REVISTA MEXICANA DE ECONOMÍA Y FINANZAS Nueva Época REMEF (THE MEXICAN JOURNAL OF ECONOMICS AND FINANCE)

Revista Mexicana de Economía y Finanzas, Nueva Época

Volume 19 Issue 1, January – March 2024, pp. 1-21, e957

FINANCIAL LITERACY

Guest Editors: Németh Erzsébet, Ph.D. and Elena Moreno, Ph.D.

DOI: https://doi.org/10.21919/remef.v19i1.957

(Received: July 10, 2023, Accepted: October 20, 2023. Published: December 8, 2023)

imef fundación de investigación

Order Creates Value: Personality, Attitudinal and Behavioral Factors of Financial Vulnerability

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Abstract

In our research, we aim to become acquainted with the attitudes and financial behaviours of financially fragile social groups. Based on an online questionnaire survey (N=22933 adult), we formed groups by cluster analysis and compared them to each other. We examined the groups with multivariable statistical methods, underscoring the characteristics relating to financial vulnerability. Beside we developed the metric for financial fragility. The results draw attention that financial fragility has multiple, complex, interrelated reasons. In terms of financial personality, attitude, and behaviour, they reached the highest average point in case of distinctly adverse claims, while the lowest at beneficial claims. Our results demonstrate that even if the financially vulnerable cluster accounts for 9%, the group of 'money pits' and the 'passive' show several such attitudes and behavioural patterns that could lead to financial fragility in the future. The cumulative ratio of these groups amounts to 32%. Financially vulnerable people do not take good care of either their finances or their household, they can't plan or prolong their wishes, and they judge their situation incurable, which is coupled with anxiety.

JEL Classification: D14, D91, G41, H31.

Keywords: financial culture, financial fragility, financial personality, financial attitude, financial behaviour

El orden crea valor: Factores de personalidad, actitud y comportamiento de la vulnerabilidad financiera

Resumen

En nuestra investigación, nuestro objetivo es conocer las actitudes y comportamientos financieros de los grupos sociales económicamente frágiles. Con base en una encuesta de cuestionario en línea (N = 22933 adultos), formamos grupos mediante análisis de conglomerados y los comparamos entre sí. Examinamos los grupos con métodos estadísticos multivariables, destacando las características relacionadas con la vulnerabilidad financiera. Además, desarrollamos la métrica de fragilidad financiera. Los resultados llaman la atención sobre el hecho de que la fragilidad financiera tiene múltiples razones complejas e interrelacionadas. En términos de personalidad financiera, actitud y comportamiento, alcanzaron el punto promedio más alto en el caso de reclamos claramente adversos, mientras que el más bajo en reclamos benéficos. Nuestros resultados demuestran que, incluso si el grupo financieramente vulnerable representa el 9 %, el grupo de los 'pozos de dinero' y los 'pasivos' muestran varias actitudes y patrones de comportamiento que podrían conducir a la fragilidad financiera en el futuro. La proporción acumulada de estos grupos asciende al 32%. Las personas económicamente vulnerables no cuidan bien ni sus finanzas ni su hogar, no pueden planificar ni prolongar sus deseos, y juzgan incurable su situación, a lo que se suma la ansiedad.

Clasificación JEL: D14, D91, G41, H31.

Palabras clave: cultura financiera, fragilidad financiera, personalidad financiera, actitud financiera, comportamiento financiero.

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*Sin fuente de financiamiento para el desarrollo de la investigación

1. Introduction

In July 2015, the "Money Compass Foundation" (hereinafter in English: Money Compass Foundation) made a financial personality questionnaire unique in Hungary available on the website www.penziranytu.hu. There was considerable interest in the questionnaire, so we have the opportunity to conduct research on a population sample of 22,933 adults that, based on the 36-item scale of financial personality, provides insight into the financial attitude and behavioural characteristics of each group. This research takes a closer look at certain characteristics, financial behaviour, habits and their driving forces of the financially vulnerable group.

Financial vulnerability has mainly concerned researchers since the global economic crisis. They try to understand what characterises people who are financially vulnerable (Lewis and Lewis, 2014, Németh, Zsótér and Luksander, 2017; Németh and Zsótér, 2019). It is also important to scrutinise social groups of a non-negligible size, because financial vulnerability affects well-being – in financial, health, and mental terms – at the level of households and individuals as well.

The aim of our study is to show the proportion of the Hungarian population characterised by financial vulnerability, and how a financially vulnerable group can be characterised in terms of their financial personality, attitudinal and behavioural characteristics, which are the most determining factors of financial vulnerability.

2. Literature review

The crisis of 2008 highlighted the fact that it is necessary to deal with the financial culture of the population, moreover, it is not enough to examine the knowledge elements of financial culture, but, beyond that, it is also necessary to deal with the so-called soft factors, i.e., the financial attitude, behaviour and beliefs (Bárczi – Zéman, 2015). Financial culture has been of interest to researchers in Hungary for years. Several studies have been published on the importance of examining financial attitudes and behaviour, and researchers have also created clusters several times, based on these concepts. Some results draw attention to the fact that there are well-definable groups within the population that are financially vulnerable (Zsótér et al., 2017).

The phenomenon of financial vulnerability concerns researchers both at the individual and societal level (Poh-Sabri, 2017), but there is no uniform and conventional definition (O'Connor et al., 2019). Financial vulnerability is often identified with financial weakness, financial stress, and indebtedness (Seldal – Nyhus, 2022). A unified position is outlined in view of the fact that financial vulnerability is not independent of the level of financial culture, and to demographic characteristics. In addition to demographic factors, financial vulnerability also depends on social background variables, but the authors do not examine this in this article. It is also necessary to examine the phenomenon from the aspect of financial attitudes and financial behaviour (Yusof et al., 2015).

According to some researchers, financial vulnerability is associated with a high level of indebtedness, which also affects everyday expenses, as well as financial preparation for the future. This can lead to a low standard of living and deteriorating health (Anderloni et al., 2012). Other researchers also connect financial vulnerability with low income and the difficult living conditions

resulting from low income (Lewis – AV Lewis, 2014; Guarcell et al., 2010; Al-Mamun – Mazunder, 2015). Luksander et al. (2017) point out the most dangerous factor in terms of indebtedness are personality traits with external control, including reliance on luck.

Financially vulnerable individuals are characterised by a feeling of hopelessness (Finney – Jentzsch, 2008) and financial stress (Schofield et al., 2010 , Guarcello et al., 2010). Poor mental health is a risk factor in itself, but research shows that, in many cases, coping strategies are also lacking (Németh et al., 2020; Schofield et al., 2010).

