
Multidimensional Assessment of Polish Farm Household Financial Security by TOPSIS and Generalised Distance Measure

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Abstract:

Purpose: Financial security is a multidimensional term, with its level is depending, in subjective and objective terms, on many socio-demographic conditions. This article aims to assess Polish farm households' financial security by means of a combined measure.

Design/Methodology/Approach: The study was based on non-identified (raw) individual data originating from the Social Diagnosis Study conducted by the Social Monitoring Council in 2015. Due to non-metric nature of many simple criteria, in order to construct a combined measure of the farm - household financial security level, a Generalised Distance Measure (GDM) was used along with TOPSIS.

Findings: Farm households are classified by types and profiles that have been developed of households featuring the highest and the lowest level of financial security. The study revealed significant differences among farm households in terms of their financial security level in both, subjective and objective terms.

Practical Implications: This research is interesting for methodological reasons, since a single methodology for studying the level of financial security and identifying its determinants has yet to be developed. The problem is not just the multidimensional character of the phenomenon and the lack of an unequivocally defined set of variables characterising it. The choice of appropriate statistical methods is also an important consideration, e.g., for constructing a single synthetic financial security indicator and dedicated software.

Originality/value: To the authors' knowledge, no one has hitherto made any studies concerning the multi-aspect assessment of the household financial security level based on a combined feature, the construction of which takes account of objective criteria (quantified on strong measurement scales) as well as subjective ones (measured on weak scales).

Keywords: Financial security, Generalised Distance Measure GDM, TOPSIS method, farms.

JEL classification: C38, D14, G50.

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1. Introduction

1.1 Household Financial Security

Financial security is a key element of economic security and - according to Corman *et al.* (2012) it is one of the dimensions of financial wellbeing. Financial security covers a number of aspects, such as i.a., financial institutions, financial market segments or financial transactions, as well as clients of financial markets (both individuals and institutions) (Capiga *et al.*, 2010). The literature includes many definitions of financial security, depending on the subject of research. Generally speaking, financial security means a lack of threats to public finance, the finances of companies, insurance, banking, and to the personal finances of households (Jajuga 2007). According to Hayes and Finney (2013), financial security refers to an individual's feeling of financial stability.

The financial security concept refers to an individual's evaluation of their financial situation reflected in the level of savings, ability to meet emergencies, an adequate income in general and retirement income (Haines *et al.*, 2009; Lange *et al.*, 2012a; Suwanrada, 2009; Swami *et al.*, 2008). It can be considered not only from the point of view of a state, financial sector or a business, but also from the point of view of an individual. The household financial security indicator shows the extent to which its members can meet their current and future needs as well as liabilities without lowering their standard of living (Kozera *et al.*, 2016). A similar definition of financial security is presented by Raczkowski. According to Raczkowski (2014) it is an amount of funds sufficient to cover basic as well as unavoidable expenses in a sustainable way, taking account of physiological and environmental needs as well as cultural standards.

Kata *et al.* (2021) defines household financial security as the capacity for attaining an income enabling a household's needs to be satisfied at an appropriate level and financial reserves to be set aside, to be used in future to cover unexpected (unplanned) and anticipated (planned) expenses. According to Piotrowska (2017), household financial security can mean the capacity for attaining an income necessary to satisfy a household's needs at an appropriate level and to generate financial reserves in case of unfavourable occurrences such as illness, job loss, or the disintegration of the family. Security results from the fact of having various types of assets (both financial and non-financial) as a means of protection against unfavourable developments in the future (Kośny 2013). Financial security refers to the ability to access financial resources in order to maintain an adequate standard of living (Kim and Lyons 2008; Chaudhuri 2003; Osberg and Sharp 2011). It is considered to be the opposite of financial vulnerability or instability (Hacker 2011; Bernheim *et al.*, 2003; Lin and Grace 2007).

The notion of household financial security is also related to the concept of "financial immunity". Solarz (2015) states that financial immunity is the "declared, feasible

capacity of households to survive financial shocks, the possibility of obtaining funds for unforeseen expenses. It is mainly applied to sudden events generating financial needs in the short term, e.g., an accident, illness, theft, temporarily reduced income". This immunity is the foundation for building a household's financial security and its financial independence which, according to Solarz (2015), is a state that ensures not only an individual's stability of functioning, but chances for development as well. On the other hand, we would speak of household financial security in the context of the capacity to cope with medium- and long-term financial problems, caused by circumstances such as job loss, disability, a house fire, retirement.

Depending on the entity and scope being considered, financial security can be measured using various indicators (Raczkowski 2014). Quantitative – objective – indicators are usually considered, while qualitative – subjective – ones are applied less often. One of the measures used for households is the Genworth Index, developed in 2007 by the Personal Finance Research Centre at the University of Bristol. It is a tool illustrating the financial situation of households and measuring the level of their financial security and vulnerability in particular countries. Genworth Index results provide information about the relative financial stability of households in a given country. Based on their responses in the survey, households are awarded between 0 and 100 points. A low indicator suggests financial vulnerability, and a high one – financial security. Households are divided into four categories: financially secure, circumspect, strivers (having experienced difficulties), and financially vulnerable (Kozera *et al.*, 2016).

