

The analysis of factors affecting the household savings as a part of food security management

Gelena Pruntseva^a, Stepan Davymuka^b, Valentyna Yakubiv^c, Taras Vasylytsiv^b, Iryna Anhelko^d, Inna Irtysheva^e, Yuliia Maksymiv^c, Iryna Hryhoruk^c, Rostyslav Bilyk^f and Nazariy Popadynets^{b,d,c*}

^aNSC “Institute of agrarian economy”, Ukraine

^bState Institution “Institute of Regional Research named after M. I. Dolishniy of the NAS of Ukraine”, Ukraine

^cVasyl Stefanyk Precarpathian National University, Ukraine

^dInstitute of Enterprise and Advanced Technologies Lviv Polytechnic National University, Ukraine

^eAdmiral Makarov National University of Shipbuilding, Ukraine

^fYuriy Fedkovych Chernivtsi National University, Ukraine

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Ensuring household food security should be a priority goal of state policy. The level of ensuring household food security reflects the state of the country's economic development and the effectiveness of agricultural policy. Household food security is achieved by ensuring a high level of purchasing power of households, which is possible by increasing income. Savings are the “safety cushion” for households during the financial and economic crisis caused by the coronavirus pandemic. The level of household savings is important both for the households themselves and for the country's economy, since savings, on the one hand, help to avoid hunger during crises, and, on the other hand, are an important investment resource for the country's economy. That is why assessing the level of household savings and identifying factors affecting savings are important aspects of building an effective government policy in the field of food security.

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1. Introduction

Households are an important element of the economic system, and household agricultural activities contribute to strengthening the agricultural sector and increasing food security. Household savings, which are mostly held in financial institutions, are a source of funding for government programs, business development programs, and other programs. Another important aspect is the fact that household savings help them survive crises and financial and economic shocks, saving them from hunger, which is an important aspect of the food security of the country's population.

It is important to note that household savings are influenced by both income and expenses, which, on the one hand, depending on the management of household finances, and on the other hand, on external factors such as government policy, economic processes, natural phenomena, and others. Therefore, for the analysis, we have selected the following factors, which, in our opinion, have a significant impact on the level of household savings: household disposable income, household spending, and social benefits. The level of influence of household disposable income and expenditures on their savings depends on the management policy of households. And social benefits are part of state policy and additional financial revenues to the household budget affecting the level of savings.

* Corresponding author.

E-mail address: popadynets.n@gmail.com (N. Popadynets)

