph for better visibility, but the data for this country is used in estimation.

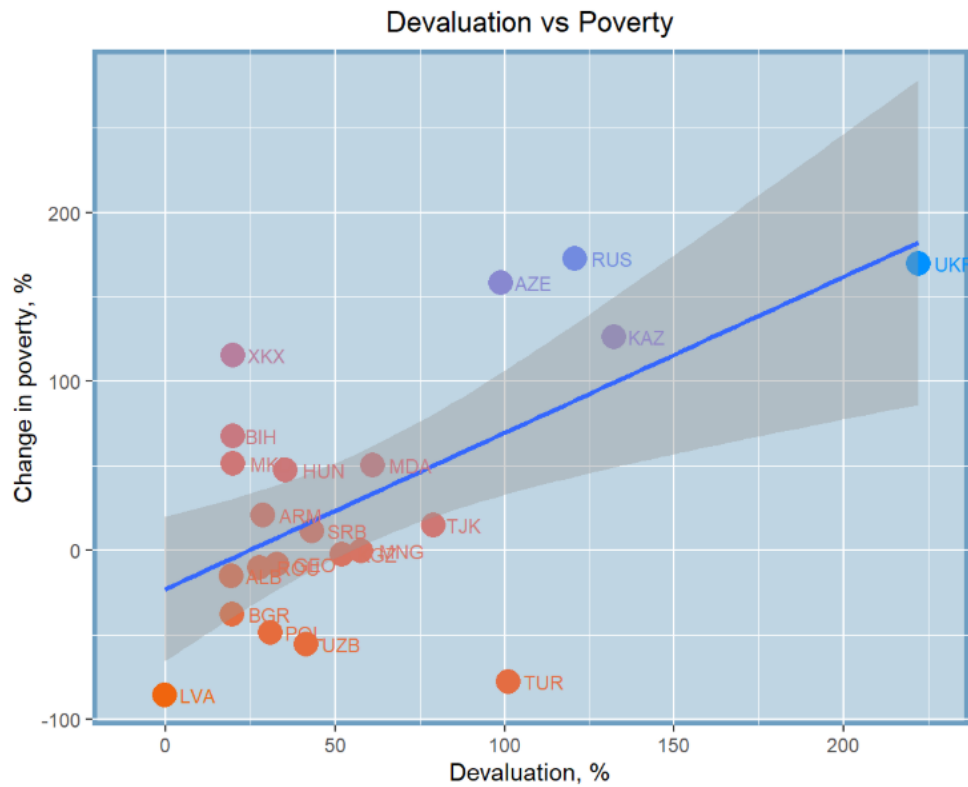


Figure 1. Devaluation and change in poverty (relative)

Note: Figure is based on author's calculations using LiTS II and LiTS III

As one can observe from the graph, there exists a positive relationship between the size of devaluation and change in poverty in time. For this scatter plot we used “income <2\$ per day” measure of poverty. It is worth to mention, that there are two ways to measure change in poverty: relative and absolute terms. In Figure 1, we used the relative comparison, while Figure 2 represents comparison in absolute terms.