In the unstable and insecure socio-economic environment surrounding today's households, maintaining financial security emerges as a need in itself, one that is of key importance for a household's survival. The threat of losing financial security concerns all households, regardless of their financial status. This stems from the fact that households' financial security can be affected by unfavourable occurrences that are exogenic or accidental, independent of the household itself and the decisions and actions of its members (Kata *et al.*, 2021. Espinosa *et al.* (2014) considers lost health as a factor affecting financial security. Health problems significantly increase the likelihood of financial strain for older individuals. According to Kim and Lyons (2008), existing health conditions were more likely to affect solvency and investment asset accumulation than liquidity, while new health events were more likely to affect solvency (in research on financial uncertainty).

However, financial security is determined mainly by household members' decisions and financial choices, i.e., by factors endogenous to the household (Kata *et al.*, 2021). According to Hacker (2021), individuals' financial security is determined by their behaviours. In his opinion, securing income at a current level is more important for the majority of people than increasing it, as any loss of or decline in current income may trigger destabilization, and even crisis. The literature underlines that households' financial security is influenced by many factors, such as i.a., a level of income, ability to meet emergencies, the adequacy of retirement income, level of

savings, education, age, race and gender (Lange *et al.*, 2012b; Mahal *et al.*, 2012; Schofield *et al.*, 2010). The loss of financial security is thus a problem that can affect any household, which makes it an extremely important issue.

No uniform definition of household financial security can be found in the literature, but all the explanations of financial security share a common framework, something which is also underlined in the research of Kata *et al.* (2021). However, the above definitions all emphasize the ability to satisfy current and future needs of household members and to ward off sudden deterioration of their financial situation. Likewise, there are no generally accepted standards for the measurement of financial security (Kochis 1996), except the one typically used in the related area, namely the financial status of individuals or households in terms of their financial resources relative to current and future financial needs (Hacker 2011; Greninger *et al.*, 1996; Moon *et al.*, 2002).

Household financial security may be considered from objective or subjective points of view (e.g., from the point of view of the head of a household). It may refer to an objective assessment of the current financial situation, a subjective assessment of household budget management methods, or an assessment of the prospects of changes in the financial situation in the future. In both objective and subjective dimensions, the financial security level varies widely not only among socio-economic population groups, but also within them.

1.2 The Peculiarity of Farmers' Households

Farmer households are a peculiar socio-economic group. Compared to other groups, they are characterized by a strong link between the spheres of consumption and production and between ownership and labor. The farmer and his or her family act simultaneously as members of a household, as organizers of production and its distribution and as farm owners and labor force (Stanisławska and Wysocki 2011). The farm operator is simultaneously the head of the household and also an entrepreneur who often makes risky economic decisions (Wołoszyn 2013). The farm is the household's main source of income, which depends on various factors that affect agricultural production and its profitability. Consequently, the farmer's income may exhibit great fluctuations due to price changes of agricultural products or varying weather conditions. These risk factors and income volatility can substantially lower the level of farmer households' financial security (Kozera *et al.*, 2016).

Farmer households are strongly tied to the land – they depend on it for residence and livelihood. The negative consequence of this attachment is limited occupational mobility and difficulty to secure alternative sources of income. All this greatly affects the level of financial security of that group of households.

The main factor undermining the financial security of farmer households is their low

income. Research conducted by Wołoszyn (2013; 2020) showed that the economic situation of farmer households in 2005-2015 was worse than that of average Polish households. Following Poland's accession to the EU, the average income of farmer households accounted for about 84% of the total average household income in Poland (Table 1). Increases in subsidies, production, and agricultural prices helped reduce at first that distance.

After 2010, however, relative income of farmer households started to decline again. In 2015, it accounted for only 74% of the national average - the main reason being the weak growth of labor productivity in agriculture. Farmer households were also marred by relatively high and increasing income inequality. In 2005, 20% of most affluent farmer households held 16 times as much income as 20% least affluent. In 2015 this number increased to 27 times, while the national average remained stable around 5. The level of income inequality measured by the Gini coefficient was also higher in farmer households than on average in Poland (Table 1). Wołoszyn and Wysocki (2014) showed that the highest level of inequality existed within the farmer households with arable land of 30 ha and more.

Table 1. Average relative income, S80/S20 ratio and Gini inequality coefficient for Polish households by socioeconomic groups in 2005, 2010 and 2015

Socioeconomic group	Average relative income (%)			S80/S20 coefficient			Gini coefficient		
	2005	2010	2015	2005	2010	2015	2005	2010	2015
blue collar workers	87.2	88.2	88.0	4.0	3.7	3.8	0.25	0.24	0.24
white collar workers	142.2	137.2	131.0	5.0	4.7	4.5	0.30	0.29	0.28
farmers	83.5	82.2	74.0	16.1	18.5	27.3	0.47	0.49	0.51
self-employed	129.9	126.1	123.5	63	5.9	5.7	0.34	0.33	0.33
retirees	109.6	95.7	99.6	3.5	3.5	3.3	0.24	0.24	0.23
pensioners	77.9	69.5	69.3	4.3	4.4	4.4	0.25	0.26	0.25
all households	100.0	100.0	100.0	5.8	5.3	5.2	0.32	0.32	0.31

Source: Own study.