In a recent research, Seldal and Nyhus (2022) examined the digital aspects of financial vulnerability. Their analysis focused on whether digital payment methods increase the risk of financial vulnerability, for example by spending more when paying by card (Runnemark et al., 2015). This is a particularly interesting question since the COVID-19 epidemic, as the demand for online payment solutions has increased, as has the use itself. Their results show that digital payment solutions can increase financial vulnerability if the necessary digital and financial competencies are lacking.

In Hungary, the results for financially vulnerable groups were published in 2020, where researchers performed calculations based on the OECD database (Németh et al., 2020). The results of analyses based on financial attitudes and behaviour show that an increase in income reduces financial vulnerability, but higher income does not mean higher financial awareness. An important factor is that financially vulnerable individuals have trouble postponing the satisfaction of their desires and controlling their spending. Therefore, it is understandable why a higher income does not completely solve their situation. Previous research also indicates that certain social groups can be considered financially vulnerable. In their research among young adults, Németh et al. (2017) draw attention to anxious spenders who struggle with many financial problems, while being characterised by strong anxiety and worry. All of this is in line with international results, where stress and a feeling of hopelessness are highlighted in the case of financially vulnerable groups.

3. Material and method

The framework of our research is provided by a nationwide, online data collection. In July 2015, the Money Compass Foundation made a financial personality questionnaire unique in Hungary available on the website www.penziranytu.hu. The test is a self-developed questionnaire by Professor Erzsébet Németh, which she put together based on her years of experience researching the topic. Significant interest was already evident in the first week, and after that the fillings continued to arrive. The peculiarity of the test is that the person completing it receives immediate feedback on what characterises their financial personality, and after completing it, personalised advice is also displayed, thus supporting individual financial self-knowledge and strategy making. In addition to financial education and self-awareness development, the expanding database also provides opportunities for scientific analysis.

The test contains statements about financial behaviour and attitudes - a total of 36 items - in relation to which the respondents have to decide with the help of a Likert scale from 1 to 5 how typical they are. Presumably, the way of wording, ensuring anonymity and life-like statements, as well as the inclusion of motivational elements (immediate profile analysis) together resulted in the high number of items. At the same time, the omission of demographic questions also limits the

analyses. Questionnaire no. 1 can be found in the appendix [2]. The tests fulfil a gap-filling role both at the level of individuals - due to the immediate evaluation - and at the scientific level - due to the significant amount of data that can be analysed.

3.1 Sample

By February 2022, a total of 23,081 applicants had passed the test. During data cleaning, a total of 22,933 respondents remained in the database, which represents a small dropout rate. We did not come across any abandoned questionnaires. The basis for the exclusion was that some of the respondents chose only 1 and others only 5 (due to statements with the opposite content, this cannot give a real result).

3.2 Statistical analysis

In this study, we use factor analysis, clustering, variance analysis and some descriptive statistical methods in order to examine the groups formed on the basis of financial personality profiles, especially the financially vulnerable ones. In addition, we prepared a financial vulnerability index, after which we performed a correlation analysis between the vulnerability score and the factor averages. Based on the descriptive investigation, all the participants in the sample answered all the questions of the questionnaire. Based on the high number of elements in the sample, the normality of the sample can be established based on the theorem of the central limit distribution (Polya, 1920), and therefore this condition of the above-mentioned tests is fulfilled. We also examined the extent to which the questions in the questionnaire measure the characteristics we are investigating. For this, we determined the value of Cronbach's α, which characterizes internal consistency.

The questionnaire examines 36 variables. Among them, there must be variables that partially contain the same information. However, leaving them out of the investigation is still not advisable due to the risk of information loss. Including all variables in a model can also cause problems, the source of which is significant collinearity between variables. This dilemma is the 'curse of variability' (Bellman, 1957, 1961). That is why we chose to use the method that reduces the number of dimensions. We were not looking for a latent variable behind the questions, but our goal was to combine the variables measuring financial personality. Therefore, we used the principal component analysis procedure. According to some opinions, there is no rotation in PCA. In fact, this is a possible option e.g. in SPSS (rotation = none). However, the authors of many studies (Nordmann et al., 2005; Pares-Casanova et al., 2013; Pritchard, 1984) use rotation, most often its orthogonal (Varimax) type, which clearly divides the variables into separate components (Brown, 2009; Jackson, 2005).

After determining the component averages, these averages were formed into clusters using the K-means procedure. Considering that the number of clusters in this method is determined by the examiners, it is advisable to determine the optimal number of clusters. For this we used the shilhouette method (Nanjundan et al., 2019; Shahapure & Nicholas, 2020; Zhou & Gao, 2014). Based

[2] The developer of the Financial Personality Test is dr. Erzsébet Németh is a social psychologist, university professor.

on this result, the optimal number of clusters was 8, so we prescribed the creation of 8 clusters in the K-means procedure.

We created an index from the statements belonging to the *impecunious vulnerable* factor, the calculation method of which is illustrated in Table 1: 1 or 0 points can be given for each statement, so the value of the vulnerability indicator ranges between 0 and 7.

Table 1. Vulnerability score calculation method

SENTENCES	CALCULATION METHOD
I sometimes end up paying a few bills late.	1 point if you agree or strongly agree
Bills are killing me.	
I am puzzled about where my money goes.	
I am in a desperate fix with debts.	
I often have to borrow at the end the month.	
I am good at budgeting my money.	
I always have enough savings for unexpected expenses.	

Source: authors' own elaboration

This index measures how sensitive the financial situation of the examined persons is to unexpected external influences. Such an external effect is, for example, running out of money at the end of the month or the occurrence of unexpected expenses. According to surveys, vulnerability is significantly increased by debt, especially if repaying it on time is a problem a (Anderloni et al., 2012). Other surveys (Noerhidajati et al., 2021) are influenced by income, financial behavior and several socio-economic factors such as age, or even factors such as the presence or absence of insurance (Lin & Grace, 2007). Research shows that the risk of financial vulnerability increases in the event of economic or financial shocks. In addition, in an ordered probit model, significant determinants of financial vulnerability are income level, marital status, age, education and money management behavior. The most financially vulnerable are younger people, those with lower education and their financial behavior leads to poor money management (Daud et al., 2019). Chipunza & Fanta, (2023) defines financial vulnerability along three dimensions, which include the inability to accumulate savings beyond basic living expenses (savings vulnerability), the inability to participate in outdoor leisure activities (lifestyle vulnerability), and the inability to meet basic living expenses (expenditure vulnerability).

