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**Impact of 2014-2015 shocks  
on economic behavior of the households  
in the Kyrgyz Republic**

**Working Paper of the National Bank of the Kyrgyz Republic**

Impact of 2014-2015 shocks on economic behavior of the households  
in the Kyrgyz Republic

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**Summary**

This paper presents the results of a survey of the impact exerted by 2014-2015 economic shock on the households' behavior in the Kyrgyz Republic in the context of expenditures and savings. According to the survey results, the macroeconomic shocks of 2014-2015 were revealed to have a strong as well as uneven impact on the consumption and saving behavior of the households. During the years of crisis, the households are less inclined to save, however the level of savings increases during devaluation of the national currency exchange rate. The households of the following categories, which can be combined, are the most inclined to save: a) those living in the south of the country, b) in the cities, c) having a labor migrant in the family. The impact of shocks on consumption was also multidirectional. The nominally fixed expenditures (utilities, communication, etc.) continued to increase in all households, meanwhile the households run by women demonstrated an increase in their expenditures for food products due to a decrease in other expenditures. Higher education increases the resilience of a household to shocks. Generally, the households are able to return to the pre-crisis consumption level already in the medium term (three-four years) since the crisis.

*JEL: C23, C26, C35, D12, D14*

**Key words:** household expenditures and savings, economic crisis, generalized method of moments, instrumental variables, panel regression, logit regression

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## Introduction

Throughout the entire period of independence, the Kyrgyz Republic has always been vulnerable to external shocks. Close relations of the Kyrgyz Republic with other countries within the framework of the World Trade Organization were replaced by membership in the Eurasian Economic Union and by strengthening of intraregional economic relations and deepening of the unique migration relations between the Kyrgyz Republic and the Russian Federation. The model of a small open economy, which has a beneficial effect on economic development in the absence of a crisis, makes the country vulnerable to external shocks during crisis years, as demonstrates the example of the countries from the Visegrád Group in 2008 (Kocziszky et al., 2018).

The standard of living of the population showed a noticeable decline or, at least, a sharp slowdown during the Russian default of 1998 and the global financial crisis of 2008. Thus, in 1998-2001, chain growth rates in gross expenditures in the Kyrgyz Republic fell from 7 percent in 1999 to zero percent in 2001<sup>3</sup>. Similar phenomena were observed in the economies of Belarus and Moldova, which are relatively similar to the Kyrgyz Republic in structure and population. At the same time, the impact of the Russian default was not accompanied by a reduction in the gross domestic product (hereinafter – GDP) in the aforementioned countries due to the insufficiently close relations with Russia. However, ten years later, these economies were already sufficiently integrated into the economy of the Eurasian region, and the global financial crisis of 2008 clearly demonstrated this. In 2009, the GDP growth rate in Belarus fell from 10.2 to 0.2 percent, in Moldova – from 7.8 to -6 percent, in the Kyrgyz Republic – from 8.4 to 2.9 percent<sup>4</sup>.

Such sharp negative impact of the global crisis on GDP can be explained by the close interaction of the world and the Kyrgyz economy through the mechanisms of the World Trade Organization and re-export of the goods from the People's Republic of China, as well as by the increased number of labor migrants from the Kyrgyz Republic to Russia. According to the census records for 2009, 10.3 percent or 118.3 thousand out of 1,145.7 thousand households in the Kyrgyz Republic had at least one labor migrant abroad, which corresponds to 137.4 thousand people (NSC KR). The absolute majority (97 percent) of these migrants were in the Russian Federation. This trend was still observed in subsequent years, and as of 2018, the number of officially registered labor migrants in the Russian Federation amounted to 640 thousand people<sup>5</sup>, or 86.4 percent of the total number of migrants.

Such strong migration relations between Kyrgyzstan and Russia are sure to have resulted in certain dependence of the Kyrgyz Republic's households on the state of the Russian economy. For example, in 2014, the volume of remittances from abroad was comparable to 30.3 percent of the Kyrgyz Republic's GDP (Dubashov, Kruse and Ismailakhunova). At the same time, the inflow of remittances varied in accordance with the state of the world and particularly the Russian economy. In 2009, the rates of net growth in remittances slowed down to 0.9 percent, meanwhile in 2008 they constituted 1.1 percent. During the shocks of 2014-2015, the decline was significant, in 2015, the growth rates made 1.3 percent, the decline was 0.5 percentage points compared to 2014<sup>6</sup>. Therefore, it becomes relevant to study the impact of 2014-2015 shocks on the households' behavior in the Kyrgyz Republic due to the important role of the households' consumption and savings in ensuring macroeconomic stability in the republic.

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<sup>3</sup>Data of the World Bank, [data.worldbank.org](http://data.worldbank.org).

<sup>4</sup>Data of the World Bank, [data.worldbank.org](http://data.worldbank.org).

<sup>5</sup>Data of the State Migration Service of the Government of the Kyrgyz Republic.

<sup>6</sup>National Bank of the Kyrgyz Republic, <https://www.nbkr.kg/index1.jsp?item=1785&lang=RUS>.

The objective of this paper is to study the impact of these shocks on the households' behavior in the context of three groups of decisions – final consumption, investments, saving behavior. The data were taken according to the results of the Kyrgyz Republic Integrated Household Survey for 2013-2018 (KIHS), conducted by the National Statistical Committee of the Kyrgyz Republic (hereinafter – NSC KR), which includes about 5000 households in each wave. Economic shocks of 2014-2015 are defined within the framework of this paper as the global energy crisis of 2014, which was followed in 2015 by the foreign exchange crisis occurred in the Russian Federation.

The structure of this paper is as follows: the first section provides a review of scientific references about the impact of economic crises on the households' behavior in different countries of the world; the second section describes the macroeconomic dynamics in the Kyrgyz Republic during three crises – the Russian default of 1998, the global financial crisis of 2008 and the economic shock of 2014-2015, as well as provides comparison of the dynamics of various expenditures calculated by the authors of the paper with the data of the NSC KR; the third section outlines the models and methodologies and an overview of the data used; the fourth section presents the calculations and results of the empirical work.

Finally, it is important to emphasize that in most categories of consumption<sup>7</sup> there was a decline or zero growth during the crisis years, with resumption of growth several years after the crisis. This result is consistent with international experience and demonstrates that the households are able to return to the pre-crisis behavior already in the medium term.

The survey showed that the shocks of 2014-2015 had a strong and heterogeneous impact on the households' behavior in terms of consumption (including investment in human capital and construction) and savings. The households are less inclined to save during the years of crisis, however devaluation of the Kyrgyz som encourages the households to save. The strongest propensity to save was revealed among the households living in the south of the republic or in the large cities, as well as among those with a labor migrant in their family. Accordingly, it seems possible to develop a range of the deposit and micro-investment products for these categories of the households.

Impact of 2014-2015 shocks on the consumption categories was complex and multifaceted. Expenditures from the categories of utilities and communication services and other nominally fixed expenditures continued to grow in almost all households. At the same time, female-run households were forced to reduce many types of consumption and to increase expenditures for food products. Provided that the female-run households are more inclined to invest in human capital, it seems appropriate to elaborate a range of the instruments of eased micro-crediting and insurance for such households to develop human capital (primarily, education of children). At the same time, it seems necessary to develop banking products for improvement of the educational market in the country, given that the availability of higher or at least vocational education increases the stability of the household during the crisis years.

It is also interesting that the structure of expenditures of the southern households for entertainment, services to the population, and durables remained at least unchanged or even continued to grow during the years of economic shocks. It can be explained by conspicuous consumption driven by the socio-cultural attitudes in the region, or by a latent indication of higher cash cushion availability in the southern households. It is reasonable to study this phenomenon in more detail and, if the hypothesis about the availability of additional funds in the southern households is confirmed, to develop products that allow to redirect the financial flows of the aforementioned households from the consumption of durables, services to the population

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<sup>7</sup> More details are provided at the end of the section “Obtained Results” in interpretation of t-tests.

and entertainment to the financial investments and investments in development of the human capital.

In general, it is interesting for economic policy purposes that the structure of household consumption was recovered almost completely up to the pre-crisis level within three-four years since the shocks of 2014-2015. Therefore, it is appropriate to expect that the households can potentially return to the pre-shock consumption level in the medium term.

## References Review

Various factors that determine the economic behavior of households and are analyzed in current economic literature, can be conditionally split into two groups: financial and economic and socio-demographic. Financial and economic factors include total household income and debt burden thereof, the macroeconomic situation in the country and the region (in case of an open economy), as well as global trends such as crises and recessions (Teppa, 2019). Socio-demographic factors include the household-specific variables (family size, education level and gender-age structure of the household) and the characteristics of the local community where the family lives (development of local infrastructure, degree of urbanization, etc.). During the crisis, these factors only highlight the differences in the households' response to changed conditions.

The economic behavior of households is reflected in changed structure of expenditures and savings. In the case of the Kyrgyz Republic, the vast majority of the households do not save<sup>8</sup>, therefore the impact of 2014-2015 macroeconomic shocks (hereinafter referred to as the shocks) will mainly be studied through the prism of expenditures. Household expenditures consist mainly of private consumption, thus a brief overview of the main theories of consumption should be provided.

Historically, the first theory was formulated by J.M. Keynes in the form of the absolute income hypothesis, according to it an individual was assumed to respond instantly to changes in income, and an increase in income was accompanied by a decrease in the average propensity to consume. J. Duesenberry suggested the relative income hypothesis, assuming the dependence of consumer expenditures on the relative position of an economic agent in the society. According to this hypothesis, the expenditures of an agent (household) are inversely related to their income compared to other agents, i.e. poorer agents spend their income primarily on consumption. Two other hypotheses – life cycle and permanent income – were suggested by F. Modigliani and M. Friedman, respectively (Guilfoil, 1962). In case of Kyrgyz households, it seems plausible to test the first two hypotheses for the period from 2013 through 2018 which covers the pre- and post-shock years.

The household's geographic location is among the important factors affecting the household expenditures. Surveys conducted by the Asian Development Bank demonstrate that the rural households are the most financially vulnerable (Heshmati et al, 2019).

Age is another important factor. Analysis of the UK households' behavior during the last three recessions<sup>9</sup> showed that younger<sup>10</sup> households were able to reduce expenditures more efficiently compared to the older households (Crossley et al., 2012). The same study revealed that the level of education was not the factor determining significant difference in expenditures.