Nevertheless, despite the implementation of the cohesion policy, farmer households still have a worse income situation than Polish households overall, display a higher level of income inequalities (Wołoszyn 2020), a higher percentage of households at risk of poverty (Jędrzejczak and Pekasiewicz 2018), and substantial consumption insufficiencies, especially in terms of durable goods, which suggests a lower standard of living in this aspect (Kozera *et al.*, 2014).

1.3 The Motivation

On the one hand, studies on households' financial security are interesting from an exploratory viewpoint. The need to ensure financial security has a direct impact on a household's financial decisions. These are decisions on how to obtain financial resources, e.g. on getting a job, opening or closing down a business etc., as well as decisions on the distribution of those resources, i.e. consumer spending, savings, taking out loans or credit. Information on households' behaviour on a micro scale is important for maintaining various kinds of security in the economy, and also for

shaping government financial policy. For example, a suddenly increased interest in mortgages could affect property prices, the emergence of a financial crisis will influence how financial resources are obtained, but will also affect savings being used to alleviate financial shocks. Issues of financial security are also increasingly being discussed in the literature in the context of demographic changes such as the depopulation of certain regions or the ageing of societies and the problems the pension system could run into in the future (Krzyszowska, 2017).

On the other hand, this research is interesting for methodological reasons, since a single methodology for studying the level of financial security and identifying its determinants has yet to be developed. As emphasized by Kata *et al.* (2021), studies of household financial security have been conducted relatively rarely and no universally accepted methodology has been developed in this area. Thus, this is an area that should be explored because of the importance of this problem at the macro level. The problem is not just the multidimensional character of the phenomenon and the lack of an unequivocally defined set of variables characterising it. The choice of appropriate statistical methods is also an important consideration, e.g., for constructing a single synthetic financial security indicator and dedicated software.

Then, there is the issue of the limited availability of reliable statistical data. The public statistics available in Poland, which are gathered annually on a representative sample of over 30,000 households as part of the Household Budget Survey (GUS 2018), are insufficient for conducting an in-depth analysis of household financial security as a phenomenon. One interesting survey of households in Poland was the Social Diagnosis project, carried out in the years 2000-2015 in a two-year cycle, which allowed an in-depth analysis of motivation and behaviours related to households' savings, debts and budget allocation to be performed (Social Diagnosis 2015 study).

The goal of this article is to provide a combined assessment of the financial security of Polish farmer households. The study on which it is based has an exploratory as well as an applied aspect. The authors classified households by types and attempted to develop profiles of farm households featuring the highest and the lowest security levels. To the authors' knowledge, no one has hitherto made any studies concerning the multi-aspect assessment of the household financial security level based on a combined feature, the construction of which takes account of objective criteria (quantified on strong measurement scales) as well as subjective ones (measured on weak scales). The present study proposes a choice of multidimensional statistical methods and provides a contribution to further research in this area.

2. Materials and Methods

The research goal has been achieved by carrying out the following research tasks:

1. The first research task involved the construction of a combined measure of the financial security level. Due to the fact that simple criteria which were

taken account of in the research were measured using both metric and non-metric scales, the combined measure was constructed using the TOPSIS method (Technique for Order of Preference by Similarity to Ideal Solution) (Hwang and Yoon 1981; Wysocki 2010) with the Generalised Distance Measure GDM (Walesiak, 2003).

2. The second research task involved classifying farm households based on financial security level values of the combined measure obtained. The classification was based on a statistical criterion, i.e. using arithmetic means and standard deviation of the combined measure values (Wysocki, 2010).

The research was based chiefly on individual (raw) data from the *Social Diagnosis Study*, conducted in 2015⁶ (Social Diagnosis 2015 study). The sample of 730 farmers' households was representative to the whole population of farmers' households. Calculations were made by means of *R software* with the use of *clusterSim*. The combined measure of farm household financial safety level was constructed in the following six steps.

Step 1: Select simple criteria for research, based on substantive assumptions and the availability of empirical data. The simple indices selected were such that they contained information on the capacity to secure household members' current needs (e.g. income level, part of income spent on food, debts, a subjective judgment on how well the budget was being handled), and also information on securing future needs (information on savings held and their amount) and coping in crisis situations.