4. Presentation of results

4.1 Factors and clusters

The Cronbach's α value of the 36-question questionnaire completed by 22933 respondents was 0.816. Based on literature data (Bonett & Wright, 2015; T. Kárász et al., 2022), this is a good value (Bonett & Wright, 2015; T. Kárász et al., 2022), so the questions in the questionnaire measure financial personality traits well.

The 36 statements of the questionnaire were included in PCA. With principal component analysis and varimax rotation, we obtained a total of 8 dimensions, i.e. we condensed the original 36 statements into 8 factors (Table 2). The KMO value is 0.902, which indicates that the set of 36 items is fully suitable for factor analysis. In the case of the 8 received components, we also calculated the average values for the components.

Table 2. Component summary of PCA

Component	SS Loadings	% of Variance	Cumulative %
1	3.22	8.93	8.93
2	3.07	8.53	17.46
3	3.03	8.43	25.89
4	2.58	7.16	33.05
5	1.75	4.85	37.9
6	1.56	4.33	42.22
7	1.5	4.17	46.39
8	1.18	3.28	49.67

Source: authors' own elaboration

The factors explain 49.67% of the total variance. Based on these averages, we sorted the 22,933 respondents into clusters using K-means cluster analysis. We chose this method because of the large number of elements (Sajtos-Mitev, 2007). The cluster mean values associated with the clusters are included in Table 3.

Table 3. Cluster mean values based on factor averages

Cluster mean values (averages of the factors in each group)								
Factors	Clusters							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
spendthrifts	2.24	2.35	2.04	2.75	2.53	2.49	2.38	2.67
reactors	2.96	4.54	4.34	2.83	2.48	4.11	4.19	2.51
the diligent creative	3.70	3.75	3.87	2.30	2.77	3.33	2.33	2.60
hoarders	2.50	2.27	1.96	2.75	2.37	3.45	2.36	3.60
money pits	2.19	2.58	1.85	3.16	2.23	3.60	2.39	3.27
the impecunious vulnerable	1.91	1.53	1.42	1.89	2.02	2.34	1.58	3.41
orderliness creates value	3.96	4.18	4.26	3.25	3.22	3.59	3.79	2.92
family- & home-centred	3.61	4.17	2.52	4.20	2.35	4.14	3.20	3.71

Source: authors' own elaboration

Some clusters have characteristic outliers that determine the characteristics of the given cluster, and there are also clusters where there are no typical outliers, but these can also serve as important results. We thought about the fact that the average of the *orderliness creates value* factor is in one of the first three places in each cluster. This raises the possibility that those who filled out

the questionnaire in this question perhaps more often tried to meet their desires or social expectations with their answers and did not evaluate themselves according to the real picture. A somewhat similar idea can also arise in connection with family and home-centricity.

Cluster #1: In this group, the *orderliness creates value* factor, and the *diligent creative* factor achieved the highest average. There is a cluster where these factors received a higher score, but their value is not negligible in this group either. The average of the Small Money vulnerable factor is higher here than in other similar clusters (e.g. cluster 3).

Cluster #2: The average of the *reactors'* factor is the highest in this group. Family and home-centricity and order are also strongly characteristic of the members of the group.

Cluster #3: In this group, the *reactors'* factor also stands out, but they are also less family- and home-centric compared to the previous group, and at the same time, the average of the *orderliness creates value* factor is higher than the former.

Cluster #4: The average for the *family- & home-centred* factor and the average for the Spending factor are clearly the highest here. The average value for the *money pit* factor is the third highest in this group.

Cluster #5: This group can best be described with the passive indicator, since they are located in the middle for most factors, and they receive a particularly low value in the *reactors'* factor.

Cluster #6: The average for the Money-absorbing factor is clearly the highest here, but the *reactors'* and the *family- & home-centred* factors also have high values.

Cluster #7: In this group, there is no factor average that reached the highest or lowest value here, but at the same time, some positive and some negative factors also reached a relatively high value.

Cluster #8: The average for the *impecunious vulnerable* factor is clearly the highest here, but the *money pits'* and the *family- & home-centred* factors also have high values.

Based on the characteristics, the clusters were labelled with the following names (Table 4):

Table 4. Names and sizes of the clusters

Cluster	Name	Size (person)
Cluster 1	The diligent	3506
Cluster 2	Reactors	3419
Cluster 3	Orderliness creates value	3400
Cluster 4	Spendthrifts	2242
Cluster 5	The passive	2217
Cluster 6	Money pits	3024
Cluster 7	Win some, lose some	2979
Cluster 8	The impecunious vulnerable	2146

Source: authors' own elaboration

When naming the clusters, the names of the factors are also echoed, since there are groups where the given factor strongly determines the characteristic. Such are the “reactors”, the “orderliness creates value”, the “spendthrifts”, the “money pits” and “the impecunious vulnerable”.

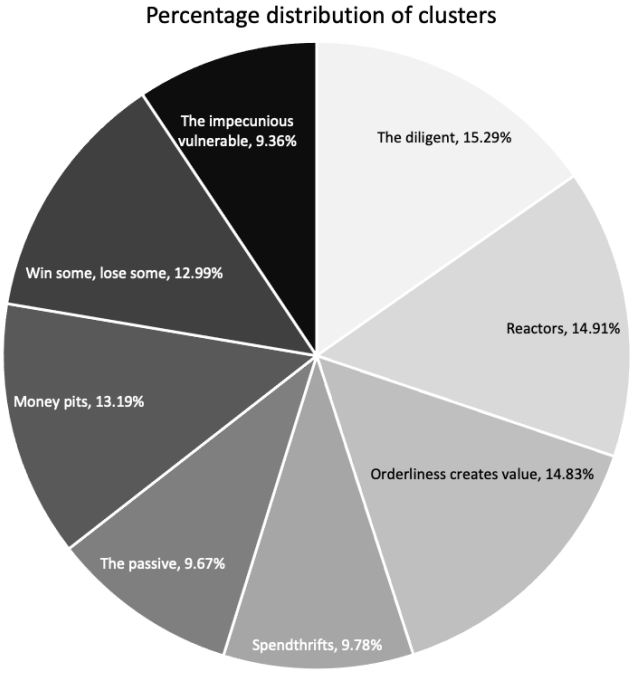

Figure 1. Distribution of clusters.
Source: authors’ own elaboration

4.2 Characterisation of the cluster of the “the impecunious vulnerable”

Although it ranks among the smallest groups, “the impecunious vulnerable” are probably the cluster that need the most attention, so in our further analyses we will focus on this group and take a closer look at what characterises them in the light of the other clusters. Because the group of vulnerable people with little money is the most endangered: they have no financial reserves, so they only focus on the short term when making their decisions ("this problem must be solved now, no matter how..."). All external crisis situations make this group particularly vulnerable. That is why it is important to get to know this cluster in detail, because they are the ones who need to be helped the most (e.g. by imparting appropriate knowledge and developing practical financial skills).