2. Literature review

Food is one of the most basic needs for human survival and access to it is a basic human right (Smith and Subandoro, 2007). Supplies of food and food security are the fundamental aspects of human societies and are considered one of the pivotal factors of individual and social health (Tutunchi et al., 2020). Food security means the provision and access to nutritionally sufficient and culturally accepted food by each member of the household for healthy life obtained through socially acceptable ways (Abdullah et al., 2017). At the household level, food security is understood as access by all members at all times to enough food for active, healthy life (Regassa & Stoecker, 2011). Food insecurity has been documented in countries throughout the range of national incomes (Rose, 2008). Household food insecurity is a serious public health concern in high-income countries (Loopstra et al., 2018). Household food insecurity is the leading risk factor of malnutrition, claiming approximately 300,000 deaths each year (Drammeh et al., 2019). The research results show that there are four concepts, implicit in the notion of “secure access to enough food all the time”: (a) sufficiency of food, defined mainly as the calories needed for an active, healthy life; (b) access to food, defined by entitlement to produce, purchase food or receive it as a gift; (c) security, defined by the balance between vulnerability, risk and insurance; and (d) time, where food insecurity can be chronic, transitory or cyclical (Maxwell and Smith, 1992). Measuring household food insecurity represents a challenge due to the complexity and wide array of factors associated with this phenomenon (Melgar-Quinonez & Hackett, 2008). Maxwell et al. (2014) underline that measures of food security are urgently required for purposes of early warning, assessment of the current and prospective status of at-risk populations, and monitoring and evaluation of specific programs and policies. Different measures are often used interchangeably, without a good idea of which dimensions of food security are captured by which measures, resulting in potentially significant misclassification of food insecure populations (Maxwell et al., 2014). The assessment of the links between food security and livelihoods is central for overcoming widespread food insecurity, and it remains challenging due to food security's multi-dimensionality and the challenge of finding indicators that are comparable and applicable to various contexts (Mutea et al., 2019; Vasylytsiv et al., 2016, 2017). The variations in the approaches that have been used in defining food security made it difficult to label its existence across countries and societies. In some cases, it encompasses the nutritional/health aspect while, for others, it is about having food for existence (Teshager, 2020). Households can be categorized either as food secure or as falling into one of several designated ranges of severity of food insecurity, such as food insecure without hunger, food insecure with moderate hunger, and food insecure with severe hunger (Blumberg et al., 1999). Food insecurity was strongly associated with income (Coleman-Jensen et al., 2014). The processes of forming the investment climate of households in the agricultural sector, as the basis for the state's food security, need to be more in-depth study (Pruntseva et al., 2021). An analysis was conducted of the development of the business process management system in the food industry as part of the food sector (Irtysheva et al., 2020). The authors (Panukhnyk et al., 2019) research the state of the food supply of the consumer market, the dependence of the effectiveness of the implementation of macro-and microeconomic regulation mechanisms of the trade and food Ukraine's policy. In Nepal, the small-scale producer-consumer households of the basin do not have food availability through subsistence production alone, although most households have been able to supplement their food requirements from the market while accessing marketed food, they often must compromise other necessities such as investments in clothing, housing, education, and health (Pandey et al., 2019). The research results indicate that action needs to be taken to decrease the prevalence of food insecurity and hunger among food stamp recipients (Cheryl et al., 2004). The research results show that participation in non-farm work exerts a positive and statistically significant effect on household income and food security status, supporting the widely held view that income from non-farm work is crucial to food security and poverty alleviation in rural areas of developing countries (Owusu et al., 2011). Thus, it can be concluded that household food security is closely related to income, and assessing the factors affecting food security is an important step towards ensuring household food security during crises, including pandemic COVID-19. For this purpose, it is necessary to analyze the factors affecting the food security of households.

3. Materials and methods

This study aims to answer the following research questions:

- (a) Does the household disposable income affect the level of household savings?
- (b) How does the household spending affect the level of household savings?
- (c) What is the level of influence of social benefits to households on household savings?

To begin to answer the questions, it is necessary to analyze the studies and define the main indicators. Smith and Subandoro (2007) note that efforts to overcome the development challenges posed by food insecurity necessarily begin with accurate measurement of key indicators at the household level. D. Abdullah et al. (2017) determine education as an important factor in the food security system of households. In the study area (Pakistan) surprisingly female education was found insignificant and if a female has higher education, it does not matter in the affairs of the household (Abdullah et al., 2017). In Ethiopia, households choose to reduce the variety of food eaten as a primary strategy to reduce the impacts of food insecurity (Teshager, 2020). Matheson et al. (2002) note that household food supplies were significantly associated with household food-security status. Gubert et al. (2016) underline that in the study area food insecurity was directly associated with socioeconomic factors. Drammeh et al. (2019) indicate main factors influencing food security households, such as availability (production, education, age of household head, trade, food aids), accessibility (income, income distribution without household, household size, food price, employment status), utilization (dietary intake, dietary safety, health status, gender, hygiene). Pandey and Bardsley (2019) indicate the multiple food system elements relevant to a comprehensive understanding of food security based on