The following set of simple criteria was suggested:

- x_1 – level of equivalent farm income (PLN/month),
- x_2 – share of food expenses in total income (%),
- x_3 – not using banking services due to lack of stable income/savings or credit refusal? (1 – yes, 0 – no),
- x_4 – savings (1 – yes, 0 – no),
- x_5 – easy-to-access savings (cash, current account, savings account, deposits in banks) (1 – yes, 0 – no),
- x_6 – difficult-to-access savings (bonds, investment funds, properties, etc.) (1 – yes, 0 – no),
- x_7 –savings amount (1 – not more than one month's household income, 2 – more than one month's but not more than three months' household income, 3 – more than three months' but not more than six months' income, 4 – more than six

⁶The project was unique and provided an opportunity for the multidimensional assessment of household financial security; it also allowed for in-depth analysis of its determinants, both quantitative and qualitative. The authors also conducted research that drew on a set of microdata of over 30,000 households (Wysocki 2010) from the Household Budget Survey of 2015. Unfortunately, a small number of diagnostics that could accurately portray household financial security limited the scope of that research to its subjective self-assessment.

- months' but not more than annual income, 5 – more than annual but not more than three years' income, 6 – more than three years' income of a household),
- x_8 – savings made for investment purposes (purchase, renovation of apartment or house, business development) (1 – yes, 0 – no),
- x_9 – loans and credits (1 – yes, 0 – no),
- x_{10} – mortgage (1 – yes, 0 – no),
- x_{11} – total debts of a household (1 – up to the amount of one month's income, 2 – more than one month's but not more than three months' household income, 3 – more than three months' but not more than six months' income, 4 – more than six months' but not more than annual income, 5 – more than annual but not more than three years' income, 6 – more than three years' income of a household),
- x_{12} – a part of monthly income appropriated for debt repayment (1: less than 10%, 2: 10-20%, 3: 20-30%, 4: 30-40%, 5: 40-50%, 6: more than 50%),
- x_{13} – default in payment of rent, electricity bills, default in credit repayment or relying on external aid (1 – positive answer to at least one question, 0 – no),
- x_{14} – can the household make ends meet with current income? (1 – with great difficulty, 2 – with difficulty, 3 – with certain difficulty, 4 – rather easily, 5 – easily),
- x_{15} – assessment of household budget management efficiency (from 1 – everything can be afforded and money is saved for the future, to 9 – there is not enough money even for the cheapest food),
- x_{16} – is regular household income sufficient to meet current needs? (1 – yes, 0 – no)
- x_{17} - x_{25} – actions taken by the household to satisfy current needs (1 – yes, 0 – no):
- x_{17} – making use of the savings,
 - x_{18} – selling or pawning property,
 - x_{19} – reducing current needs,
 - x_{20} – taking loans and/or credits,
 - x_{21} – accepting aid from family,
 - x_{22} – accepting aid from church /Caritas charity,
 - x_{23} – accepting aid from state welfare organisations,
 - x_{24} – taking additional employment by a family member,
 - x_{25} – no actions whatsoever.

Step 2: The diagnostic features adopted for the study could in different ways influence the complex concept of household financial security. For some features, their values were expected to positively correlate with the levels of financial security while for others – negatively. For the former, sometimes called stimulants, high feature values contributed to high values of the combined measure of financial security – for the latter, called destimulants⁷, high values translated into low values of the measure (Wołoszyn *et al.*, 2017; Hellwig, 1968; Panek, 2009). The choice of

⁷The concept of stimulants and destimulants in multivariate linear ordering was introduced by Hellwig (1968).

diagnostic features was such that the assignment of each as a positively correlated stimulant, or a negatively correlated destimulant, was self-evident.

Define stimulants to be variables x_1, x_4-x_8, x_{14} and x_{16} , and destimulants – $x_2, x_3, x_9-x_{13}, x_{15}, x_{17}-x_{25}$. Next, normalise values of simple criteria by means of zero unitarization (min-max) method (Kukuła 2020) for:

$$\text{Stimulants} \quad z_{ik} = \frac{x_{ik} - \min_i\{x_{ik}\}}{\max_i\{x_{ik}\} - \min_i\{x_{ik}\}}, \quad (1)$$

$$\text{Destimulants} \quad z_{ik} = \frac{\max_i\{x_{ik}\} - x_{ik}}{\max_i\{x_{ik}\} - \min_i\{x_{ik}\}}, \quad (2)$$

where: x_{ik} – value of k^{th} criterion for i^{th} household, $k=1,2,\dots, K$, $i=1,2,\dots,N$, ($K=25$, $N=730$).

The min-max method allowed to:

1. change destimulants $x_2-x_3, x_9-x_{13}, x_{15}, x_{17}-x_{25}$ into stimulants: $z_2, z_3, z_9-z_{13}, z_{15}, z_{17}-z_{25}$,
2. bring all x_1-x_{25} variables to comparability, since every z_{ik} value is in the $[0, 1]$ interval.