The 36 statements of the questionnaire are grouped according to the factors carried out as the first step of our investigations, and we see what average values are typical for the “impecunious vulnerable” cluster for each item, and where this average is located in relation to the other clusters.

As a first step, we scrutinise the main statements that define vulnerability. Based on Figure 2, it is clear that the “impecunious vulnerable” cluster takes on an extreme value for all statements compared to the other groups (Figure 2). Of course, this is also due to the fact that the group-forming identity criteria were made up of these statements.

Compared to the other groups, those belonging to the vulnerable group with little money have no savings, are less able to allocate their money, have an overwhelming amount of debt, and it happens more often that they cannot pay a bill or do not know where their money went.

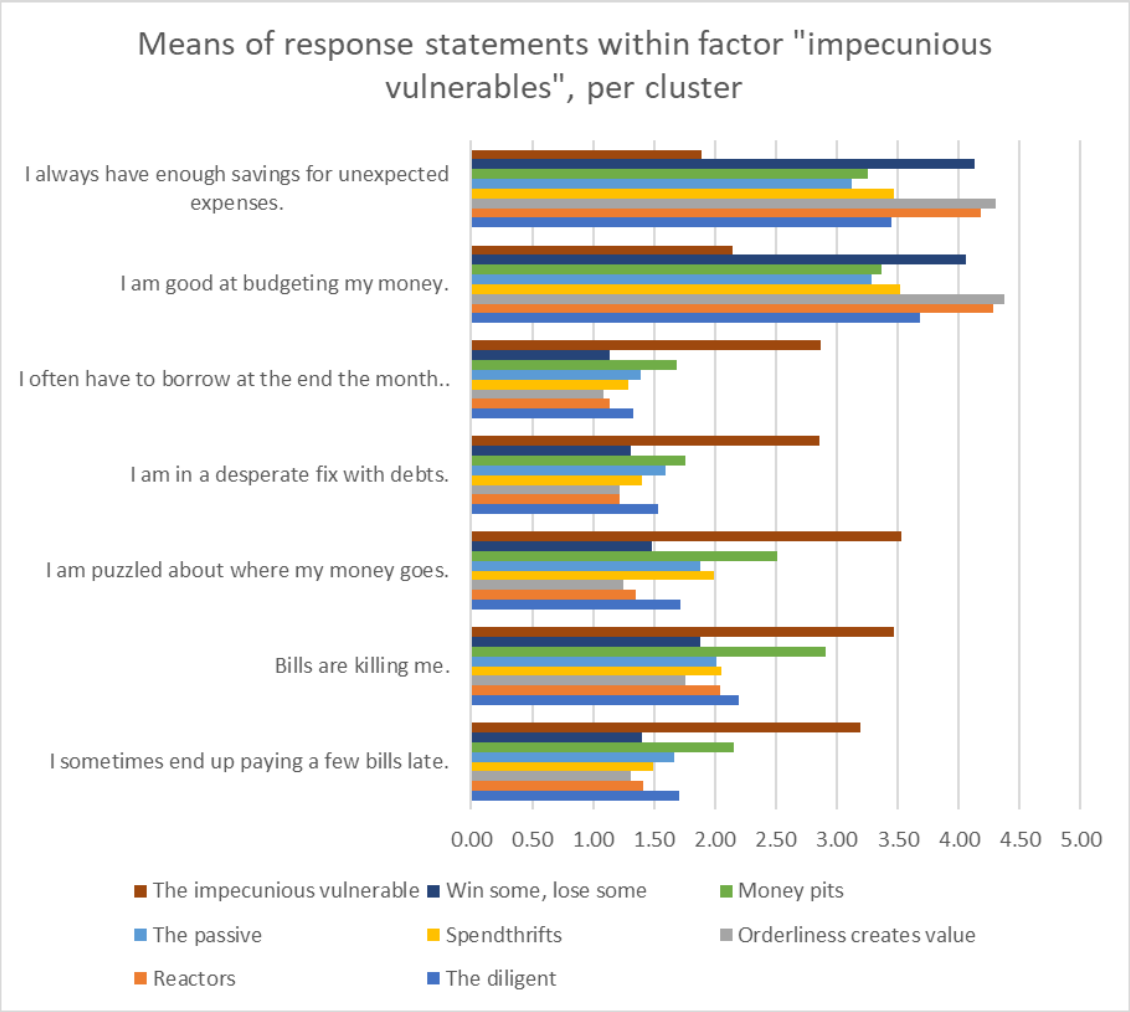

Figure 2. Averages of responses belonging to different clusters per statement
Source: authors' own elaboration

4.2.1 Lack of order in the cluster of "the impecunious vulnerable"

The next statement group summarises those belonging to the orderliness creates value factor. In the case of all 6 statements, it is true that the lowest averages are found for the vulnerable (see Figure 3). The results show that those belonging to the financially vulnerable group typically do not prepare for purchases either by getting to know the prices in advance or by making a shopping list. They do not pay attention to price comparisons during the act of purchase, nor do they keep track of their expenses afterwards. Law enforcement is the least typical of those who belong to "the "impecunious vulnerable" cluster. Keeping one's household in order is an important aspect of financial awareness. People who keep their household in order usually also know what they need, so they buy less

unnecessary things. On the other hand, the test results also show that those who are tidy keep their household and finances in order. This is therefore a more comprehensive statement that does not only affect finance, but at the same time has a strong impact on finance.