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<sup>8</sup> See the household survey for more information on savings.

<sup>9</sup> The first of three recessions is the recession that extended since Q1 1980 till Q1 1981, the second - since Q3 1990 till Q3 1991, and the third recession is the Great Recession that began in 2009.

<sup>10</sup> Until 2001, the household age in the United Kingdom was the age of the household head of. In 2001, the fiscal definitions were revised and the concept of "beneficial unit" was introduced. Beneficial unit is one person or a couple with at least one child.

A recent study of the impact of the COVID-19 pandemic on the UK households also reveals a significant relationship between age and consumer behavior (Chronopoulos et al., 2020). An analysis of 23 million transactions conducted by over 100,000 consumers showed that young people (under 35) reduced expenditures primarily for food products bought outdoors, more efficiently and faster than older consumers. In addition to age, gender also plays an important role in expenditures, i.e. women spend significantly less than men.

The relationship between gender and expenditures is conditioned by a number of reasons, including systematic barriers in the labor market, and differences in access to education. UNAIDS survey demonstrates based on the example of 2008 crisis, that women are most vulnerable to macroeconomic shocks and the subsequent food and energy crises. It is women and girls who are the first to feel the impact of shocks, as they lose their jobs, are forced to stop attending school or university, change their diet and experience violence from partners. (UNAIDS, 2012).

Unemployment clearly affects the households' behavior through reduced income flows. At the same time, loss of a job during economic crises conditions more significant reduction of consumption, and return to the previous level of expenditures takes more time. The 2008 crisis showed that by the second month since the loss of work, household consumption in the United States decreased down to 83 percent compared to previous consumption, meanwhile incomes decreased by 37 percent. At the same time, resumption of employment resulted in sharp increase of income, however the growth of expenditures to pre-crisis indicators lasted longer. Thus, by the third month after employment, expenditures increased only by nine percent compared to the level of the last month in the unemployed period (Hurd, 2016). Similar phenomena were observed in the European Union during the 2007-2009 recession. Household expenditures decrease by 6 percent when one of the employed members loses a job and remain at that level for two years, meanwhile cumulative decline in income constitutes 35 percent (Andersen, 2018).

Household expenditures depend significantly on credits, in particular on the debt burden calculated as the household's debt-to-income ratio (DI) or in the form of the debt-to-assets ratio (DA). An analysis of a panel consisted of 4,600 households in the Netherlands revealed that in 2009-2012, marginal propensity to consume (MPC) in vulnerable<sup>11</sup> households was two times more compared to resilient households (Teppa, 2019).

At the same time, according to Jensen and Niels (2017), household consumption is also associated with the impact of shocks on the bank in which the households receive credits. The survey of 440 thousand borrowers conducted in Denmark from 2003 till 2011 showed that the banks affected by the 2008 crisis reduced lending volumes, which resulted in reduction of their consumption by the clients, and by 2011 the majority of borrowers had not returned to pre-crisis levels of consumption.

When studying the households' behavior during the periods of shocks, it is important to consider the joint rather than isolated impact of the aforementioned factors. Introduction of interactions between the crisis period and various socio-demographic and economic factors into the panel regression model contributes to identifying additional links. A study of the impact of increase in wage on labor supply in the Kyrgyz Republic showed that the effect of a wage policy change was uneven between the urban and the rural areas (Jenish, 2015).

Moreover, it should be noted that the shocks affect the households in various ways, depending on the income level of a particular household. The experience of Mexico in 2008-2009 showed that economically vulnerable households were the most affected, these households had to significantly increase the share of expenditures for food products (more than 2/3 of expenditures) (Vilar-Compte, 2015). At the same time, all households in the sample used in this survey were more likely to move to a more vulnerable group in general, in other words, they would have

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<sup>11</sup> In the methodology of the Dutch National Bank, a household is considered vulnerable if the DA exceeds 0.1.



to spend even more on food products due to reduction of other expenditures. Such strong response from Mexican households is consistent with the survey conducted by the European Bank for Reconstruction and Development (hereinafter – the EBRD), which revealed that the most significant consequences of the 2008 crisis for the households in transition economies was the impact on expenditures for final consumption, healthcare and education. However, the EBRD revealed that the households in many countries were able to mitigate the impact of the crisis, which reflects the potential importance of formal or informal social safety facility (EBRD, 2011). In the case of the Kyrgyz Republic, remittances could potentially be such a softening factor. However, the experience of Kazakhstan shows that particularly migrant households suffered most of all in 2008-2009, and, primarily the households with the members employed in low-skilled jobs (construction, etc.) became poorer (Gavrilovic et al., 2009).

It should be further emphasized that some categories of expenditures may remain unchanged in the context of the crises' complex impact on various categories of household consumption. Thus, Russian authors revealed that Russian households increased expenditures for food products from 26.8 percent in 2007 to 28.8 percent in 2009 and reduced expenditures for purchasing vehicles from 9.9 to 6 percent during the same period. At the same time, expenditures for healthcare remained almost unchanged, meanwhile expenditures for tourism and recreation on the contrary increased from 1.7 to 2.3 percent, which can be explained by availability of cash cushion in the households in the fifth quintile.

Since 2010, consumption started recovering and was confidently approaching pre-crisis levels, until the Russian economy faced the currency and energy crisis of 2014-2015. The new shock revived previous expenditure patterns, and the share of household expenditures for food products increased from 26.2 percent in 2013 up to 30.3 percent in 2015. An increase in expenditures for food products indicates deterioration in the financial status of the households. However, detailed analysis demonstrated that, in the first quintile, the households, which increased their expenditures for food products up to 42.8 percent of their budget, were the most affected, meanwhile, in the fifth quintile, the households maintained the level of 22.2 percent and only moderately reduced expenditures for tourism and entertainment (Ibragimova, 2017).

It is of interest that growth in consumption levels that began rather quickly in Russia was also observed in other countries. For example, the households in Romania experienced the most severe impact on consumption in 2009, which began to recover afterwards. However, if the shocks end, consumption may return to the long-term equilibrium level in the medium term, in 3-4 years (Scutaru et al., 2015).

Generally, a typical portrait of a household for Kazakhstan being most vulnerable to shocks, and therefore more prone to significant changes in behavior, is as follows: the household is engaged in farming activities or has a migrant employed in the field of low-skilled labor, and this is a household with a large number of children or with a single parent in the family (Gavrilovic et al., 2009).

Among the factors that determine the level of household savings, it is necessary to emphasize the level of disposable income and accumulated wealth, as well as availability of the credits, the area where the household is located, the level of education and marital status of the household's head. The survey of the households' saving behavior in the Kyrgyz Republic revealed that the residents of more industrialized and urbanized regions are less inclined to save than the residents of rural areas. The gender of the household head plays an important role in saving behavior, for example, women are more likely to save than men (Muktarbek, 2016).

It is also necessary to emphasize the significant role of cultural traditions. In the paper by Muktarbek et al. (2015), it is indicated that the Uzbeks in the Kyrgyz Republic have a higher share of investments in human capital in the overall structure of expenditures, meanwhile the Russians have a smaller share of expenditures for *tois* (*toi* means feast or festival in Turkic countries) and other

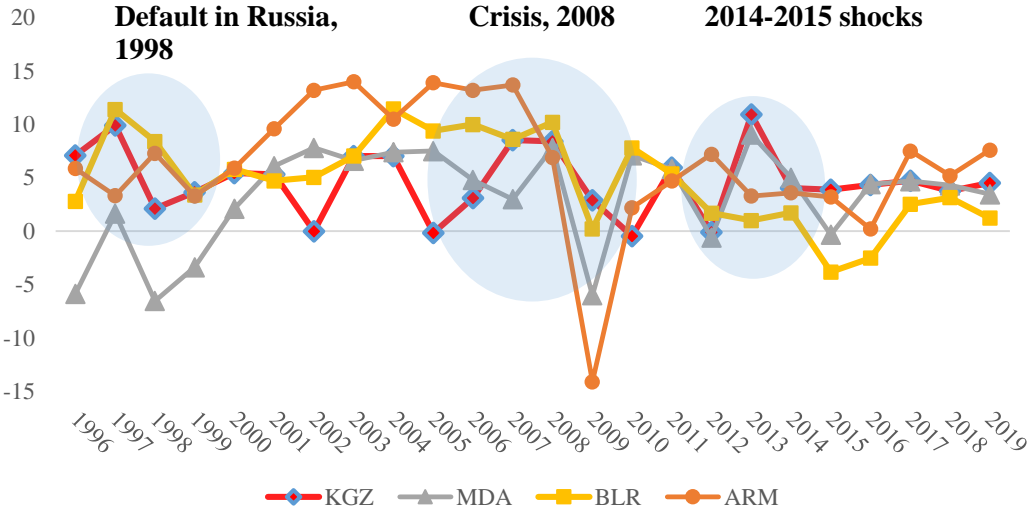
celebrations<sup>12</sup>. Similar trends are observed in other countries. For example, a survey of the saving behavior of the Swiss households showed that German-speaking households are significantly more inclined to save compared to Italian- and French-speaking households (Guin, 2017).

**Kyrgyz Republic during Crisis Periods**

The countries of the post-Soviet region, comparable to the Kyrgyz Republic in terms of population and territory, responded to crises similarly. Armenia, Belarus and Moldova were taken to be compared to the Kyrgyz Republic. Almost all countries, except for the Kyrgyz Republic, demonstrated stable economic growth since 1999 until the beginning of the global crisis of 2008-2009, meanwhile the Kyrgyz Republic tried to eliminate the consequences of recession of 2002 and revolution of 2005 (Jenish, 2013). Armenia and Kyrgyzstan are highly dependent on labor migration, primarily to the Russian Federation. Moldova and Belarus are primarily oriented towards Romania and Poland, respectively, however a significant part of the citizens of Moldova and Belarus still consider Russia an important area of labor migration for cultural, linguistic and geographical reasons. The chart 1 demonstrates a clear pattern of close links between Russian economy and economies of aforementioned countries.

Almost all reviewed countries experienced reduction in GDP in 2008-2009 and 2014-2015, due to strong ties with the Russian economy. Despite the fact that these countries were somehow engaged in trade and cooperate with the outside world, the economy of the Russian Federation was among the main drivers of slowdown in their economic growth. It can be indirectly confirmed by the period of 1998-1999, when, regardless of the Russian economic default, the reviewed countries still demonstrated stable economic growth.