Step 3: Determine positive (A^+) and negative (A^-) ideal solutions as minimum and maximum values of criteria within the set of all the objects (farm households):

$$A^+ = (\max_i\{z_{i1}\}, \max_i\{z_{i2}\}, \dots, \max_i\{z_{ik}\}) = (1, 1, \dots, 1) \quad (3)$$

$$A^- = (\min_i\{z_{i1}\}, \min_i\{z_{i2}\}, \dots, \min_i\{z_{ik}\}) = (0, 0, \dots, 0) \quad (4)$$

It follows from formulas (1) and (2) that the positive ideal solution is a vector of 1's and the negative – a vector of 0's.

Step 4: Calculate the distance of an object from positive (A^+) and negative (A^-) ideal solution.

Euclidean distance is a frequently used function of distance, but it may only be used for criteria measured in the metric scale. Distance measurement is more complicated when a set of criteria also includes criteria measured on a different scale. If a study takes account of criteria measured in different scales, i.e., metric (e.g., level of equivalent income) and non-metric (e.g., subjective assessment of household budget management), one has to use measures which allow this. Of these, the Generalised Distance Measure (GDM), which is based on Kendall rank correlation coefficient and a generalised correlation coefficient, is the most universal (Walesiak, 2002; 2002a; 2016). GDM distance d_{ij} of the i^{th} K-dimensional object from the j^{th} K-

dimensional object ($i, j = 1, \dots, N$) is expressed by the following formula (Walesiak, 2002a; 2016):

$$d_{ij} = \frac{1}{2} - \frac{\sum_{k=1}^K a_{ijk} a_{jik} + \sum_{k=1}^K \sum_{l=1}^N a_{ilk} a_{jlk}}{2[\sum_{k=1}^K \sum_{l=1}^N a_{ilk}^2 \cdot \sum_{k=1}^K \sum_{l=1}^N a_{jlk}^2]^{1/2}} \quad (5)$$

where i, j, l are the numbers of objects, k is the number of a variable, and a_{ijk} , a_{jik} , a_{ilk} , a_{jlk} denote quantities whose calculation from the $z_{\cdot k}$ values depends on the measurement scale of the k th variable and is shown in (6a) i (6b).

Now, for any two u^{th} and t^{th} objects, the value a_{utk} is defined differently for metric and non-metric scale variables. When k corresponds to a metric scale variable, then:

$$a_{utk} = z_{uk} - z_{tk} \quad (6a)$$

but for non-metric (ordinal) scale, the formula is:

$$a_{utk} = \begin{cases} 1 & z_{uk} > z_{tk} \\ 0 & z_{uk} = z_{tk} \\ -1 & z_{uk} < z_{tk} \end{cases} \quad (6b)$$

GDM distance (5) can be calculated for any two K -dimensional objects, but also for any object i and the ideal solutions A^+ or A^- .

The financial security of each (i th) household is characterized by 25 variables. Their values form a 25-dimensional vector that describes the financial security of each household. The GDM distances between any two households are described by formulas (5), (6a), and (6b), in which k denotes one of the $K=25$ variables. Two special cases of model households are the positive (A^+) and negative (A^-) ideal households described by formulas (3) and (4).

The GDM distance between the i th household (25-dimensional vector) and the positive ideal solution vector (A^+ in formula 3) is denoted by d_i^+ instead of d_{ij} in formula (5). Likewise, the distance between the i th household and the negative ideal solution (A^- in formula 4) is denoted by d_i^- .

As a result, each i th household can be assigned two scalar values: d_i^+ and d_i^- , which are used in the next step to calculate the combined measure.

Step 5: Calculate combined measure by the TOPSIS method:

$$q_i = \frac{d_i^-}{d_i^+ + d_i^-} \quad (7)$$

where: $i = 1, \dots, N$, $0 \leq q_i \leq 1$.

Step 6: Classify farm households in terms of financial security. The values of the synthetic index potentially cover the range [0, 1]. The appearance of values from ranges that do not cover the potential area of variability of the synthetic index could stem from problems related to the appearance of outliers or an asymmetry of the simple indices (Głowicka-Wołoszyn and Wysocki, 2018; 2019). The values of the synthetic index serve as the basis for distinguishing typological classes of household financial security. When defining classes in the development of a phenomenon, the literature includes examples of arbitrary approaches, based on a division of the [0, 1] range into equal-length classes, as well as a statistical approach based on the average and the standard deviation from the synthetic index value (Nowak 1985, 1990; Malina 1997; Wysocki 1996). In the study presented here, the classification is based on a statistical criterion using arithmetic mean (\bar{q}) and standard deviation (s_q) of the combined measure (Wysocki, 2010):

$$\text{class I (high level)} \quad q_i \geq \bar{q} + s_q \quad (8)$$

$$\text{class II (upper-intermediate level)} \quad \bar{q} \leq q_i < \bar{q} + s_q \quad (9)$$

$$\text{class III (lower-intermediate level)} \quad \bar{q} - s_q \leq q_i < \bar{q} \quad (10)$$

$$\text{class IV (low level)} \quad q_i < \bar{q} - s_q \quad (11)$$

These classes were described by means of simple criteria and their categories which were used for the construction of the combined measure (so called active criteria). In this step, the set of active criteria under examination was extended to include other criteria (the so - called passive criteria) defining selected socio-demographic conditions of farm household financial security.