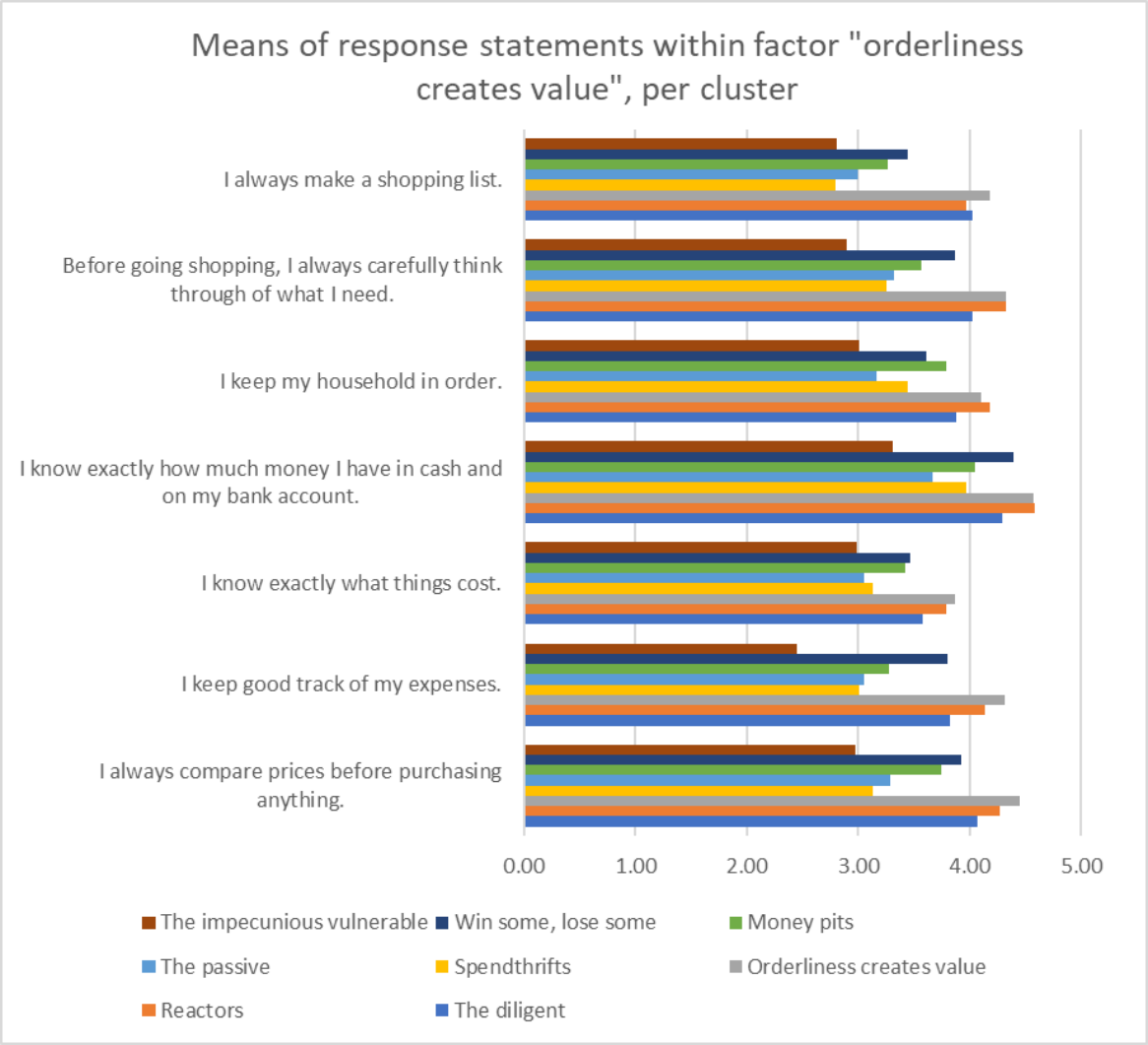

Figure 3. Averages of responses belonging to different clusters per statement
Source: authors' own elaboration

4.2.2 The emergence of hoarding in the cluster of "the impecunious vulnerable"

The following statement group summarizes those belonging to the hoarders' factor. Figure 4 also clearly shows that hoarding - as a bad habit, hoarding, buying unnecessary things - is most characteristic of two clusters: the money pits and "the impecunious vulnerable". In all but one statement, the highest average appears for the vulnerable. Postponing the fulfilment of needs causes them difficulty, and this is one of the reasons why they cannot make a conscious decision during their purchases. Vulnerable people with little money are most likely to have some bad habits that only take

money. In addition, vulnerable people with little money and hoarders are similar in that they do not keep the household in order and are surprised when it turns out how much they have actually spent.