**Chart 1. Change in GDP in annual terms compared to 1995, chain growth rates**

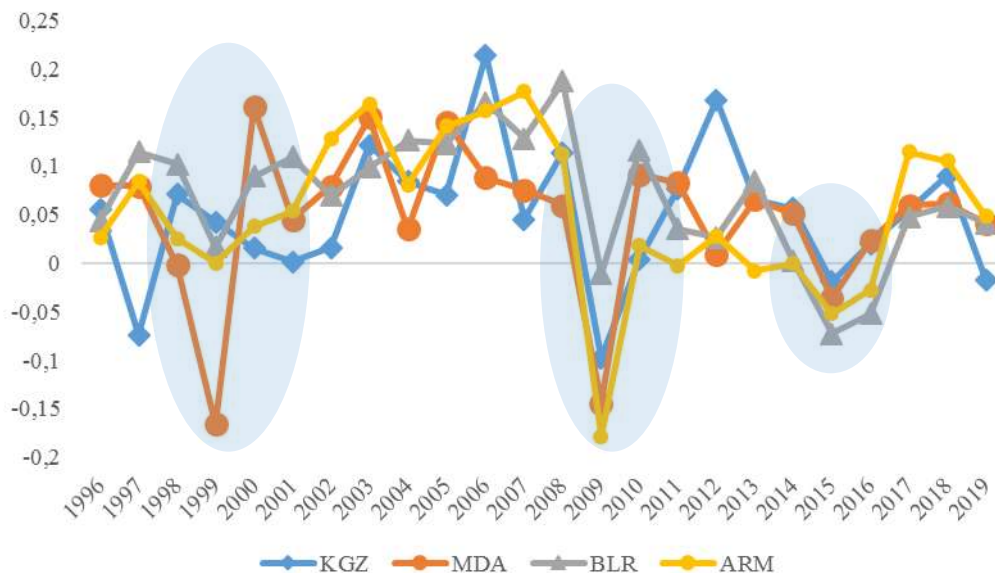


Source: World Bank

At the same time, if we go from GDP to total expenditures, it is clearly seen that all countries have reduced expenditures during all indicated periods (Chart 2). It indicates an insufficiently high share of expenditures in GDP structure of these countries, since their GDP continued to grow after 1998, despite decline in consumption.

<sup>12</sup> Comparisons are made in relation to the overall average value across all ethnic groups.

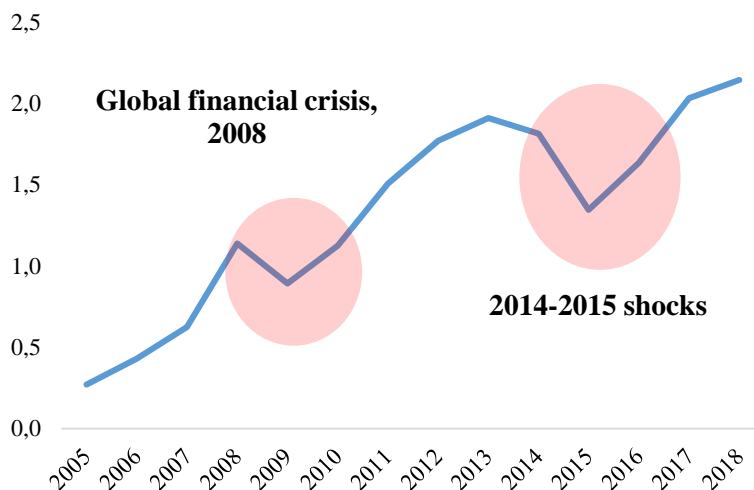
**Chart 2. Change in total consumption, in percent compared to 1995, chain growth rates**



Source: World Bank

With regard to the remittances' role for the Kyrgyz economy, it can be noted that remittances are very sensitive to the state of the global and regional economies. During both crisis periods that occurred in 2008-2009 and 2014-2015, there was a noticeable decrease in total remittances from abroad (Chart 3).

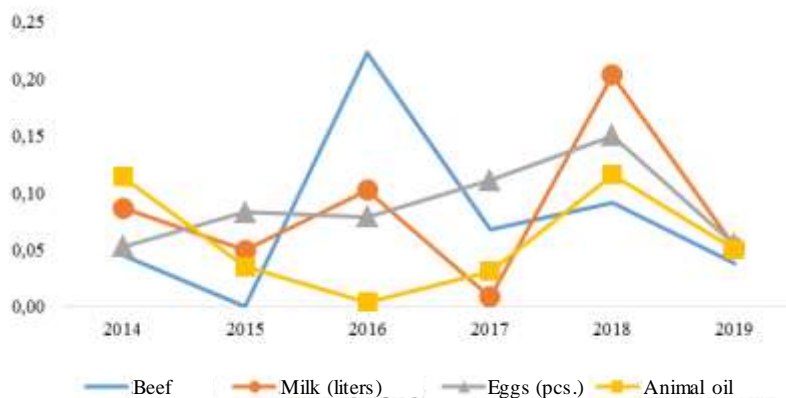
**Chart 3. Balance of remittances in the Kyrgyz Republic, billions of USD**



Source: National Bank of the Kyrgyz Republic

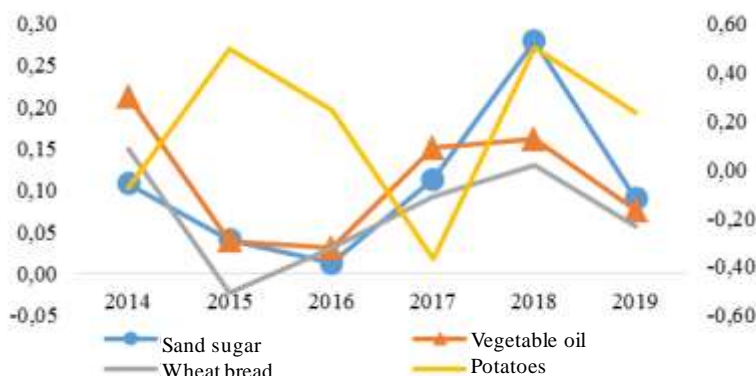
Such a sharp decline in the volume of remittances should have a negative impact on household consumption, which will be demonstrated in detail in the modeling section. Devaluation of the Kyrgyz som observed in 2014-2015 resulted in change of the income purchasing power, primarily, it affected food prices (Chart 4).

**Chart 4. Income purchasing power (meat and dairy products), growth rate in percent**



Source: NSC KR

**Chart 5. Income purchasing power (vegetable oil and carbohydrates), growth rate in percent**



Source: NSC KR

Charts 4 and 5 demonstrate that there was increase in prices for almost all products, except for potatoes and eggs, which has surely affected the distribution of expenditures in the household budgets. This analysis justifies classifying food expenditures as a separate category when developing regression models.

## Research Methodology and Model Definition

### Model Specification

To assess the impact of 2014-2015 shocks on the behavior of the households, the following components of economic behavior should be considered: consumption expenditures, investments and savings.

Generally, there will be nine regressions: six regressions for expenditures, two for investments, and one - for savings (logit model). The specification is the same for expenditures and investments, the abstract name  $dep\_var^k$  is on the left, and the variable  $dep\_var^k$  belongs to the following set:

$$dep\_var^k \in \{e_i, inv_j\}$$

The  $dep\_var^k$  dependent variable categories are as follows:

1. food products and clothes –  $e\_food$ ;
2. various services to the population –  $e\_services$ ;
3. communication services, utilities and transport –  $e\_utils$ ;
4. unspecified expenditures (alimonies, gratuitous financial assistance to relatives, providing money at interest, etc.) –  $e\_nonspec$ ;
5. durables such as furniture, jewelry, etc. –  $e\_durables$ ;
6. cultural events (food in restaurants and cafes, sports and other activities, etc.) –  $e\_entertainment$ ;
7. investments in human capital (expenditures for medical care and education) –  $inv\_hc$ ;
8. investments in construction (purchase of building materials and/or real estate) –  $inv\_constr$ .

The brief specification of panel regression for expenditures and investments is given as follows:

$$dep\_var_{i,t}^k = \alpha_i + \beta_k \cdot crisis_t + \theta_k \cdot \mathbf{X}_{i,t} + \gamma_k \cdot \mathbf{Z}_i + \mu_i + v_{i,t}$$

where  $\mathbf{X}$  is a vector of financial, economic and socio-demographic variables that vary over time and between objects, and  $\mathbf{Z}$  is a vector of variables that are unique for each household and do not vary over time.

In turn, the formula for savings is a non-linear regression where the modeled variable takes values 1 and 0 depending on availability of the household's savings in the current year.

The brief specification is as follows:

$$logit(save_{i,t}) = \alpha_i + \beta_k \cdot crisis_t + \theta_k \cdot \mathbf{X}_{i,t} + \gamma_k \cdot \mathbf{Z}_i + \varepsilon_{i,t}$$

When choosing between logit and probit models, the choice was made in favor of the former due to the impossibility to assume that the data-generating process (DGP) follows a multivariate normal distribution. Nevertheless, we present the estimates obtained by both methods, since in the practical use the logit and probit models provides fairly close results. Since the savings model also contains a number of invariant variables not to be used in the fixed effects estimation, we use a random effects procedure, which will allow us to preserve the invariant characteristics and calculate their marginal effects on the probability of savings availability.