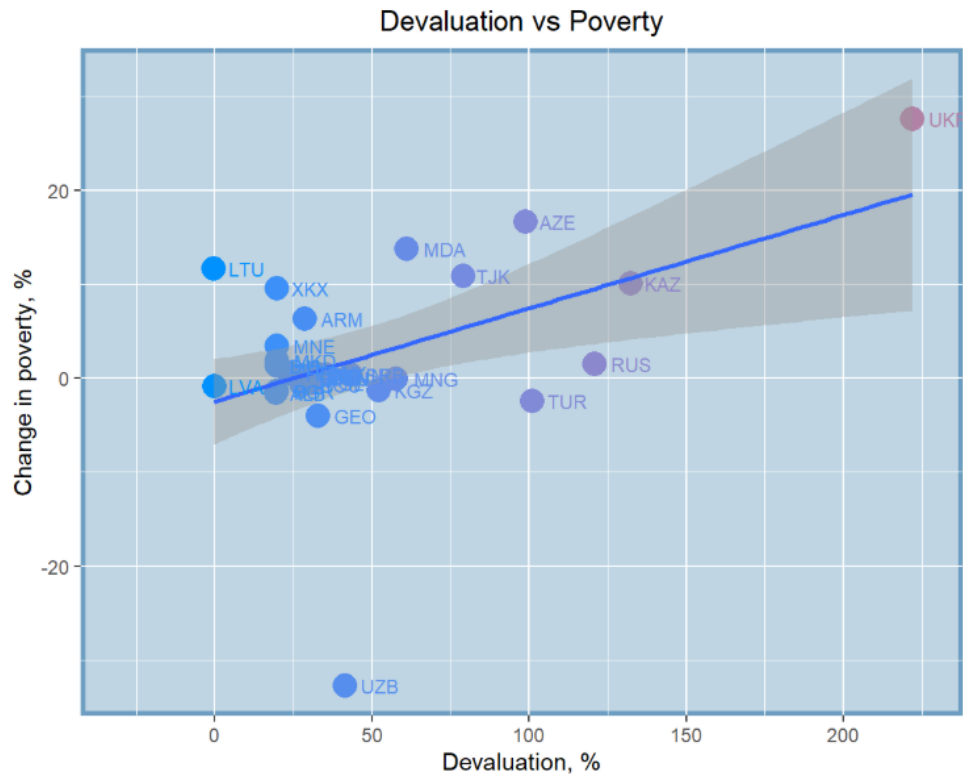


Figure 2. Devaluation and change in poverty (absolute)
 Note: Figure is based on author's calculations using LiTS II and LiTS III

Figure 2 as well as Figure 1 shows us a positive relation between size of devaluation and change in poverty in time. Therefore, we can turn to estimation and try to confirm the relationship between devaluation and poverty empirically.

Chapter 5

RESULTS

According to the chosen methodology we made an OLS and ML estimation for previously-mentioned measures of poverty using the data for household characteristics (36861 observations) and devaluation in percent for the period 2010-2016.

5.1. Basic LPM results

In result (Appendix A), we can conclude that educational level has statistically significant relationship with poverty. This can be proven by the fact, that the coefficients on all 3 dummies, which control for level of education, are statistically significant. Even more, these is the case not only for regression, where we consider household as poor if the answer on the question of interest was 1, but also for the second regression (from now, we will call these regressions as regression 1 and regression 2 respectively). Since our reference level of education was primary education, therefore we can interpret the results in this way: households, whose head don't have even a primary level of education, they are at 6.92% more likely to be poor, than those households, whose head has a primary level of education (10.2% from regression 2). Speaking about secondary and higher education, when head of a household has secondary level of education, such household is at 3.27% less likely to be poor, compared to reference level (7.83% from regression 2); if higher – at 5.55% (13.58% from regression 2).

As it was already mentioned, in our model we included a variable, controlling for membership in former Soviet party. Earlier, we speculated that the effect of being a former member of Soviet party can be explained by the fact, that former members had some privileges comparing to other people. It was previously mentioned in the literature review that many managers, especially in the period of mass privatization benefited from their ability to implement their plans. And it is obvious that very high percentage of managers were the members of former Soviet party. But we didn't observe statistically significant evidence in our analysis, as in our linear probability model we don't have a statistically significant coefficient on the corresponding variable.

Speaking about urban factor, we can't conclude that it has significant effect. From our analysis, households from city and countryside have equal chances to be poor, which is proven by results of both regressions.

In terms of the size of household, from our regressions we can indicate that the households with high number of members are less likely to be poor. This finding is quite interesting, since there is an opportunity to speculate. On the one hand, one think that high number of household members leads to extremely high costs in absolute terms. And these costs are probably hard to cover, especially if this is a household with many children. On the other hand, in households with high number of members possibly could be reduced fixed costs per one person, especially if all members share one dwelling. Also, if this is the case, when most household members have income, then logically, such households have low probability to be poor. So, it is worth to discuss, how different groups of household members and their participating in household's structure affects the probability of household to be poor.

According to the ages and structure of household, one can observe for the share of young people (aged 15-25), has statistically insignificant effect on poverty. The

same can be said and for some other groups, such as aged 41-retirement age and retired people. But share of children has significant positive effect on poverty. The is logical, that the higher share of children in household, the higher probability of such household to be poor, as children don't have income, but their parents have costs associated with children. Speaking about households, which consists only from women and children, we didn't observe any significant effect on probability of household to be poor.

Gender factor appeared to have statistically significant effect on poverty, as from both regressions we observe that female-headed households are more likely to be poor (at 1.09% and 2.14% from regressions 1 and 2 respectively).