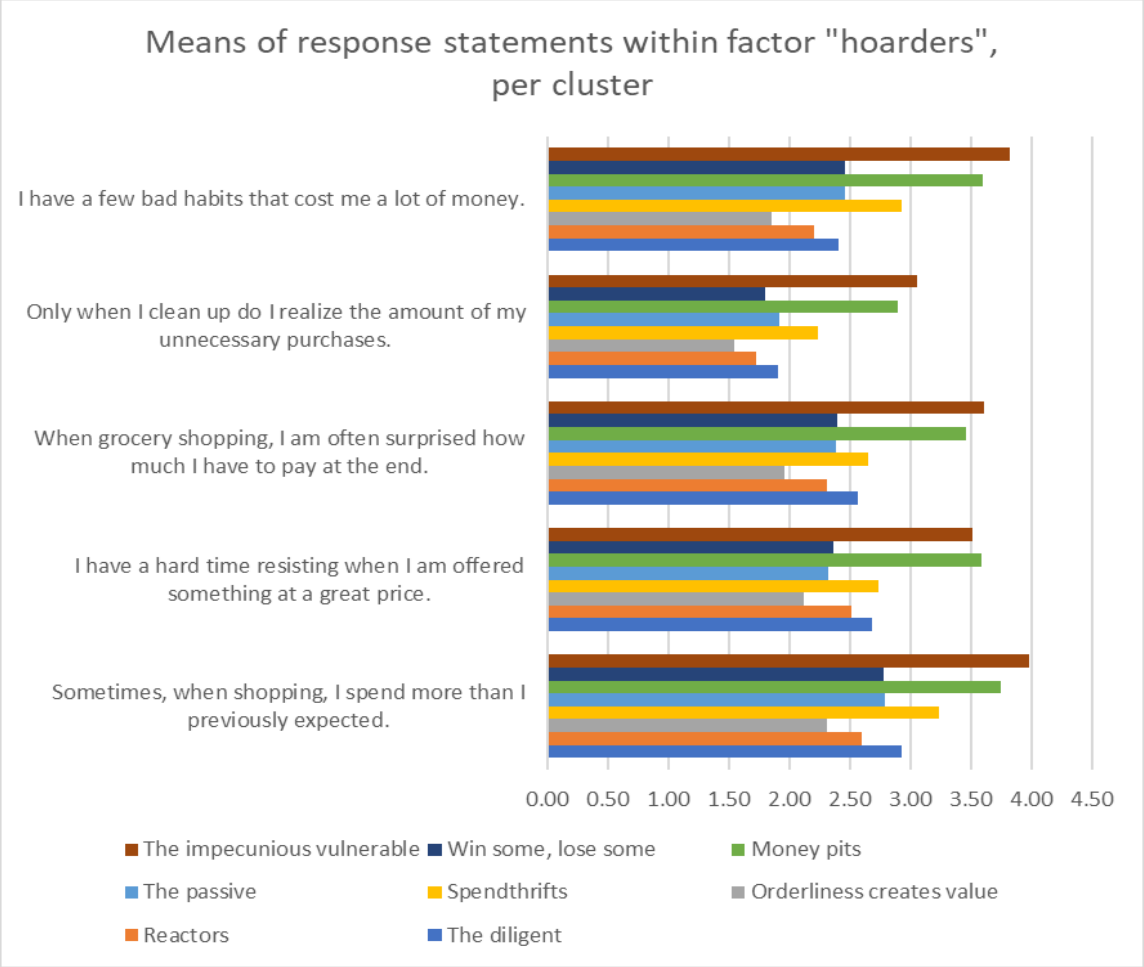

Figure 4. Averages of responses belonging to different clusters per statement
Source: authors' own elaboration

4.2.3 The appearance of spending in the cluster of "the impecunious vulnerable"

The following group of statements summarises those belonging to the spendthrifts' factor. Compared to the previous ones, the picture for this set of statements is a little more nuanced, the vulnerable do not represent such a strong extreme as in the previous three cases. At the same time, they reach the highest average for the statement "I don't usually ask for change back". In addition, they do not really pay attention to keeping the things that can still be used, and in accordance with the previous results, they do not choose for a long time during their purchases, it is assumed that impulse buying is strongly characteristic of them (see Figure 5).

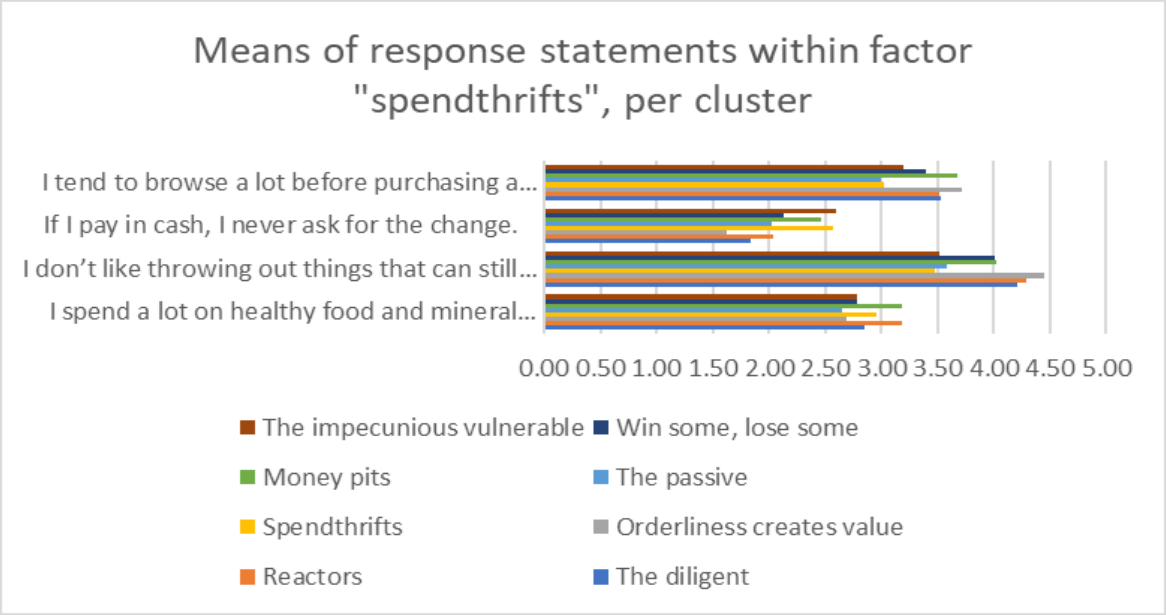

Figure 5. Averages of responses belonging to different clusters per statement
Source: authors' own elaboration

4.2.4 The difficulty of responding in the cluster of "the impecunious vulnerable"

The *reactors'* factor**,** the lowest averages are typically achieved by the vulnerable among them (see Figure 6). When someone becomes financially unstable, one of the solutions may be to take action: to tighten their belts even more or take on extra work. None of these are typical of the "impecunious vulnerable" cluster. This group does not seem to be able to mobilise its internal resources to move towards a solution. This may be related to the fact that they are mainly characterised by externally controlled personality traits and that they basically live their everyday lives in a sense of hopelessness.

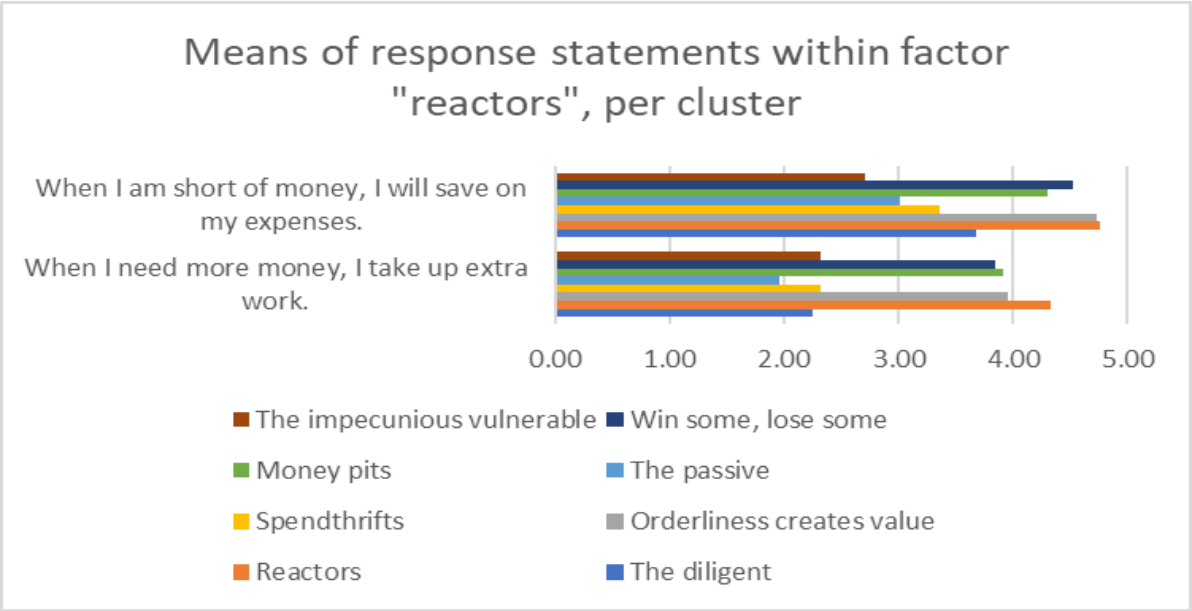

Figure 6. Averages of responses belonging to different clusters per statement
Source: authors' own elaboration