The detailed specification for both groups of formulas is shown below:

#### Formulas for Expenditures and Investments<sup>13</sup>

$$\left\{ \begin{array}{l} dep\_var_{i,t}^k = \alpha + \beta_1 \cdot crisis_t + \beta_2 \cdot l\_inc_{i,t} + \beta_3 \cdot l\_hours_{i,t} + \\ \beta_4 \cdot l\_wealth_{i,t} + \beta_5 \cdot age_{i,t} + \beta_6 \cdot age_{i,t}^2 + \beta_7 \cdot adults_{i,t} + \beta_8 \cdot children_{i,t} + \\ \beta_9 \cdot city_i + \beta_{10} \cdot south_i + \beta_{11} \cdot fem_i + \beta_{12} \cdot spouse_{i,t} + \beta_{13} \cdot soc\_st_{i,t} + \\ \beta_{14} \cdot remit_{i,t} + \beta_{15} \cdot fragile_{i,t} + \beta_{16} \cdot educ\_prof_i + \beta_{17} \cdot educ\_higher_i + \\ \beta_{18} \cdot crisis\_city + \beta_{19} \cdot crisis\_south + \beta_{19} \cdot crisis\_fem + \\ \beta_{20} \cdot crisis\_spouse + \beta_{21} \cdot crisis\_soc\_st + \beta_{22} \cdot crisis\_fragile + \\ \beta_{23} \cdot crisis\_prof + \beta_{24} \cdot crisis\_higher + \\ \beta_{25} \cdot profession2 + \beta_{26} \cdot profession3 + \beta_{27} \cdot profession4 + \\ \beta_{28} \cdot profession5 + \beta_{29} \cdot profession6 + \beta_{30} \cdot profession7 + \\ \beta_{31} \cdot profession9 + \beta_{31} \cdot year2014 + \beta_{32} \cdot year2015 + \\ \beta_{33} \cdot year2016 + \beta_{34} \cdot year2017 + \beta_{35} \cdot year2018 + \\ \mu_i + v_{i,t} \end{array} \right.$$

<sup>13</sup>Dummy variables for occupations should be ignored for reasons stated in the variable glossary.

## Formulas for Savings

$$\left\{ \begin{array}{l} \text{logit}(\text{save}_{i,t}) = \alpha + \beta_1 \cdot \text{crisis}_t + \beta_2 \cdot \text{l\_inc}_{i,t} + \beta_3 \cdot \text{dep\_ratio}_{i,t} + \\ \beta_4 \cdot \text{gr\_xrate}_{i,t} + \beta_5 \cdot \text{age}_{i,t} + \beta_6 \cdot \text{age}_{i,t}^2 + \beta_7 \cdot \text{extra\_earner}_{i,t} + \beta_8 \cdot \text{credit}_{i,t} + \\ \beta_9 \cdot \text{city}_i + \beta_{10} \cdot \text{south}_i + \beta_{11} \cdot \text{fem}_i + \beta_{12} \cdot \text{spouse}_{i,t} + \beta_{13} \cdot \text{soc\_st}_{i,t} + \\ \beta_{14} \cdot \text{remit}_{i,t} + \beta_{15} \cdot \text{fragile}_{i,t} + \beta_{16} \cdot \text{educ\_prof}_i + \beta_{17} \cdot \text{educ\_higher}_i + \beta_{18} \cdot \text{house\_own}_i \\ \beta_{19} \cdot \text{crisis\_city} + \beta_{20} \cdot \text{crisis\_south} + \beta_{21} \cdot \text{crisis\_fem} + \\ \beta_{22} \cdot \text{crisis\_spouse} + \beta_{23} \cdot \text{crisis\_soc\_st} + \beta_{24} \cdot \text{crisis\_fragile} + \\ \beta_{25} \cdot \text{crisis\_prof} + \beta_{26} \cdot \text{crisis\_higher} + \\ \beta_{27} \cdot \text{profession2} + \beta_{28} \cdot \text{profession3} + \beta_{29} \cdot \text{profession4} + \\ \beta_{30} \cdot \text{profession5} + \beta_{31} \cdot \text{profession6} + \beta_{32} \cdot \text{profession7} + \\ \beta_{33} \cdot \text{profession9} + \beta_{34} \cdot \text{year2014} + \beta_{35} \cdot \text{year2015} + \\ \beta_{36} \cdot \text{year2016} + \beta_{37} \cdot \text{year2017} + \beta_{38} \cdot \text{year2018} + \\ \mu_i + v_{i,t} \end{array} \right.$$

where:

- $\text{dep\_var}^k$  is the logarithm of expenditures for the k-th group of consumer or investment goods;
- $\text{crisis}$  is a dummy for the macroeconomic shock, equal to 1 for 2014 and 2015 and 0 – for other periods;
- $\text{fragile}$  is a dummy for vulnerable households. Based on the analysis of the minimum cost of living and poverty levels in the Kyrgyz Republic, it was decided to assign the  $\text{fragile}$  variable a value of 1 if the total income per one household member is less than the established minimum cost of living in the current year, otherwise the variable gets a value of 0<sup>14</sup>. This variable is rather problematic, since out of 16,866 observations in the panel, only 114 households satisfy this condition which results in almost singular matrix;
  - $\text{south}$  – 1 for southern households and 0 for northern households;
  - $\text{city}$  – 1 – for urban and 0 – for rural households;
  - $\text{l\_inc}$  is the logarithm of the total household income, defined as the sum of labor income and income from the sale of livestock, crop growing, meat and dairy products;
  - $\text{remit}$  – 1 if the household receives transfers from abroad;
  - $\text{age}$  is the age of the household's head;
  - $\text{l\_hours}$  is the logarithm of the duration of the working week in working hours;
  - $\text{hsize}$  is the size of the household;
  - $\text{adults}$  is the number of adults of 18 and older;
  - $\text{children}$  is the number of children under 18;
  - $\text{fem}$  – 1 – for women and 0 – for men;
  - $\text{soc\_st}$  – 1 if the respondent is employed and 0 if unemployed;
  - $\text{educ\_prof}$  – 1 if the household's head has secondary vocational education;
  - $\text{educ\_higher}$  – 1, if the household's head has completed higher education;
  - $\text{ln\_hcu}$  is the logarithm of investments in human capital, that is, in health care and education;
  - $\text{gr\_xrate}$  is the growth rate (logarithmic difference) of the average annual exchange rates of the Kyrgyz som against the US dollar with a base in 2012;

<sup>14</sup> According to the NSC KR, the established minimum cost of living was KGS 4,599, 4,982, 5,183, 4,794, 4,901 and 4,793 per capita in 2013, 2014, 2015, 2016, 2017 and 2018, respectively. The poverty rate for the same years was KGS 2,314, 2,485, 2,631, 2,596, 2,674 and 2,723, respectively.

- *spouse* – 1 if the household’s head is married and 0 – otherwise;
- *save* – 1 if the household has non-zero savings in the current year;
- *dep\_ratio* is the share of dependents in the household. It is calculated as the number of household members under 18 and over 64 divided by the household size;
- *extra\_earner* is equal to 1 if the household has an additional working person besides the household’s head. Important: *extra\_earner* is not necessarily the spouse of the household’s head;
- *credit* is equal to 1 if the household has an outstanding loan in the given year;
- *house\_own* is equal to 1 if the house is own;
- *year2014* – *year2018* are binary variables for the corresponding years, 2013 was excluded as the base one;
- *l\_wealth* is the logarithm of the household wealth. Wealth is defined as the sum of the value of a house, land, livestock, and cars (including trucks, express buses, and motorcycles). When calculating wealth, it was decided not to include the cost of the land plot, since it could be taken into account in the house value;
- *prof* is a categorical variable that takes the values from 0 to 7 and 9. The values from 1 to 7 correspond to 7 highest paid professions, value 0 – all other professions, value 9 – missing answers. It will be split into binary ones using **i** operator in the regression itself. This variable is also very problematic, like *fragile*, as more than 2,200 values out of 2,811 households are missing, which was most likely to result in almost singular matrix<sup>15</sup>;
- *crisis\_fem*, *crisis\_city*, *crisis\_fragile*, ... are interactions between the crisis years and the corresponding binary variables;
- $\mu_i$  is unobservable heterogeneity;
- $v_{i,t}$  is idiosyncratic error.

As noted in the references review, the ethnicity of the household’s head would be a very important characteristic for understanding the household behavior. It would be interesting to compare the household behavior with the household’s heads of Kyrgyz, Russian and Uzbek nationalities. However, the Kyrgyz Integrated Household Survey (KIHS) panel lacks information on the household ethnicity, hence we were unable to utilize ethnic background in our analysis.

Estimating the models using the fixed effects method does not provide estimates of the coefficients for time invariant regressors (gender, region, etc.).

Moreover, the model may have endogeneity, since characteristics such as the level of income and education, family size, accumulated wealth, presence of an additional breadwinner in the family, etc. can correlate with unobservable individual characteristics. For example, more educated households may be less prone to labor migration because they can earn enough money within the country; on the other hand, level of education may also explain the family size. For example, less educated adults are more likely to have many children due to early marriages, etc. Thus, we estimate the models using the Generalized Method of Moments (GMM) using the Hausman-Taylor approach to obtain consistent estimates of the invariant regressors coefficients and eliminate the endogeneity problem. The breakdown of variables into endogenous and exogenous blocks is shown in the table below.

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<sup>15</sup>As a result, the professions were decided to be divided into 3 groups: *profession\_short2* – professions from the category “Scientific, technical and professional activities”, *profession\_short3* – all other professions, and *profession\_short1* – respondents who did not indicate a profession. Moreover, these dummies did not significantly improve the modelling results, thus it was decided to abandon their interpretation/use for now.

**Table 1. Endogenous and Exogenous Variables in the Model**

	<b>Invariant</b>	<b>Varying</b>
<b>Exogenous</b> (uncorrelated with $\mu$ and $v$ )	south, city, fem, educ_prof, educ_higher, house_own	crisis, age, l_hours, spouse, dependents, gr_xrate, hsize
<b>Endogenous</b> (correlated with $\mu$ )	prof	l_inc, fragile, remit, soc_st, dep_ratio, extra_earner, credit, children

Paired sample t-tests will be conducted to analyze changes in average expenditures for aforementioned categories. We will conduct two groups of t-tests: each year from 2014 through 2018 will be compared with the base of 2013, and then chained t-tests will be carried out, i.e. 2014 will be compared with 2013, the average expenditures of 2015 will be compared with 2014, etc. Tests will be conducted for all eight expenditure categories (excluding unspecified expenditures), as well as for general costs.

Combining the chain tests with the tests of 2013 base will determine which expenditure categories demonstrated significant changes in average levels, as well as the duration of return to pre-crisis levels. We will conduct the tests with the left-sided alternative, the point is as follows: whether the next year's expenditures have increased compared to the previous year or not. By rejecting the null hypothesis of equality in average values, we may conclude that expenditures have increased.

### **Data Description**

Data from six waves of KIHS ( $N \approx 5016$ ) covering period from 2013 till 2018 were used to develop the model of the household expenditures. Up to 25 percent of households are rotated each year. Accordingly, after filtering the households provided that the region where the household is located and the gender of the household's head remained unchanged while the size of household changes by no more than two persons in either direction, 2,811 households were selected that were sure to have passed through all six waves of the KIHS.