Age of household's head is also a significant factor, which affects poverty. It is observed that 1 additional year of life of household's head increases the probability of household to be poor by 0.19% (by 0.24% from regression 2). However, this effect is not so huge. Also, there is no evidence on reverse, since the coefficient on quadratic term is statistically insignificant.

In our model we have 2 regional dummy variables: FSU and Mongolia and Southern Europe. From the regressions we see that the compared to Eastern Europe countries (which is a reference level), households from FSU countries and Mongolia are much more likely to be poor (difference in probability varies between 5.04% to 9.03% among regressions). Speaking about Southern Europe countries, there is no chance to conclude about the significance of the relationship, which appeared to be negative in our analysis.

Since our main variable of interest is "Devaluation", it is worth to notice that from both regressions we observe negative and significant relationship between devaluation and poverty. The effect is not huge, it is also 0.013% decrease in probability of household to be poor, with 1 additional percent increase in the level

of devaluation. And now we would like to discuss, how devaluation affects the poverty among different groups of households. For this, we proceed to the extended model.

5.2. Extended LPM results

According to the methodology, our basic linear probability model was extended with some cross-terms. The results of estimation are presented in Appendix B.

The results of estimation of (2) are consistent with results of estimation of (1). We see, that the effect of education remains the same in direction, but now it is slightly larger: if we speak about households with head who don't have a primary level of education, the probability of being poor is +8% and +13.01% from regressions 1 and 2 respectively (from (1) it was 6.92% and 10.2%). For secondary: -3.64% and -9.2% (from (1) it was -3.27% and 7.83%). Finally, for higher education: -6.02% and -15.21% (from (2) it was -5.55% and -13.58%). For other variables we have extremely close estimates, including "access to land", which we didn't mention in previous subsection. The effect there is negative in both regressions, but significant only in regression 1. From this regression we conclude, that households, which have access to land are .8% less likely to be poor.

Speaking about devaluation, in this model the effect is still statistically significant and negative. From regression 1 we have -0.027% change in poverty, with 1 additional percent of change in level of devaluation, from regression 2 it is -0.058%. Now we would like to consider the cross-terms. The cut model estimates are represented in Table 3.

Table 3. Cross-terms estimates of extended LPM. Source: LiTS III, author's calculations

	Estimate (10%)	P-value	Estimate (20%)	P-value
Devaluation*Share of aged 15-25	0.0033	0.2459	0.0059	0.3615
Devaluation*Share of aged 41-retirement age	-0.0035*	0.0774	-0.0053*	0.0519
Devaluation*Share of retired	0.0003	0.9297	0.0098	0.3836
Devaluation*Only women and children in HH	0.0016	0.4829	0.0068	0.1039
Devaluation*No primary education	-0.0298	0.2398	-0.0765*	0.0803
Devaluation*Some secondary education	0.0102	0.1445	0.0348***	0.0033
Devaluation*Some higher education	0.0116*	0.0677	0.0386***	0.0007
Devaluation*Urban	0.0044	0.2409	0.0043	0.5344

From Table 3 one can observe, that the effect of devaluation is statistically significant for share of aged 41-retirement age. We can say that devaluation decreases the probability of household to be poor for those who have higher share of aged 41-retirement age. From regression 2, we observe that devaluation decreases the positive relationship with households whose heads don't have a primary level of education and poverty. But such effect didn't appear to be significant in regression 1. The same is for households whose heads have secondary level of education. In this case devaluation increases the probability of such households to be poor. Speaking about higher education, both regressions tells us

that devaluation increases the probability of such households to be poor. The effect is even larger than for secondary level of education.

5.3. Probit regression results

As was already mentioned, for the part of our analysis, for robustness check we decided to run a probit regression with the same regressors as in extended linear probability model. This estimation was made using maximum likelihood estimation. Also, as in the previous models, our standard errors were clustered at country level. The results of probit regression are represented in Appendix C. The estimates of cross-terms are represented in Table 4.