Overall, it can be seen in terms of financial personality, attitude and behaviour, the members of the Small Money vulnerable cluster achieved the highest averages in a significant part of the statements that were clearly unfavourable, while the lowest averages were obtained for those with positive content. The group, which makes up 9% of the sample, is practically extremely different from the other groups along the following characteristics:

It is most characteristic of them that

- they consider their financial situation hopeless,
- are in debt, respectively,
- are worried about their finances.

The least characteristic of them is that

- they keep order in their household,
- keep track of their expenses,
- they plan ahead,
- they pay attention to their bad habits,
- able to prolong their desires,
- they look for solutions and mobilise their internal resources.

4.3 Financial vulnerability indicator

4.3.1 Development of an indicator of financial vulnerability

4.3.2 The degree of financial vulnerability in each cluster

The highest score (3.58), as expected, was given to the "impecunious vulnerable" cluster, significantly behind the average of the entire sample (0.96 points). The lowest score (0.29) was given to the members of the "orderliness creates value" cluster, i.e., they are the most protected from a financial point of view. (see Table 5).

Table 5. Vulnerability score averages per cluster and in the entire sample

	SIZE (MAIN)	AVERAGE
The diligent	3506	0.7955
Reactors	3419	0.3445
Orderliness creates value	3400	0.2926
Spendthrifts	2242	0.7480
The passive	2217	1.0316
Money pits	3024	1.4213
Win some, lose some	2979	0.4005
The impecunious vulnerable	2146	3.5811
Whole sample	22933	0.9638

Source: authors' own elaboration

Graphically represented in Figure 7, it is clear that the vulnerable with small amounts of money significantly "fall out of line", they are an extremely vulnerable group. Money pits and the passive received a higher than average value for vulnerability, although they deviated from the average to a lesser extent. Regarding vulnerability, the differences between the groups are significant ($F=2264.803$, $p<.000$). However, further research is needed to answer the surprising result, why the diligent are more vulnerable from a financial point of view than both the spendthrifts and the respondents characterised by the behaviour of "win some, lose some".

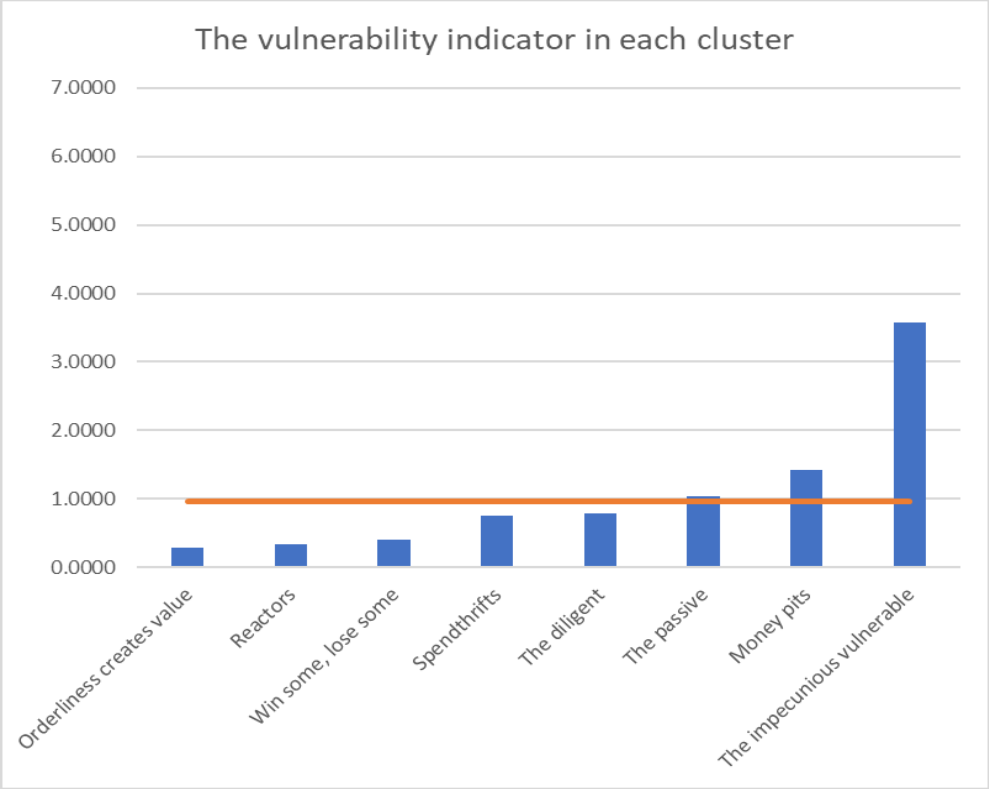

Figure 7. Average values of the vulnerability indicator in each cluster
Source: authors' own elaboration

4.3.3 Vulnerability characteristics

In the case of the vulnerability score, we examined which sets of statements are the most indicative of financial vulnerability. We performed a correlation analysis between the vulnerability score and the factor averages. The results show (see Table 6) that all relationships are significant.