The following table summarizes certain invariant characteristics of the households' heads participating in the panel.

**Table 2. Socio-Demographic Characteristics of the Households' Heads, Sample Percent**

Men	66.84
Women	33.16
Married	67.98
Single	32.02
City	56.67
Village	43.33
North	62.29
South	37.71
Vocational technical education	19.69
Higher completed education	10.55

Men dominate in the sample and make almost 67 percent of all households' heads with nearly 68 percent of the households' heads being married or living with a partner and over 30 percent having at least a vocational technical education. Almost 57 percent of the households are urban, and just over 62 percent of the households in the final sample are in the north of the country.



**Table 3. Average Values of Some Characteristics of the Households**

Remittances, KGS/month	1,167
Age of the household's head, years	51.6
Number of children	1.5
Number of adults	2.4

Judging by the average number of adults in the households, generally, the households consist of two parents, meanwhile rather low number of children for the Kyrgyz Republic can be explained by the prevalence of urban households in the final sample.

It is necessary to find out the representative level of the resulting panel nationwide prior to initiating the evaluation of the regression models. For this purpose, we will compare the expenditures calculated on the basis of the KIHS panel, for various categories, with macroeconomic statistics calculated by the NSC KR. We will compare the total household expenditures of the panel with the data on consumer expenditures provided by the NSC KR.

**Chart 6. Aggregate Household Expenditures, Chain Rate of Increase in Percent Since the Beginning Of 2013**



**Chart 7. Household Expenditures for Entertainment, Chain Rate of Increase in Percent Since the Beginning of 2013**



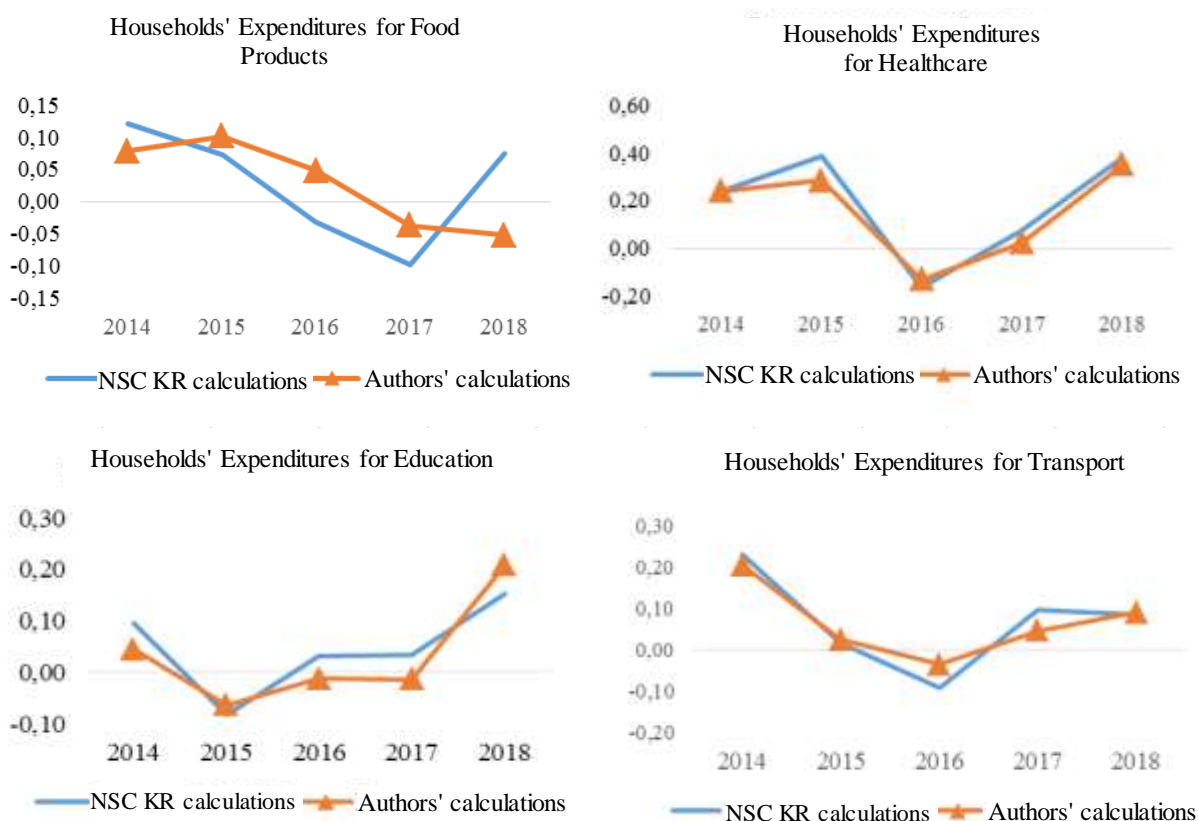
Source: data of the NSC KR

During the period from 2014 till 2018, the dynamics of expenditures was co-directional, except for 2016. It can be explained by a number of reasons, mainly due to incompletely coinciding components of total expenditures (Chart 8). For instance, the authors excluded the expenditures for paying income and other taxes from calculation of the total expenditures, meanwhile the NSC KR does not provide a component-wise breakdown of its calculated consumer expenditures.

A similar situation is observed when comparing the expenditures for entertainment. Figure 7 demonstrates that the dynamics of expenditures for entertainment was multidirectional over the past two years due to differences in the components. Thus, the NSC KR includes expenditures (tois<sup>16</sup>, funerals, etc.) in this category; meanwhile the authors calculated this type of expenditures as the sum of expenditures for meals in cafes, restaurants and expenditures for sports events. At the same time, the dynamics of expenditures for other categories of consumption is almost the same, which indicates that the panel is sufficiently representative for these categories.

<sup>16</sup> Toi means feast or festival in Turkic nations

**Chart 8. Expenditures for food, healthcare, education and transport, chain growth rate in percent since the beginning of 2013**



Source: data of the NSC KR

### Obtained Results

The results of regression analysis of eight categories of expenditures and investments are presented in Appendix 2. The results obtained demonstrate that there was an increase in almost all types of expenditures during the crisis periods, except for the expenditures for durables. Increase was primarily observed in the category of services, which included repair services, baths, saunas, hairdressing saloons and other services, as well as expenditures for investments in human capital and expenditures for items and services not included in other categories (unspecified expenditures).

The group of these “unspecified” expenditures included alimonies, provision of money at interest, free financial assistance to relatives, expenditures for farming and other expenditures not listed above. The impact of the crisis was multidirectional and depended on a number of socio-demographic characteristics of the households, which can be seen from the interaction term in the corresponding regression. During the crisis periods, urban households demonstrated a decrease in almost all expenditures, however, only the reduction in expenditures for utilities and communication services was statistically significant. Southern households demonstrated increase in five out of eight categories of expenditures during the shock periods; meanwhile there was statistically and economically significant increase in expenditures for durables, various services, utilities, communication, and entertainment.

The households run by women had to significantly increase expenditures for food products and reduce expenditures for services during the shock years. The presence of a husband as a head of the household is associated with an increase in expenditures for food products during

the indicated periods; meanwhile there is a negative correlation with most other expenditures. Shocks had practically no effect on the expenditures of the households with the heads having secondary vocational education, meanwhile there was an increase in expenditures for utilities and communication, in construction investments in the households with the heads who had a higher education, however consumption of services declined.

According to the available references, the age of the households' heads is positively correlated with almost all expenditures, except for utilities, communication and entertainment services; however, the number of additional breadwinners in the household is expected to influence household behavior. Increase in the number of adults in the household conditions growth in all expenditures and investments. Similarly, increase in the number of children results in growth of consumption in almost all categories, except for unspecified expenditures and investments in construction (given the fact that the coefficient for the number of children is anyway insignificant in these formulas).

The level of education of the household's head is positively correlated with almost all categories of expenditures, except for food, construction services and utilities. In terms of the firm's economy, expenditures for food products and utilities can be (rather conditionally) compared with constant expenditures that change quite rarely, thus the households with a highly-educated head have more consumption opportunities. Moreover, the urban households spend less on construction and unspecified expenditures compared to the rural households. The fact that the urban households spend money on food products approximately by seven percent less compared to the rural households can be explained by the fact that food expenditures were not broken down into food expenditures for toys and funerals, respectively, the rural households can spend less money on everyday food products, however at the same time they can host the festivities such as toys more often, thereby exceeding the total expenditures for food products in the cities.

Moving to the marital status of the household's head, the households with married heads are generally expected to spend more than the households with single heads. This holds true for all expenditures categories except for expenditures for food products, utilities, utilities and communication services and unspecified expenditures (including alimony and fee financial assistance to relatives). The negative signs in the equations for food products can be explained by the fact that the category "food products" also includes clothes and household appliances, and perhaps "two-parent" households minimize these expenditures.

Moreover, the negative coefficient in the regression for unspecified expenditures can be explained by the fact that "two-parent" households do not pay alimonies, or provide less free financial assistance to relatives, or one of the spouses works in agriculture, thereby saving on agricultural expenditures.

The households headed by a woman spend less on almost all consumption categories, except for expenditures for entertainment, investment in human capital, utilities and communication.

Geographic factor also affects the behavior. The households in the south of the country spend more on food products, entertainment and construction, and less on utilities, communication, and durables. Presence of a labor migrant in the family conditions additional income; therefore, it is quite expected that the households with a labor migrant in the family spend more on all categories, except for entertainment and investments in human capital.

Household income is positively correlated with all categories of expenditures, and income coefficients are significantly different from zero in all formulas. Since expenses (investments) and incomes are presented in log-log form, the coefficients can be directly interpreted as income elasticities of a particular consumption category. For example,<sup>17</sup> if incomes grow by 10 percent,

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<sup>17</sup>All other variables being equal, when other factors are fixed at the same level.

consumption of durables increases by 4.2 percent, expenditures for entertainment and investment in human capital grow by 2.4 percent and 2.7 percent, respectively, and investment in construction increases by 8.2 percent.