FAO&SAARC. The authors emphasize the following elements: Availability (Resources for food (natural, human, and physical), Production of food (food production, food imports, market integration)), Access (Production of food, income (purchasing power, social safety nets, food for work schemes, community support), Consumption (intra-household distribution, dietary practices, nutrition knowledge, supplementary feeding, childcare)), Utilization (Consumption and absorption (health, sanitation, safe water, food quality)), Stability (Food availability and access instability, such as environmental risks to food production (climate shocks, pests, natural resource degradation, loss of productive assets), Economic shocks, market, and entitlement risk (deteriorating terms of trade, the collapse of safety nets, price hikes) and associated effects on production, income, and consumption of food, nutrition and health risks (epidemics, erosion of social services) (Pandey et al., 2019). Loopstra et al. (2018) determine that public policy interventions reduce food insecurity and reach large numbers in the population, governmental efforts to expand investment in social protection in high-income countries would likely further reduce food insecurity and may have long-term benefits for reduced spending on healthcare and other expenditures resulting from the harms of food insecurity. One aspect of the social security policy that may increase food insecurity among low-income households is the practice of sanctioning, which abrogates financial support to unemployed persons receiving unemployment insurance if they fail to meet the criteria for seeking work (Loopstra et al., 2018). Regassa and Stoecker (2011) note that households in the lowland dry climatic zone were more prone to food insecurity and hunger than those in the highland climatic zone. Melgar-Quinonez and Hackett (2008) underline that researchers, policymakers, governmental and non-governmental agencies must intensify their efforts to further develop tools that provide valid and reliable measures of food security in diverse population groups, to synthesize a universally applicable tool able to capture the global human phenomenon of food insecurity. Cheryl et al. (2004) note that it is important to assess how employment and wages contribute to food insecurity and hunger among low-income households, how the barriers to participation in food assistance programs can be decreased and eliminated, and the extent to which these food assistance programs provide nutritional support to participating at-risk populations. Rose (2008) underlines that it is important to improve food security without leading to over-consumption, a problem of increasing concern in Latin America and elsewhere (Rose, 2008). Mutea et al. (2019) underline that households' ownership of productive hand tools, followed by off-farm income, consumption of own-produced food, type of agro-ecological zone, farm income, and a number of main crops infested by pests had a significant effect on household food security. Authors emphasize that household size, the size of accessible land, and household members' participation in large agricultural investments (as wage workers or sub-contract farmers) were not significantly influencing food security (Mutea et al., 2019). Maxwell et al. (2014) note that "food insecurity" has no accepted gold standard metric against which individual indicators can be gauged, though without one it is difficult to say which indicator performs "best" in correctly and reliably identifying food-insecure households. The implication is that using more than one indicator is advisable, and policymakers should be aware of what elements of food insecurity each indicator portrays (Maxwell et al., 2014). Based on above mentions opinions, the following indicators have been chosen for the analysis: Household savings, Household disposable income, Household spending, Social benefits to households.

Table 1
Key indicators meaning

| Indicator | Meaning |
|--------------------------------|---|
| Household savings. | Net household saving is defined as household net disposable income plus the adjustment for the change in pension entitlements less household final consumption expenditure (households also include non-profit institutions serving households). |
| Household disposable income. | Household disposable income measures the income of households (wages and salaries, self-employed income, income from unincorporated enterprises, social benefits, etc.), after taking into account net interest and dividends received and the payment of taxes and social contributions. |
| Household spending. | Household spending is the amount of final consumption expenditure made by resident households to meet their everyday needs, such as food, clothing, housing (rent), energy, transport, durable goods (notably cars), health costs, leisure, and miscellaneous services. |
| Social benefits to households. | In national accounts social benefits to households are broken down into two distinct categories: social benefits other than social transfers in kind; and social transfers in kind. |

Source: OECD

In the study the data for EU-28 countries with the period from 2010 to 2019 have been used. The indexes of Household savings, Household disposable income, Household spending, and Social benefits to households are available in Organization for Economic Cooperation and Development (OECD). The data of indicators are presented in Table 2.

Table 2
The indicators influencing on food security

| Indicator | Year | | | | | | | | | | |
|----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | |
| Household savings. % | 6.59 | 6.12 | 5.60 | 5.61 | 5.72 | 5.66 | 5.68 | 5.45 | 5.86 | 6.47 | |
| Household disposable income. % | -0.07 | -0.18 | -1.50 | -0.45 | 0.99 | 1.78 | 2.13 | 1.45 | 1.70 | 1.85 | |
| Household spending. % | 2.7 | 6.7 | 8.3 | 11.5 | 13.5 | 15.5 | 22.3 | 28.1 | 32.2 | 37.3 | |
| Social benefits to households. % | 16.30 | 16.04 | 16.32 | 16.46 | 16.31 | 16.04 | 15.96 | 15.73 | 15.59 | 15.68 | |

Source: OECD

In the study the correlation and regression analysis have been used. The dependent variable (Y) is the index “Household savings”. The explanatory variables are Household disposable income (X1), Household spending (X2), Social benefits to households (X3).