Table 4. Cross-term estimates of probit model. Source: LiTS III (2016), author's calculations

	Estimate (10%)	P-value	Estimate (20%)	P-value
Devaluation*Share of aged 15-25	0.0299	0.7314	0.0325	0.5286
Devaluation*Share of aged 41-retirement age	-0.0503	0.2576	-0.0362*	0.0608
Devaluation*Share of retired	0.0168	0.6823	0.0318	0.4877
Devaluation*Only women and children in HH	0.0519	0.1710	0.0374**	0.0299
Devaluation*No primary education	-0.6029	0.1740	-0.9601**	0.0120
Devaluation*Some secondary education	0.1419	0.2449	0.1749***	0.0077

TABLE 4 – Continued

	Estimate (10%)	P-value	Estimate (20%)	P-value
Devaluation*Some higher education	0.1555	0.1544	0.2164***	0.0020
Devaluation*Urban	0.0801	0.3071	0.0224	0.5945

From Table 4, one can observe that nothing appeared to be statistically significant in regression 1, if we speak about cross-terms. But if we look at regression 2, we see that as in extended LPM, the effect of devaluation differs among households with different level of education of household's head (in all 3 cases it decreases the base effect). Also, we observe that it decreases the probability for people aged from 41 to retirement age, but increases the probability for households which consist from only children and women.

Chapter 6

CONCLUSIONS

In this research we tried to explore the effect of devaluation on poverty using linear probability model (OLS estimation) and probit (ML). The main hypothesis was a question: “Does devaluation increase poverty?”. We can conclude that hypothesis is rejected, this is confirmed by the results of the modelling, since for all regressions we have negative and significant coefficients on corresponding variable.

As a result of our estimation is the fact that level of education of household head his age, households’ size as long as share of children and access to land affect the probability of household to be poor. Even more, these results are consistent with the literature. Speaking about the interactions with devaluations (for education level and structure of household), there is statistically significant evidence that the effect of devaluation differs among households with different levels of education of household’s head. In this case, devaluation slightly decreases the main effect of these groups.

In addition, we can conclude that households from former Soviet Union countries and Mongolia are much more likely to be poor than households from Eastern and Southern Europe.

All in all, we can conclude that there presents a negative relationship between devaluation and poverty in transition countries. One issue, which is still need to be discussed is that since relationship is negative, it is worth to explore long-lasting effect of recent devaluation. There could be a situation, that households’ welfare

could adjust to new exchange rate regimes, increasing devaluation in some years.
So, it is reasonable to try using lagged devaluation further.

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APPENDIX A

BASIC LPM MODEL ESTIMATION

Table 5. Output for OLS estimation of probability of household to be poor

	Estimate (10%)	P-value	Estimate (20%)	P-value
Intercept	0.0204	0.5074	0.1146***	0.0097
Age of household's head	0.0019**	0.0439	0.0024*	0.0705
Age of household's head squared	-0.00001	0.1396	-0.00001	0.4220
No primary education	0.0692**	0.0142	0.1020***	0.0000
Some higher education	-0.0555***	0.0000	-0.1358***	0.0000
Some secondary education	-0.0327***	0.0002	-0.0783***	0.0000
Non-communist	-0.0015	0.5218	0.0006	0.9061
Urban	-0.0005	0.8990	0.0005	0.9372
Ln (household size)	-0.0251***	0.0000	-0.0619***	0.0000
Share of children	0.0275***	0.0055	0.0754***	0.0001
Share of aged 15-25	0.0003	0.9606	-0.0058	0.7139
Share of aged 41 – retirement age	0.0021	0.7680	0.0077	0.4315
Share of retired	0.0019	0.8479	0.0148	0.2623
Only women and children in HH	-0.0041	0.4635	0.0016	0.8263
Access to land	-0.0080**	0.0296	-0.0049	0.5038
Devaluation	-0.0129***	0.0017	-0.0154**	0.0102
Female-headed household	0.0109**	0.0151	0.0214***	0.0005
FSU countries and Mongolia	0.0504***	0.0008	0.0903***	0.0002
Southern EU	-0.0097	0.1562	-0.0169	0.2555

APPENDIX B

EXTENDED LPM ESTIMATION

Table 6. Output for OLS estimation of probability of household to be poor (2)