Likewise, the coefficients for accumulated wealth and duration of the working week are also interpreted as elasticities. The households with higher levels of wealth are expected to have spent more on entertainment and investment in human capital. An increase in wealth by 10 percent is accompanied by increase in expenditures for entertainment by 5.1 percent and growth of investment in human capital by 6 percent. Increase in working hours by 10 percent results in decline in expenditures for food products by 3.3 percent and increase in human capital investment by 1.8 percent. Vulnerable<sup>18</sup> households in the Kyrgyz Republic spend more on almost everything except for entertainment. Even during the crisis, vulnerable households increased almost all types of expenditures. These illogical results may be due to the fact that only 114 out of 16,866 observations are flagged as vulnerable, which is almost guaranteed to result in an almost singular regressor matrix.

Moving on to the savings formula, it can be emphasized that the results are broadly consistent with the findings of Muktarbek (2016) for the Kyrgyz Republic. The results of evaluating the logit and probit models are fully presented in Appendix 2, here we will also provide the conclusions and demonstrate the limiting effects. The factors that increase the propensity to save include presence of an additional breadwinner in the family, living in the south of the country, high income and accumulated wealth, presence of a labor migrant in the family, and devaluation of the Kyrgyz som. Meanwhile, the urban households have fewer propensities to save.

Moreover, the shock years negatively affect the opportunity to save. During the crisis period, the households prefer to spend on immediate consumption and/or have no opportunity to save. The same variables as gender of the household's head, education, etc. turned out to be insignificant in this sample.

We present a table of marginal effects, which includes only significant results (complete table is given in Appendix 2) for more visual analysis of the influence made by these factors.

**Table 4. Significant marginal effects for probable availability of savings**

	<b>logit</b>	<b>probit</b>
city	-0.00558**	-0.00627**
crisis	-0.110***	-0.105***
extra_earner	0.00492**	0.00498**
remit	0.00730***	0.00766***
south	0.0312***	0.0315***
gr_xrate	0.803***	0.765***
l_income	0.00524***	0.00552***
l_wealth	0.00321***	0.00340***

Comparison of the marginal effects calculated using the logit and probit models showed that both models yielded similar results. Presence of an additional breadwinner in the household increases probability of having savings by about 0.5 percent. At the same time, living in the city reduces probable availability of savings by 0.5 percent. Southern households are three percent more likely to save than northern households, and presence of a labor migrant in the household increases probability of having savings by one percent. The shock periods had a sharply negative impact, since in 2014-2015 the probability of ability to save decreased by 11 percent compared to quiet

<sup>18</sup> In this paper, the vulnerable households are defined as the households with income per one household member below the minimum cost of living.

years. This indicates that the households did not have the opportunity to save and most of the cash flows were directed to immediate consumption. Turning on to continuous variables, we can state that devaluation of the Kyrgyz som conditioned an increase in probability of having savings by 80 percent, while an increase in the logarithms of income and accumulated wealth increased probability of having savings by 0.5 and 0.3 percent, respectively<sup>19</sup>.

The tests of means showed the following results<sup>20</sup>:

- the average total expenditures increased significantly in 2014 compared to 2013, however afterwards there were no significant changes for three consecutive years compared to the level of 2014. Thus, expenditures remained at the level of 2014 during three years, which reflects lack of opportunities for households to increase their aggregate consumption;

- expenditures for services increased in 2014 and remained unchanged in 2015, afterwards expenditures increased in 2016 and have not changed since then;

- investments in human capital did not demonstrate significant growth during the whole analyzed period, except for 2018, when there was an increase compared to 2017. At the same time, there was an increase in investments in 2015 compared to the base of 2013, which may reflect an increase in the prices for education and healthcare services, followed by price stabilization up to 2018;

- expenditures for utilities and communication services steadily increased every year compared to the previous year, except for the annual stabilization in 2016, when the prices remained at the level of 2015;

- investments in construction in 2013 were lower compared to 2015, 2017 and 2018, meanwhile they did not change significantly when comparing the years sequentially;

- expenditures for durables increased significantly in 2014 and remained unchanged in 2015 and 2016 in consequential comparison and after being compared with the pre-crisis 2013, afterwards there was a consistent increase in average expenditures in 2017 and 2018;

- expenditures for food products grew during the reviewed period, except for 2015, when there were no significant changes compared to the level of 2014;

- expenditures for entertainment increased in 2014, in 2015 they remained unchanged, and in 2016 they increased compared to the previous year, then remained unchanged again in 2017 and increased in 2018.

Summarizing these results, we can conclude that the average level for most categories of expenditures increased in the crisis 2014-2015, and afterwards remained unchanged for two-three years prior to growth. This result may indicate that consumption can recover within two-three years after the crisis, which is consistent with international experience (Scutaru et al., 2015; Ibragimova, 2017).

## Conclusions and Recommendations

The internal resources of the state, which are determined, among other things, by the consumer demand of the households and their savings, are among the main sources of sustainable economic growth. It therefore becomes important to identify the main determinants of the savings and consumer behavior of the population in the Kyrgyz Republic due to the fact that

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<sup>19</sup> When interpreting the marginal effects for variables on a continuous scale, one should remember that we are talking about rather small changes. While in case of binary variables, the marginal effect can be directly interpreted as an increase/decrease in the probability within the range from 0 to 1, in case of continuous variables (income, wealth, exchange rate, etc.), it is necessary to talk about small, close to zero change.

<sup>20</sup> Since these are the tests of average values, we mean the *average* expenditures among all households of the current year in all interpretations.

the last two decades have been turbulent on a global (world crisis of 2008 and the Great Recession of 2010) and on a regional scale (shocks of 2014-2015, etc.).

Currently available literature on economic development of the Kyrgyz Republic doesn't provide any surveys that would comprehensively consider the households' behavior during crisis years, including the determinants of savings behavior and a detailed analysis of the consumption categories. This paper focuses on filling this gap in the empirical economic literature.

In conducting the survey, we took into account the integral nature of the decision-making process regarding expenditures and savings that the households pass through, and therefore we covered a wide range of financial, economic, socio-cultural and demographic, as well as exogenous macroeconomic factors that determine the households' behavior.

The results of the analysis showed that the shocks of 2014-2015 had rather strong as well as uneven impact across almost all aspects of the households' behavior. During the crisis years, the ability of the households to save falls sharply being confirmed by a decrease in probability of having savings by 10 percent during these periods. Location in the city, in the southern region of the country, the level of savings and wealth, as well as devaluation of the Kyrgyz som and presence of a labor migrant in the family are other significant factors influencing the household's decision to save or not to save.

More evident propensity of southern households to save, as well as more significant share of southern residents in the total flow of labor migration, demonstrates higher availability of savings and might hint about investment potential. In this regard, it is possible to recommend further development of the range of deposit products and micro-investment instruments targeting southern households. Implementing such instruments which will contribute to using the available funds of southern population for regional development. Generally, these micro-depositing and micro-investment instruments should also be available to the residents of the large cities, who are less inclined to save, in order to encourage them to save even small amounts.

Generally, it should be noted that higher probability to save money during the periods of the Kyrgyz som devaluation reflects conversion of deposits and savings into foreign currency or other savings instruments. This factor should be taken into account when developing or implementing monetary policy measures, namely devaluation of the Kyrgyz som conditions increase in savings, while the stable exchange rate of the Kyrgyz som encourages the households to consume more instead of saving.

In analyzing the impact of shocks on consumption, it should be noted that the response of different categories of expenditures is not uniform. While some nominally fixed expenditures (utilities and communication services, etc.) continued to grow in almost all households, there was a decrease in expenditures of some households in other categories (for example, food products, investment in human capital, etc.). First of all, these are the households run by women. Such households had to increase expenditures for food products and, at the same time, reduce expenditures for other categories of consumption. Taking into account the revealed propensity of the "female" households to invest in human capital, it seems reasonable to develop the support instruments for the female-led households, for example, these can be the instruments of eased micro-crediting and insurance. It was quite expected that the households with educated head (higher or secondary vocational education) turned out to be more resistant to the impact of shocks, and therefore it is possible to recommend development of measures for improvement of the educational market in the country to increase the population's chances for employment and relative income stability<sup>21</sup>.

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<sup>21</sup>Even in the absence of opportunities to work in their field, educated people have more chances to find job in the related field or to be retrained relatively quickly and find a job compared to the people with just a secondary education.

Examining expenditures for entertainment, it is interesting to emphasize that this category of consumption consistently demonstrated growth even during the crisis years in the southern regions of the country amid demand for durables and for services rendered to the population. This indirectly confirms either the availability of sufficient cash cushion in the southern households or the desire for conspicuous consumption due to socio-cultural attitudes and accepted norms in the region. It seems necessary to develop attractive tools to redirect financial flows from the consumption of services, durables and entertainment in southern households to financial investments and human capital.

Finally, it is important to emphasize that there was a decline or zero growth during the crisis years in most categories of consumption, with resumption of growth several years after the crisis. This result is consistent with international experience and shows that the households are able to return to the pre-crisis behavior in the medium term.

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<https://www.nbkr.kg/index.jsp?lang=ENG>

## Appendix 1. Data Sources

A panel of 2,811 households was built covering the years of 2013-2018 to conduct statistical and econometric analysis. The panel is based on the database of the NSC KR KIHS. The NSC KR conducts a survey annually and interviews about 5,000 households in each survey wave. The list of the KIHS questionnaires used is given below:

- household control card;
- socio-demographic characteristics of persons in the household;
- a diary to record household expenditures;
- employment and unemployment;
- household income and expenditures;
- availability of personal property in the household.

All financial values were brought to the level of 2005. The value of the consumer price index provided in the NSC KR report “Consumer Price Index in the Kyrgyz Republic (2005 = 100, in percent)” was used for this purpose.

Since the NSC KR rotates up to 25 percent of households in each new wave, a five-level filter was applied to identify unique households that passed all six waves when combining the questionnaire files:

1. the size of the household in 2014-2018 should differ from the size thereof in the base year by no more than two people in any direction;
2. the level of education of the household head must remain unchanged for all six years;
3. the gender of the household head should be unchanged;
4. the regional breakdown of the households (north-urban, north-rural, south-urban, south-rural) should remain unchanged in all six waves;
5. and, finally, the age of the household head should increase strictly by one year with each new wave.

Such strict filter is sure to result in inevitable loss of unique households where, for one reason or another, the gender of the household head has changed (for example, due to a divorce) or the households have moved to another region, etc. However, due to the loss of a small number of such households, we will filter out almost all incorrectly entered households. Filtering results showed that 2811 unique households remained out of more than 5000 ones.