4. Results and discussion

A model was built using the Eviews program. First of all, we studied the correlation between the indicators by creating a correlation matrix. The correlation matrix is shown in table 3.

Table 3

Correlation matrix

| Indicator | Y | X1 | X2 | X3 |
|-----------|-----------|-----------|-----------|-----------|
| Y | 1.000000 | -0.014522 | -0.047684 | -0.098247 |
| X1 | -0.014522 | 1.000000 | 0.750051 | -0.722885 |
| X2 | -0.047684 | 0.750051 | 1.000000 | -0.863003 |
| X3 | -0.098247 | -0.722885 | -0.863003 | 1.000000 |

Source: own analysis

We can conclude that the indicator “Y” does not have a close direct correlation with any variable indicator “X”. This means that none of the indicators has a significant effect on the household savings. However, there is an inverse relationship between Y and X3, the value of which is “-0.09847”. This means that the level of the social benefits to households has a slight inverse relationship with the household savings.

A multivariate regression model was built, and the coefficients of the regression equation were determined:

$$Y = \beta_0 + \beta_1 \cdot X1 + \beta_2 \cdot X2 + \beta_3 \cdot X3 \quad (1)$$

The results of multiple regression are presented in Table 4.

Table 4

The results of multiple regression

Dependent Variable: Y

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|-----------------------|-------------|----------|
| X1 | -0.015237 | 0.191860 | -0.079418 | 0.9393 |
| X2 | -0.016541 | 0.027781 | -0.595426 | 0.5733 |
| X3 | -0.717592 | 1.019129 | -0.704123 | 0.5077 |
| C | 17.69466 | 16.73331 | 1.057451 | 0.3310 |
| R-squared | 0.079378 | Mean dependent var | | 5.876000 |
| Adjusted R-squared | -0.380933 | S.D. dependent var | | 0.388764 |
| S.E. of regression | 0.456849 | Akaike info criterion | | 1.560248 |
| Sum squared resid | 1.252267 | Schwarz criterion | | 1.681282 |
| Log likelihood | -3.801238 | Hannan-Quinn criter. | | 1.427474 |
| F-statistic | 0.172444 | Durbin-Watson stat | | 1.081522 |
| Prob(F-statistic) | 0.911213 | | | |

Source: own analysis

We can see in the table that R-squared = 0,0793. This means that Y is only 7.9% dependent on variables X1, X2 and X3. Our multifactor model has the following form:

$$Y = 17.69466 - 0.015237X1 - 0.016541X2 - 0.717592X3$$

The coefficients of the equation reflect the quantitative effect of each factor on the dependent indicator. The data obtained mean that the “Household savings” is reduced by 0,0152 with an increase in the “Household disposable income” by 1 unit at a constant level of the “Household spending” and “Social benefits to households”. Secondly, the “Household savings” is reduced by 0,0165 with an increase in the “Household spending” by 1 unit at a constant level of the “Household disposable income” and the “Social benefits to households”. Thirdly, the “Household savings” is reduced by 0,7176 with an increase in the “Social benefits to households” by 1 unit at a constant level of the “Household disposable income” and the “Household spending”. We checked the residuals for the presence of autocorrelation. For these purposes, the value of the Durbin-Watson (DW) was taken:

$$DW=1.081522$$

According to the Durbin-Watson table with $m = 2$, we determined the critical points for the significance level of 0,01 and the number of observations $n = 10$:

$$d_1 = 0.466$$

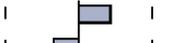
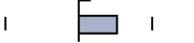
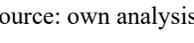
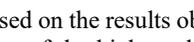
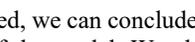
$$d_2 = 1.333$$

We got the following results:

$$d_1 < DW, \quad 0.466 < 1.081522 \quad d_2 < DW < 4 - d_2, \quad 1.333 < 1.081522 < 2.667$$

Therefore, there is reason to conclude that there is no autocorrelation. This is one of the confirmations of the high quality of the model. We checked the results for autocorrelation. The results of autocorrelation are presented in Table 5.