3. Results

Table 2 presents results of typological classification of farm households according to the level of financial security. Table 3 presents subgroups of farm households according to active criteria categories in selected typological classes. Table 4 presents socio-demographic criteria of the household group concerned (passive criteria) which reflect selected conditions of the financial security level. The research revealed significant differences in household financial security levels in objective as well as subjective terms. In 2015, 17.9% of the farm households featured a high level of financial security and 20.4% featured a low level. The largest group included farm households whose financial security level was assessed in subjective terms as upper-intermediate (32.2%) and lower-intermediate (29.5%) (Table 2).

Table 2. Results of classification of Polish farm households according to the level of financial security in 2015

Combined measure values	Typological class	Financial security level	Farm households	
			number	%
<0.725, 0.972>	I	high	131	17.9
<0.544, 0.725)	II	upper-intermediate	235	32.2
<0.363 0.544)	III	lower-intermediate	215	29.5
<0.118, 0.363)	IV	low	149	20.4
Total			730	100.0

Source: Own calculations based on raw data from the Social Diagnosis.

Class I includes farm households with a high level of financial security. These had the highest level of equivalent income amounting to PLN 2,025.00/person/month and the lowest share of expenses for food and non-alcoholic beverages in total income (32.5%), which points to an objectively good financial situation.

Moreover, Class I had the highest percentage of savings-generating households (87.3%), as well as those which saved money for investment purposes (94.2%). In these households the most frequently declared level of savings ranged from one month's to three months' income (32.7%) and three months' to six months' income (32.1%). Only 4.6% of those households had loans and credits to repay, and none had mortgages. Representatives of this group of households declared that they could rather easily make ends meet with current net income (57.6% of the total number of Class I households); they also declared that they spent money economically and thanks to that they could afford everything they needed (43.8% of the total number of Class I households) or they could afford everything they needed, and they could even save money for the future (30.9%) (Table 3).

Class II is made up of farm households (32.2% of total households analysed in a given socio-economic group), whose financial security was assessed at the upper-intermediate level. As in case of Class I households, Class II households had an above-average level of equivalent income (PLN 1,772.00/month) and lower than average share of expenses on food and non-alcoholic beverages in total income (34.4%). However, savings were declared by only slightly more than half of them and was quarter were in the process of repaying loans and credits. Savings are very important from the point of view of household financial security, as in an emergency they may be a form of security against a possible loss of financial liquidity due to a need to incur unexpected expenses or survive a fall in income (Hogarth *at al.*, 2003; Lusardi *at al.*, 2011). An assessment of funds management in Class II households showed that their members lived economically and as a result could satisfy all their needs (56.1%), and with current net income they were certainly able to make ends meet (62%) (Table 3).

Class III was made up of farm households (29.5% of total households examined), whose financial security was assessed as lower-intermediate. Unlike Class II households with an upper-intermediate level of financial security, Class III households had a lower than average level of equivalent income (PLN

1,494.00/month and average share of expenses for food and non-alcoholic beverages in total income (35.9%)). Only 23.4% of Class III farm households had some savings, of which 26.1% included savings amounts not exceeding one month's income, and 17.5% included amounts ranging from one month's to three months' income. These farms far more often took loans and credits (43.2% of households).

Between 10% to 20% of average monthly income was appropriated for debt repayment by one in five household in Class III (20% to 30% of average monthly income was assigned for this purpose by one in ten household). As in Class II households, representatives of Class III households assessed their budget management as economical, which allowed them to afford everything they needed (47.3%). Nearly 37% of households found it difficult to make ends meet with current net income. The lower-intermediate level of financial security of this group is best proven by the fact that 13.3% of them have to reduce current needs on the daily basis, and 4.3% must take out loans and credits to meet current needs (Table 3).

Class IV was composed of farm households (20.4% of total households in this socio-economic group), whose level of financial security was assessed as low. Unlike Class I households, they had the lowest level of equivalent income amounting to PLN 1,050.00 /person/month and the highest share of expenses for food and non-alcoholic beverages in total income (41.1%). At the same time as much as 10.7% did not use banking services due to lack of a regular income/savings or credit rating. The low level of financial security of households in medium- to long-term perspective is reflected in their poor ability to save. Only one in twenty Class IV farm household declared savings. This is worrying as even small amount of savings (a so called „financial cushion”) is particularly important as financial security for low-income households, which have poorer access to traditional credit facilities, as well as tighter budget which makes it difficult to save.

The low level of financial security of Class IV households is also described by the fact that more than half of them have loans or credits to repay, and nearly one in ten households must pay a mortgage. At the same time those households most often find it extremely difficult (36.7%) or difficult (36.7%) to make ends meet on their current net income, and thus they must manage their budgets very economically on daily basis in order to save for bigger purchases (38.3%). As much as 40.5% of these households can only afford to pay utility and credit and to buy the cheapest food and clothing (Table 3).