## Appendix 2. Results of Models Estimation<sup>22</sup>

**Table 5. Expenditures and Investments Modeling Results (Part I)**

Variables	Durables		Food products		Services		Utilities and communication	
	H-T	FE	H-T	FE	H-T	FE	H-T	FE
crisis	-0.0253	-0.172	0.0241	0.0350	0.163**	0.126	0.0844**	0.132***
	(0.159)	(0.174)	(0.0368)	(0.0404)	(0.0771)	(0.0804)	(0.0384)	(0.0435)
crisis_city	-0.0629	-0.0693	0.00139	0.00184	-0.0403	-0.0428	-0.0370**	-0.0389**
	(0.0611)	(0.0656)	(0.0142)	(0.0154)	(0.0298)	(0.0306)	(0.0148)	(0.0166)
crisis_south	0.163***	0.161**	0.0124	0.00870	0.0784***	0.0775***	0.0262*	0.0290*
	(0.0592)	(0.0636)	(0.0138)	(0.0149)	(0.0290)	(0.0297)	(0.0143)	(0.0161)
crisis_fem	0.143	0.154	0.0621**	0.0613*	-0.108*	-0.112*	-0.00730	-0.00726
	(0.131)	(0.142)	(0.0302)	(0.0328)	(0.0634)	(0.0654)	(0.0314)	(0.0353)
crisis_spouse	0.206	0.205	0.0651**	0.0659*	-0.0107	-0.0104	-0.0298	-0.0317
	(0.135)	(0.146)	(0.0310)	(0.0337)	(0.0653)	(0.0674)	(0.0323)	(0.0364)
crisis_soc_st	-0.0256	-0.0367	0.0170	0.0194	0.0286	0.0217	0.0274	0.0243
	(0.0850)	(0.0916)	(0.0199)	(0.0216)	(0.0418)	(0.0430)	(0.0207)	(0.0233)
crisis_fragile	-0.266	-0.316	-0.0326	-0.0397	-0.229	-0.242	0.169*	0.171*
	(0.359)	(0.384)	(0.0838)	(0.0908)	(0.186)	(0.192)	(0.0871)	(0.0978)
crisis_prof	0.0892	0.0855	0.0235	0.0214	-0.0603	-0.0592	0.0229	0.0228
	(0.0879)	(0.0944)	(0.0204)	(0.0221)	(0.0425)	(0.0437)	(0.0212)	(0.0238)
crisis_higher	0.123	0.117	0.00250	0.00250	-0.0840**	-0.0776**	0.0497***	0.0492**
	(0.0765)	(0.0821)	(0.0178)	(0.0193)	(0.0374)	(0.0383)	(0.0185)	(0.0208)
city	0.100	0.798**	-0.0740**	0.239***	0.133***	0.190	0.162***	-0.149
	(0.0846)	(0.370)	(0.0317)	(0.0883)	(0.0456)	(0.172)	(0.0563)	(0.0952)
spouse	-0.0532	-0.111	-0.0725*	-0.125**	0.0346	-0.0140	-0.0709	-0.0839
	(0.138)	(0.216)	(0.0394)	(0.0508)	(0.0724)	(0.105)	(0.0466)	(0.0547)
soc_st	-0.133	-0.199*	0.0593***	0.0573**	-0.0368	-0.0694	-0.0195	-0.0142
	(0.0885)	(0.104)	(0.0217)	(0.0244)	(0.0451)	(0.0506)	(0.0232)	(0.0263)
remit	0.190***	0.196***	0.0160	0.0129	0.0861**	0.0835**	0.117***	0.119***
	(0.0689)	(0.0733)	(0.0160)	(0.0172)	(0.0341)	(0.0347)	(0.0165)	(0.0186)

<sup>22</sup> \*\*\*, \*\*, \* mean statistical significance at 1, 5 and 10 percent of significance, respectively. H-T and FE mean the Houseman-Taylor and Fixed Effects methods.

fragile	0.980***	0.993***	0.439***	0.426***	0.293*	0.281	0.240***	0.241***
	(0.314)	(0.337)	(0.0729)	(0.0790)	(0.169)	(0.175)	(0.0757)	(0.0851)
educ_prof	0.0891	0.263	-0.0464	-0.0379	0.0200	0.0150	0.000444	0.00532
	(0.180)	(0.219)	(0.0424)	(0.0497)	(0.0887)	(0.103)	(0.0464)	(0.0536)
educ_higher	0.261	0.0294	-0.0181	-0.0220	0.0791	0.0518	-0.113**	-0.112*
	(0.189)	(0.254)	(0.0471)	(0.0585)	(0.0933)	(0.117)	(0.0537)	(0.0631)
age	0.0233	0.0108	0.00592	0.00286	0.000523	0.0170	-0.0230***	-0.0242**
	(0.0221)	(0.0396)	(0.00663)	(0.00916)	(0.0117)	(0.0191)	(0.00821)	(0.00987)
age2	-0.000358*	-0.000133	-7.80e-05	-3.70e-05	-5.28e-05	-0.000163	0.000161**	0.000163*
	(0.000216)	(0.000376)	(6.46e-05)	(8.75e-05)	(0.000115)	(0.000181)	(7.91e-05)	(9.43e-05)
adults	0.00723	0.0116	0.0463***	0.0289***	0.0890***	0.0566***	0.0411***	0.0396***
	(0.0296)	(0.0389)	(0.00778)	(0.00911)	(0.0151)	(0.0184)	(0.00858)	(0.00982)
children	0.129***	0.110***	0.0172**	0.0112	0.0358**	0.0264	0.00644	0.00830
	(0.0345)	(0.0378)	(0.00805)	(0.00882)	(0.0172)	(0.0179)	(0.00842)	(0.00951)
l_income	0.423***	0.431***	0.164***	0.160***	0.166***	0.160***	0.109***	0.107***
	(0.0513)	(0.0555)	(0.0120)	(0.0130)	(0.0259)	(0.0267)	(0.0125)	(0.0140)
l_hours	-0.0416	-0.0520	-0.0331***	-0.0287**	0.0153	0.0235	-0.00230	-0.00470
	(0.0513)	(0.0606)	(0.0128)	(0.0143)	(0.0257)	(0.0286)	(0.0136)	(0.0155)
l_wealth	0.0270	0.0223	-0.00507	-0.00501	0.000351	0.00634	-0.00166	-0.00227
	(0.0191)	(0.0228)	(0.00474)	(0.00533)	(0.00949)	(0.0106)	(0.00507)	(0.00574)
_Iyear_2015	-0.130***	-	0.0145	-	-0.0320	-	0.0357***	-
	(0.0434)	-	(0.0102)	-	(0.0209)	-	(0.0107)	-
_Iyear_2016	0.0734	-	0.133***	-	0.278***	-	0.140***	-
	(0.0478)	-	(0.0115)	-	(0.0231)	-	(0.0126)	-
_Iyear_2017	0.0606	-	0.185***	-	-1.423***	-	0.642***	-
	(0.0505)	-	(0.0123)	-	(0.0262)	-	(0.0138)	-

south	-0.465***	-	0.101***	-	0.0313	-	-0.177**	-
	(0.0868)	-	(0.0331)	-	(0.0467)	-	(0.0722)	-
fem	-0.287	-	-0.218***	-	0.0732	-	0.152	-
	(0.175)	-	(0.0613)	-	(0.0977)	-	(0.115)	-
profession_short1	-0.417	-	0.0278	-	0.362	-	0.298	-
	(0.424)	-	(0.162)	-	(0.244)	-	(0.324)	-
profession_short2	-0.922	-	0.492	-	1.209**	-	1.635**	-
	(0.847)	-	(0.343)	-	(0.498)	-	(0.685)	-
Constant	1.949**	1.253	8.182***	8.285***	5.753***	5.729***	8.110***	8.717***
	(0.981)	(1.274)	(0.278)	(0.296)	(0.507)	(0.612)	(0.395)	(0.319)
Observations	6.918	6.918	7.105	7.105	6.734	6.734	7.105	7.105
R-squared		0.026		0.104		0.551		0.403
Number of hh_code	1.817	1.817	1.830	1.830	1.801	1.801	1.830	1.830

**Table 6. Expenditures and Investments Modeling Results (Part II)**

Variables	Expenditures not classified elsewhere		Entertainment		Investments in human capital		Investments in construction	
	H-T	FE	H-T	FE	H-T	FE	H-T	FE
crisis	0.409***	0.387**	0.217	0.281	0.391**	0.478**	0.413	0.125
	(0.143)	(0.161)	(0.162)	(0.182)	(0.181)	(0.192)	(0.414)	(0.495)
crisis_city	-0.0467	-0.0582	-0.0866	-0.0604	-0.0463	-0.0638	-0.0945	-0.114
	(0.0524)	(0.0588)	(0.0568)	(0.0625)	(0.0690)	(0.0716)	(0.154)	(0.179)
crisis_south	-0.114**	-0.131**	0.125**	0.111*	-0.0475	-0.0326	-0.0211	0.0961
	(0.0487)	(0.0546)	(0.0546)	(0.0605)	(0.0668)	(0.0695)	(0.175)	(0.216)
crisis_fem	-0.138	-0.153	0.0422	0.0991	-0.133	-0.0573	-0.571	-0.564
	(0.125)	(0.141)	(0.134)	(0.150)	(0.149)	(0.156)	(0.354)	(0.408)
crisis_spouse	-0.0782	-0.0762	0.124	0.174	-0.0475	0.0210	-0.385	-0.258
	(0.128)	(0.144)	(0.133)	(0.149)	(0.155)	(0.163)	(0.369)	(0.435)
crisis_soc_st	-0.191***	-0.176**	-0.201**	-0.176*	-0.228**	-0.242**	0.0354	0.170
	(0.0677)	(0.0759)	(0.0913)	(0.0987)	(0.0970)	(0.101)	(0.212)	(0.241)
crisis_fragile	0.284	0.260	1.142**	1.128*	0.0219	0.0230	0.0506	0.195
	(0.265)	(0.296)	(0.576)	(0.619)	(0.465)	(0.492)	(1.111)	(1.402)