Table 5
The results of autocorrelation

| Autocorrelation | Partial Correlation | AC | PAC | Q-Stat | Prob | |
|---|---|----|--------|--------|--------|-------|
|  |  | 1 | 0.278 | 0.278 | 1.0331 | 0.309 |
|  |  | 2 | -0.212 | -0.314 | 1.7091 | 0.425 |
|  |  | 3 | -0.120 | 0.055 | 1.9545 | 0.582 |
|  |  | 4 | -0.090 | -0.157 | 2.1167 | 0.714 |
|  |  | 5 | -0.127 | -0.087 | 2.5043 | 0.776 |
|  |  | 6 | -0.292 | -0.337 | 5.0659 | 0.535 |
|  |  | 7 | -0.347 | -0.304 | 9.8825 | 0.195 |
|  |  | 8 | 0.098 | 0.116 | 10.461 | 0.234 |
|  |  | 9 | 0.312 | 0.012 | 22.126 | 0.008 |

Source: own analysis

Based on the results obtained, we can conclude that there is no autocorrelation in our model. This is also one of the confirmations of the high quality of the model. We checked the results for heteroskedasticity using the ARCH test. The results of ARCH test are presented in Table 6.

Table 6
Heteroskedasticity Test: ARCH

| Heteroskedasticity Test: ARCH | | | | |
|-------------------------------|-------------|-----------------------|-------------|-----------|
| F-statistic | 1.111384 | Prob. F(1,7) | | 0.3268 |
| Obs×R-squared | 1.233138 | Prob. Chi-Square(1) | | 0.2668 |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 0.130514 | 0.060712 | 2.149732 | 0.0686 |
| RESID^2(-1) | -0.407968 | 0.386985 | -1.054222 | 0.3268 |
| R-squared | 0.137015 | Mean dependent var | | 0.094242 |
| Adjusted R-squared | 0.013732 | S.D. dependent var | | 0.151104 |
| S.E. of regression | 0.150063 | Akaike info criterion | | -0.762396 |
| Sum squared resid | 0.157632 | Schwarz criterion | | -0.718568 |
| Log likelihood | 5.430781 | Hannan-Quinn criter. | | -0.856976 |
| F-statistic | 1.111384 | Durbin-Watson stat | | 1.222433 |
| Prob(F-statistic) | 0.326804 | | | |

Source: own analysis

Based on the results obtained, we can conclude that there is no heteroskedasticity in our model. This is also one of the confirmations of the high quality of the model.

5. Conclusion

The study has found that there is no close relationship between household savings and indicators “Household disposable income”, “Household spending” and “Social benefits to households”. None of the indicators has a significant effect on household savings. There is an inverse relationship between Y and X3, which means the level of the Social benefits to households has a slight inverse relationship with the Household savings. Thus, the answer to the first research question “Does the “Household disposable income” affect the level of “Household savings”?” is “Household disposable income” does not significantly affect the “Household savings”. The answer to the second research question “How does the “Household spending” affect the level of “Household savings”?” is the “Household savings” is reduced by 0,02% with an increase in the “Household spending” by 1 unit. The answer to the third research question “What is the level of influence of “Social benefits to households” on “Household savings”?” is “Social benefits to households” does not significantly affect the “Household savings”. The “Household savings” is reduced by 0,72% with an increase in the “Social benefits to households” by 1 unit. The data obtained may help the government, FAO, and other authorities develop programs and policies to stimulate agricultural production. The findings of the research might be used by international funds, non-profit organizations, agricultural enterprises, and other organizations to prevent hunger and economic losses.

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