From subjective as well as objective points of view, the financial security level of households depends on many socio-demographic conditions, i.a., on the level of education, number household members, etc. According to the research, the financial security level of a farm household is conditional upon the education of its head, and upon the size of the household concerned. The high level of financial security was a feature of households belonging to farmers who held vocational school diploma, junior high school graduates (52.2%) and secondary-school graduates (30.3%).

Table 3. Inter-class values of simple criteria describing Polish farm households financial security according to typological classes (level of financial security) in 2015 (median)

Description	Typological class				Total
	I	II	III	IV	
Average level of equivalent income (PLN/month)	2025	1772	1494	1050	1588
Share of expenses for food and non-alcoholic beverage in total income (%)	32.5	34.4	35.9	41.1	35.9
Share of households which do not use banking services due to lack of stable income/savings or refusal of credit (%)	0.0	0.5	0.3	10.7	2.4
Share of households having some savings (%)	87.3	55.0	23.4	6.1	41.5
<i>easily convertible to cash</i>	96.1	87.6	57.5	6.1	65.6
<i>difficult to convert to cash</i>	20.0	7.2	1.6	0.0	6.4
Share of households which save money for investment (%)	94.2	73.6	43.2	3.3	54.0
Value of household's savings (% of households)					
<i>not more than one month's income</i>	12.8	21.0	26.1	10.9	19.0
<i>from one month's to three months' income</i>	32.7	36.4	17.5	1.5	23.0
<i>from three months' to six months' income</i>	32.1	18.8	10.7	0.4	15.0
<i>from six months' to annual income</i>	16.7	6.6	1.4	0.0	5.5
<i>from annual to three years' income</i>	1.4	0.9	0.0	0.0	0.5
<i>more than three years' income</i>	1.1	0.0	0.0	0.0	0.2
<i>no answer</i>	3.2	16.2	44.4	87.3	36.7
Share of households which must repay loans or credits (%)	4.6	27.7	43.2	51.7	33.0
Share of households which must repay mortgage (%)	0.0	5.2	5.7	9.0	5.2
What is the total outstanding household debt (% of households)					
<i>not exceeding one month's income</i>	1.4	2.3	1.3	2.8	1.9
<i>from one month's to three months' income</i>	1.9	3.1	8.4	11.8	6.2
<i>from three months' to six months' income</i>	1.1	5.9	10.1	12.9	7.7
<i>from six months' to annual income</i>	0.0	3.2	10.0	9.1	5.8
<i>from annual to three years' income</i>	0.1	3.2	4.1	4.6	3.2
<i>more than three years' income</i>	0.0	4.4	4.6	5.2	3.9
What portion of monthly income is appropriated for debt repayment? (% of households)					
<i>Less than 10%</i>	1.5	7.2	7.4	13.5	7.5
<i>10%-20%</i>	2.9	12.9	20.3	24.4	15.6
<i>20%-30%</i>	0.0	4.2	10.2	7.1	5.8
<i>30%-40%</i>	0.0	2.7	3.9	3.7	2.8
<i>40%-50%</i>	0.0	0.3	0.9	2.9	1.0
<i>More than 50%</i>	1.5	7.2	7.4	13.5	7.5
<i>No answer</i>	95.5	72.7	57.2	48.4	67.3
Percentage of households which are in default on rent, electricity bills or loans or which receive some external aid (%)	1.9	4.2	7.4	27.1	9.4
Can a household make ends meet with current net income (% of households)					
<i>with great difficulty</i>	0.0	0.5	12.2	36.7	11.2
<i>with difficulty</i>	0.4	10.0	24.7	42.3	19.2
<i>with certain difficulty</i>	30.7	62.0	54.2	20.5	45.6
<i>rather easily</i>	57.6	25.4	7.9	0.5	20.9
<i>easily</i>	11.3	2.2	0.9	0.0	3.0
Assessment of household budget management (% of households)					
<i>We can afford to meet all our needs including savings for the future</i>	30.9	5.7	0.3	0.0	7.5
<i>We can afford to meet all our needs but we do not save for the future</i>	18.4	13.0	2.0	0.1	8.1
<i>We live economically and as a result we can meet all our needs</i>	43.8	56.1	47.3	7.7	41.4
<i>We live very economically in order to save for bigger purchase</i>	7.0	24.3	37.0	38.3	27.8
<i>We can afford the cheapest food, clothes, we pay our bills and loans</i>	0.0	0.9	12.2	40.5	12.1
<i>We can afford the cheapest food and we pay our bills, but income is insufficient to repay our loan</i>	0.0	0.0	0.8	3.3	0.9
<i>We can afford the cheapest food and clothes, but income is insufficient to pay rent</i>	0.0	0.0	0.0	0.6	0.1
<i>We can afford the cheapest food but income is insufficient for clothes</i>	0.0	0.0	0.5	8.0	1.8
<i>Income is insufficient to buy even the cheapest food</i>	0.0	0.0	0.0	1.5	0.3
Share of households in which a stable income meets current needs (%)	100	95.4	81.2	53.0	83.4
Actions taken by a household in order to meet current needs (% of households)					
<i>Making use of savings</i>	0.4	3.4	6.3	3.0	3.7
<i>Selling or pawning property</i>	0.0	0.0	0.6	1.7	0.5
<i>Reducing current needs</i>	0.4	5.3	13.3	43.8	14.7
<i>Taking loans and credits</i>	0.0	0.1	4.5	14.1	4.2
<i>Accepting family aid</i>	0.0	0.9	3.1	17.8	4.9
<i>Accepting aid of state social welfare</i>	0.0	0.0	0.9	8.9	2.1

Source: See Table 2.