crisis_prof	-0.109	-0.0938	0.0111	0.00880	0.120	0.131	0.0228	0.0201
	(0.0726)	(0.0813)	(0.0838)	(0.0913)	(0.100)	(0.104)	(0.226)	(0.267)
crisis_higher	-0.0151	-0.00630	-0.0937	-0.113	-0.0830	-0.114	0.440**	0.724***
	(0.0684)	(0.0765)	(0.0664)	(0.0726)	(0.0862)	(0.0894)	(0.203)	(0.238)
city	-0.708***	0.564**	0.528***	0.786***	0.228**	0.317	-0.0406	-1.672
	(0.117)	(0.263)	(0.0700)	(0.269)	(0.0949)	(0.411)	(0.176)	(2.513)
spouse	-0.0158	-0.108	0.0151	-0.0283	0.277*	0.248	0.304	-0.0431
	(0.170)	(0.223)	(0.119)	(0.216)	(0.156)	(0.248)	(0.341)	(0.619)
soc_st	0.0379	0.00500	0.331***	0.387***	-0.0487	-0.131	0.0211	0.121
	(0.0755)	(0.0861)	(0.0913)	(0.104)	(0.101)	(0.114)	(0.233)	(0.292)
remit	0.0789	0.0592	-0.0922*	-0.110*	-0.0324	-0.0256	0.675***	0.717***
	(0.0535)	(0.0597)	(0.0541)	(0.0576)	(0.0777)	(0.0796)	(0.226)	(0.248)
fragile	0.432**	0.420*	-0.291	-0.269	0.971**	0.901**	2.049**	1.771*
	(0.220)	(0.245)	(0.460)	(0.489)	(0.386)	(0.402)	(0.899)	(0.991)
educ_prof	-0.120	-0.168	0.0166	0.0664	-0.242	-0.0998	-1.384***	-1.787***
	(0.154)	(0.187)	(0.160)	(0.210)	(0.204)	(0.241)	(0.450)	(0.567)
educ_higher	0.0792	-0.00378	0.153	0.113	0.0769	0.131	-1.038**	-0.972
	(0.183)	(0.247)	(0.155)	(0.200)	(0.215)	(0.280)	(0.469)	(0.772)
age	0.111***	0.0710*	-0.0330*	-0.0418	0.0429*	-0.0142	0.0650	0.345***
	(0.0257)	(0.0365)	(0.0182)	(0.0341)	(0.0254)	(0.0464)	(0.0542)	(0.129)
age2	-0.000990***	-0.000728**	0.000333*	0.000329	-0.000480*	0.000142	-0.000730	-0.00330***
	(0.000244)	(0.000336)	(0.000178)	(0.000336)	(0.000248)	(0.000437)	(0.000539)	(0.00126)
adults	0.0238	0.0124	0.0456*	0.0372	0.0862***	0.0462	0.0101	-0.0439
	(0.0265)	(0.0314)	(0.0251)	(0.0350)	(0.0331)	(0.0429)	(0.0695)	(0.105)
children	-0.0100	-0.0176	0.0719**	0.0723**	0.175***	0.123***	-0.102	-0.100
	(0.0269)	(0.0303)	(0.0304)	(0.0335)	(0.0387)	(0.0408)	(0.0947)	(0.106)
l_income	0.274***	0.267***	0.242***	0.228***	0.266***	0.204***	0.816***	0.756***
	(0.0385)	(0.0431)	(0.0497)	(0.0538)	(0.0599)	(0.0627)	(0.134)	(0.150)
l_hours	0.101**	0.119**	0.0584	-0.0646	0.184***	0.172**	-0.0288	-0.0530
	(0.0402)	(0.0461)	(0.0695)	(0.0913)	(0.0602)	(0.0695)	(0.106)	(0.134)
l_wealth	0.00799	-0.00418	0.0509***	0.0205	0.0582***	0.0190	0.0503	-0.0430
	(0.0168)	(0.0194)	(0.0173)	(0.0213)	(0.0217)	(0.0248)	(0.0484)	(0.0698)

_Iyear_2015	-0.0163	-	0.114***	-	0.134***	-	-0.00348	-
	(0.0355)	-	(0.0398)	-	(0.0491)	-	(0.105)	-
_Iyear_2016	-0.179***	-	0.389***	-	0.154***	-	0.0302	-
	(0.0412)	-	(0.0432)	-	(0.0547)	-	(0.123)	-
_Iyear_2017	-0.119***	-	0.539***	-	0.152***	-	-0.0436	-
	(0.0446)	-	(0.0464)	-	(0.0579)	-	(0.131)	-
south	-0.490***	-	0.686***	-	-0.0590	-	0.367*	-
	(0.137)	-	(0.0673)	-	(0.0943)	-	(0.201)	-
fem	-0.0270	-	0.192	-	0.216	-	-0.0482	-
	(0.282)	-	(0.138)	-	(0.207)	-	(0.396)	-
profession_short1	0.718	-	-0.221	-	-0.942*	-	-2.513**	-
	(0.760)	-	(0.341)	-	(0.560)	-	(1.025)	-
profession_short2	1.590	-	0.0964	-	-0.297	-	-2.033	-
	(1.622)	-	(0.688)	-	(1.134)	-	(1.993)	-
Constant	1.781	3.599***	2.221**	3.883***	2.039*	4.354***	-3.108	-8.791**
	(1.110)	(1.126)	(0.934)	(1.149)	(1.167)	(1.498)	(2.550)	(3.939)
Observations	4839	4839	3456	3456	6168	6168	2596	2596
R-squared		0.034		0.100		0.017		0.052
Number of hh_code	1435	1435	1253	1253	1768	1768	1154	1154

**Table 7. Logit and Probit Models for Savings**

Variables	logit		probit	
	save	std. error	save	std. error
city	-0.721**	(0.299)	-0.418**	(0.167)
credit	0.0793	(0.649)	-0.0586	(0.352)
crisis	-14.27***	(2.986)	-7.021***	(1.272)
extra_earner	0.636**	(0.261)	0.333**	(0.141)
fem	-0.239	(0.526)	-0.144	(0.292)
remit	0.944***	(0.239)	0.511***	(0.130)
south	4.028***	(0.415)	2.104***	(0.273)
gr_xrate	103.8***	(19.05)	51.07***	(8.029)
adults	-0.189	(0.135)	-0.106	(0.0745)
spouse	-0.271	(0.508)	-0.155	(0.282)
children	0.0450	(0.104)	0.0265	(0.0569)
l_income	0.677***	(0.214)	0.369***	(0.115)
l_wealth	0.415***	(0.107)	0.227***	(0.0574)
varsity	0.266	(0.382)	0.145	(0.214)
age	0.0560	(0.0815)	0.0353	(0.0442)
age2	-0.000393	(0.000702)	-0.000257	(0.000383)
2014.year	8.648***	(1.565)	4.286***	(0.664)
2016.year	-3.552***	(1.063)	-1.752***	(0.467)
Constant	-29.25***	(3.761)	-15.77***	(2.040)
Observations	10331		10331	
Number of hh_code	2464		2464	



**Table 8. Marginal Effects for Logit and Probit Models**

<b>Variables</b>	<b>logit</b>	<b>probit</b>
city	-0.00558**	-0.00627**
credit	0.000614	-0.000878
crisis	-0.110***	-0.105***
extra_earner	0.00492**	0.00498**
fem	-0.00185	-0.00216
remit	0.00730***	0.00766***
south	0.0312***	0.0315***
gr_xrate	0.803***	0.765***
adults	-0.00146	-0.00159
spouse	-0.00209	-0.00232
children	0.000349	0.000397
l_income	0.00524***	0.00552***
l_wealth	0.00321***	0.00340***
varsity	0.00206	0.00218
age	0.000434	0.000529
age2	-3.04e-06	-3.85e-06
Observations	10331	10331

### Appendix 3. Results of Paired Sample T-Tests

**Table 9. T-Test for Equality of Average Expenditures of the Current Year and 2013**

Expenditure type	Year	p-value	Expenditure type	Year	p-value
Total expenses	2014-2013	0.0000	Services	2014-2013	0.0000
	2015-2013	0.0000		2015-2013	0.0000
	2016-2013	0.0012		2016-2013	0.0000
	2017-2013	0.0000		2017-2013	1.0000
	2018-2013	0.0000		2018-2013	1.0000
Human capital	2014-2013	0.0950	Utilities	2014-2013	0.0008
	2015-2013	0.0120		2015-2013	0.0000
	2016-2013	0.0980		2016-2013	0.0000
	2017-2013	0.1830		2017-2013	0.0000
	2018-2013	0.0000		2018-2013	0.0000
Construction	2014-2013	0.0830	Durables	2014-2013	0.0000
	2015-2013	0.0400		2015-2013	0.1317
	2016-2013	0.0950		2016-2013	0.0843
	2017-2013	0.0120		2017-2013	0.0033
	2018-2013	0.0050		2018-2013	0.0000
Food	2014-2013	0.0000	Entertainment	2014-2013	0.0002
	2015-2013	0.0000		2015-2013	0.0000
	2016-2013	0.0000		2016-2013	0.0000
	2017-2013	0.0000		2017-2013	0.0000
	2018-2013	0.0000		2018-2013	0.0000

**Table 10. Chain Tests for Equality of Average Expenditures**

Expenditure type	Year	p-value	Expenditure type	Year	p-value
Total expenses	2014-2013	0.0000	Services	2014-2013	0.0000
	2015-2014	0.2270		2015-2014	0.9030
	2016-2015	0.3090		2016-2015	0.0000
	2017-2016	0.5263		2017-2016	1.0000
	2018-2017	0.0000		2018-2017	0.2273
Human capital	2014-2013	0.0945	Utilities	2014-2013	0.0008
	2015-2014	0.1799		2015-2014	0.0005
	2016-2015	0.8460		2016-2015	0.9275
	2017-2016	0.6448		2017-2016	0.0000
	2018-2017	0.0004		2018-2017	0.0000
Construction	2014-2013	0.0823	Durables	2014-2013	0.0000
	2015-2014	0.0762		2015-2014	0.9986
	2016-2015	0.2472		2016-2015	0.4571
	2017-2016	0.8453		2017-2016	0.0275
	2018-2017	0.3265		2018-2017	0.0652
Food	2014-2013	0.0000	Entertainment	2014-2013	0.0002
	2015-2014	0.2320		2015-2014	0.1100
	2016-2015	0.0640		2016-2015	0.0000
	2017-2016	0.0004		2017-2016	0.4236
	2018-2017	0.0005		2018-2017	0.0144