	Estimate (10%)	P-value	Estimate (20%)	P-value
Intercept	0.0259	0.4062	0.1352***	0.0027
Age of household's head	0.0019**	0.0433	0.0023*	0.0749
Age of household's head squared	-0.00001	0.1362	-0.00001	0.4443
No primary education	0.0800***	0.0230	0.1301***	0.0001
Some higher education	-0.0602***	0.0000	-0.1521***	0.0000
Some secondary education	-0.0364***	0.0005	-0.0920***	0.0000
Non-communist	-0.0016	0.4946	0.0002	0.9732
Urban	-0.0029	0.5355	-0.0012	0.8699
Ln (household size)	-0.0252***	0.0000	-0.0623***	0.0000
Share of children	0.0273***	0.0056	0.0753***	0.0001
Share of aged 15-25	-0.0020	0.7434	-0.0098	0.5721
Share of aged 41 – retirement age	0.0043	0.5674	0.0113	0.2672
Share of retired	0.0016	0.8701	0.0087	0.5420
Only women and children in HH	-0.0054	0.3661	-0.0035	0.6552
Access to land	-0.0080**	0.0298	-0.0049	0.5055
Devaluation	-0.0266**	0.0161	-0.0583***	0.0040
Female-headed household	0.0111**	0.0126	0.0218***	0.0003
FSU countries and Mongolia	0.0509***	0.0007	0.0910***	0.0002
Southern EU	-0.0098	0.1532	-0.0173	0.2423

TABLE 6 - Continued

	Estimate (10%)	P-value	Estimate (20%)	P-value
Devaluation*Share of aged 15-25	0.0033	0.2459	0.0059	0.3615
Devaluation*Share of aged 41- retirement age	-0.0035*	0.0774	-0.0053*	0.0519
Devaluation*Share of retired	0.0003	0.9297	0.0098	0.3836
Devaluation*Only women and children in HH	0.0016	0.4829	0.0068	0.1039
Devaluation*No primary education	-0.0298	0.2398	-0.0765*	0.0803
Devaluation*Some secondary education	0.0102	0.1445	0.0348***	0.0033
Devaluation*Some higher education	0.0116*	0.0677	0.0386***	0.0007
Devaluation*Urban	0.0044	0.2409	0.0043	0.5344

APPENDIX C

PROBIT MODEL ESTIMATION

Table 7. Output for MLE estimation of probability of household to be poor

	Estimate (10%)	P-value	Estimate (20%)	P-value
Intercept	-2.1724***	0.0000	-1.2664***	0.0000
Age of household's head	0.0278**	0.0298	0.0142*	0.0708
Age of household's head squared	-0.0002*	0.0594	-0.0001	0.2648
No primary education	0.5888***	0.0089	0.6441***	0.0001
Some higher education	-0.7460***	0.0000	-0.8385***	0.0000
Some secondary education	-0.3898***	0.0000	-0.4312***	0.0000
Non-communist	-0.0159	0.5866	0.0006	0.9825
Urban	-0.0424	0.4832	-0.0035	0.9328
Ln (household size)	-0.2875***	0.0000	-0.3270***	0.0000
Share of children	0.3573***	0.0085	0.4316***	0.0005
Share of aged 15-25	-0.0176	0.8713	-0.0607	0.6341
Share of aged 41 – retirement age	0.0929	0.2890	0.0999*	0.0773
Share of retired	0.0430	0.6871	0.0838	0.2454
Only women and children in HH	-0.1226**	0.0349	-0.0714*	0.0773
Access to land	-0.0969**	0.0208	-0.0325	0.3971
Devaluation	-0.3825*	0.0676	-0.2992**	0.0122
Female-headed household	0.1458***	0.0004	0.1359***	0.0000
FSU countries and Mongolia	0.5729***	0.0000	0.4885***	0.0000
Southern EU	-0.1553	0.1049	-0.1159	0.1977

TABLE 7 - Continued

	Estimate (10%)	P-value	Estimate (10%)	P-value
Devaluation*Share of aged 15-25	0.0299	0.7314	0.0325	0.5286
Devaluation*Share of aged 41- retirement age	-0.0503	0.2576	-0.0362*	0.0608
Devaluation*Share of retired	0.0168	0.6823	0.0318	0.4877
Devaluation*Only women and children in HH	0.0519	0.1710	0.0374**	0.0299
Devaluation*No primary education	-0.6029	0.1740	-0.9601**	0.0120
Devaluation*Some secondary education	0.1419	0.2449	0.1749***	0.0077
Devaluation*Some higher education	0.1555	0.1544	0.2164***	0.0020
Devaluation*Urban	0.0801	0.3071	0.0224	0.5945