Table 4. Selected socio-demographic criteria of farm households in typological classes established due to financial security in 2015 (% of households)

Items		Typological class – Level of financial security				Total
		I <i>high</i>	II <i>upper- intermediate</i>	III <i>lower- intermediate</i>	IV <i>low</i>	
Education of head of the household	Elementary and lower	9.0	12.7	12.7	30.4	15.7
	Vocational /junior high school	52.2	55.7	60.7	48.2	55.0
	Secondary	30.3	26.4	22.8	19.3	24.6
	College or University	8.5	5.2	3.8	2.2	4.8
Number of household members	1	6.1	3.4	8.4	8.0	6.3
	2	10.7	13.0	15.6	11.0	12.9
	3	23.5	16.9	16.0	9.8	16.4
	4	22.4	22.0	21.8	20.2	21.6
	5	15.2	14.9	11.4	23.8	15.7
	6 and more	22.1	29.9	26.8	27.2	27.1
Civil status of head of a household	Single	10.2	10.0	14.6	13.4	12.1
	Divorced	0.0	2.4	1.4	1.3	1.5
	Separated	0.6	0.0	0.5	1.5	0.6
	Widowed	3.8	5.3	5.6	9.4	5.9
	Married	85.5	82.3	77.9	74.4	80.0
Sex of the head of a household	Female	11.5	10.4	9.2	12.1	10.6
	Male	88.5	89.6	90.8	87.9	89.4

Source: See Table 2.

Moreover, Class I included the biggest share of households run by farmers with an university degree (8.5% with the average for the total number of farm households amounting to 4.8%). On the other hand, households with low financial security were chiefly headed by holders of basic vocational school diplomas or junior high school graduates (48.2%) as well as elementary school graduates or those with an even lower level of education (30.4%) (Table 4).

The study has also revealed that the level of farm household financial security is determined by an average number of household members. A high level of financial security was characteristic of households with three (23.5%) or four members (22.4%), and low level of security was common among households of five (23.8%), six or more members (27.2) (Table 4).

One can also observe that the household financial security level is determined by the civil status of its head. Class I households were most often run by married people (85.5%). Class I featured the lowest percentage of households run by widows/widowers (3.8% with the average for the total rural households amounting to 5.9%). Farm households whose financial security was low were also most frequently run by married people (74.4%), however, there was a higher percentage of households run by a single, divorced, separated or widowed person (Table 4). The study demonstrated that the financial security of a household is not conditioned by the sex of the head of the household.

4. Summary and Conclusion

Assessing financial security of farm households is not easy due to complex and multi- aspect character of the phenomenon. One of the proposals for measuring the level of financial security of households has been presented herein; it is a multidimensional assessment based on combined values. Due to different nature of the simple criteria which were measured by metric as well as non-metric scales, the combined measure was constructed using the TOPSIS method and GDM.

The empirical research conducted on farm households in Poland enabled us to establish four typological classes of financial security level. According to the 2015 data, 17.9% of farm households had a high level, and 20.4% had a low level of financial security. The research helped establish profiles of farm households featuring i.a. the highest and the lowest level of financial security. The high level of financial security was characteristic of households that featured among other things:

- a high average level of income per equivalent unit,
- a high tendency to save money and a high level of savings,
- a high percentage of households where savings served investment purposes,
- a relatively small percentage of indebted households,
- a high level of satisfying current needs.

Apart from day-to-day management of the household budget, farm households with the highest level of financial security also took account of medium- and long-term perspective. They saved money for emergency situations. One can say that savings for these households are their financial cushion. On the other hand, a low level of financial security was characteristic of farm households which, among other things, had:

- the lowest average level of equivalent disposable income,
- a very low tendency to save money and a low level of savings,
- a very low level of households saving money for investment,
- a high percentage of indebted households, including a high percentage of households with mortgages,
- a high percentage of households whose income is insufficient to satisfy current needs (they can hardly make ends meet).

The study has shown that a vast majority of farm households live from hand to mouth. They can cater for the basic needs of their members, but they are unable or find it extremely difficult to save. Such a situation demonstrates that many households in this group will not achieve financial security in the medium- to long-term. This is worrying if we consider the huge transfers in the form of direct payments made to this socio-economic group within i.a., the Common Agricultural Policy.

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