The higher the average value of the following factors, the more likely vulnerability is (in the order of the strength of the relationship):

- *the impecunious vulnerable*
- *hoarders*
- *money pits*
- *spendthrifts*
- *family- & home-centred*

The higher the average value of the following factors, the lower the chance of vulnerability (in order of the strength of the relationship):

- *orderliness creates value*
- *reactors*
- *the diligent creative*

Table 6. Vulnerability score calculation method

Factor		Vulnerability
spendthrifts	Pearson Correlation	.121
	Sig. (2-tailed)	0.000
	N	22933
reactors	Pearson Correlation	-.271
	Sig. (2-tailed)	0.000
	N	22933
the diligent creative	Pearson Correlation	-.145
	Sig. (2-tailed)	0.000
	N	22933
hoarders	Pearson Correlation	.412
	Sig. (2-tailed)	0.000
	N	22933
money pits	Pearson Correlation	.224
	Sig. (2-tailed)	0.000
	N	22933
the impecunious vulnerable	Pearson Correlation	.891
	Sig. (2-tailed)	0.000
	N	22933
orderliness creates value	Pearson Correlation	-.331
	Sig. (2-tailed)	0.000
	N	22933
family- & home-centred	Pearson Correlation	.096
	Sig. (2-tailed)	0.000
	N	22933

Source: authors' own elaboration

Based on both the cluster analysis and the correlation calculation, we can say that order is the opposite of vulnerability, so those who keep their household and finances in order are the least exposed to financial instability and vulnerability.

5. Conclusion and summary

In our research, we examined individual personality, attitude and behavioural characteristics of financial vulnerability. The research partially confirms and partially shades the results of the research examining the factors of financial vulnerability presented in the literature introduction. In order to examine financial culture, several types of clustering were created, and the researchers point out that there are socio-demographic, knowledge, attitudinal and behavioral factors that characterize financially vulnerable groups. (Zsótér et al., 2017). The research drew attention to the correlation between financial vulnerability and the level of financial culture. Research highlights that the external

controlling attitude, difficulties in prolonging desires, the lack of financial goals and strategies and, as a consequence, coping difficulties and missing competencies may be behind the phenomenon (O'Connor et al. 2019; Luksander et al. 2017; Schofield et al. 2010)

In this study, we examine groups formed on the basis of financial personality profiles, with particular attention to the financially vulnerable. As a novelty, we compiled a financial vulnerability index, after which we performed a correlation analysis between the vulnerability score and the factor averages.

The results of the research draw attention to the fact that financial vulnerability has many, complex, interrelated causes. The "impecunious vulnerable" cluster takes an extreme value compared to the other groups for almost all statements. From the point of view of financial personality, attitude, and behaviour, in a significant part of the statements that are clearly unfavourable, "the impecunious vulnerable" achieved the highest average score, while the favourable ones scored the lowest. The group that makes up 9% of the sample is practically totally different from the other groups, and it can be said that it is an extremely vulnerable group.

The financial situation of vulnerable people with little money is worrisome, compared to other groups; they have no savings, they have an overwhelming amount of debt, and it happens more often that they cannot pay one or another bill. In addition, it is difficult for them to manage their money properly: they are less able to allocate and keep track of their money.

An interesting result is how important the maintenance of order is for financial protection, and the lack of it for vulnerability. People who keep their household in order also keep their finances in order, so they know what they need and do not buy unnecessary things. We found that law enforcement was the least typical of the financially vulnerable group.

Prolonging their desires also causes them difficulty. In addition, it is most characteristic of vulnerable people with little money that they have some bad habits that only take the money. Most of all, they resemble hoarders: they do not keep order, and they are surprised by how much they have spent. Unexpectedly, vulnerable people with small change reach the highest average for the statement "If I pay in cash, I never ask for the change". However, this result fits perfectly with their behaviour, which is that they do not prefer to keep things that can still be used, nor do they choose for a long time during their purchases; impulse buying is typical for them.

Coping with financial problems is a difficulty for the vulnerable group with little money. While the reactors' cluster save money or take on extra work in such cases, the "impecunious vulnerable" cluster cannot properly mobilise their internal resources; they prefer to wait for their fortunes to change for the better from others or from luck.

A new result is that both the cluster analysis and the correlation calculation show that order is the opposite of vulnerability, so those who keep their household and finances in order are the least exposed to financial instability and vulnerability.

The results of the research can be a reference point in the targeted assistance and education of financially vulnerable groups, and in the development of the training methodology. In addition, the research draws attention to the fact that, in addition to the financial education of school-aged children, special attention must also be paid to the support of financially vulnerable adults, not only in terms of knowledge, but also in terms of behavioral and attitudinal factors such as financial strategy and planning, the development of coping skills, strengthening the attitude of internal

control. Research highlights as a new result that the creation and maintenance of order can mean protection not only in material matters, but also in other areas of life.

References

[1] Al-Mamun, A., Mazumder, MNH (2015). Impact of Microcredit on Income, Poverty, and Economic Vulnerability in Peninsular Malaysia. *Development in Practice, 25*(3), pp. 333–346, https://doi.org/10.1080/09614524.2015.1019339

[2] Anderloni, L., Bacchiocchi, E., Vandone, D. (2012). Household Financial Vulnerability: An Empirical Analysis. *Research in Economics, 66*(3), pp. 284–296, https://doi.org/10.1016/j.rie.2012.03.001

[3] Bárczi J., Zéman Z. (2015). A pénzügyi kultúra és annak anomáliái [Financial culture and its anomalies, in Hungarian]. *Polgári Szemle, 11*(1–3) pp. 23–41. Available at: https://polgariszemle.hu/archivum/93-2015-junius-11-evfolyam-1-3-szam/gazdasagpolitika/651-a-penzuegyi-kultura-es-annak-anomaliai

[4] Bellman, R. (1957). Dynamic Programming. Princeton University Press. https://books.google.co.uk/books?id=wdtoPwAACAAJ&redir_esc=y

[5] Bellman, R. (1961). Adaptive Control Processes: A Guided Tour. Princeton University Press.

[6] Bonett, D. G., & Wright, T. A. (2015). Cronbach's alpha reliability: Interval estimation, hypothesis testing, and sample size planning: CRONBACH'S ALPHA RELIABILITY. Journal of Organizational Behavior, 36(1), 3–15. https://doi.org/10.1002/job.1960

[7] Brown, J. D. (2009). Choosing the Right Type of Rotation in PCA and EFA. Shiken: JALT Testing & Evaluation SIG Newsletter, 13(3), 20–25. https://hosted.jalt.org/test/bro_31.htm

[8] Chipunza, K. J., & Fanta, A. B. (2023). Quality financial inclusion and financial vulnerability. International Journal of Consumer Studies, 47(2), 784–800. https://doi.org/10.1111/ijcs.12871

[9] Daud, S. N. M., Marzuki, A., Ahmad, N., & Kefeli, Z. (2019). Financial Vulnerability and Its Determinants: Survey Evidence from Malaysian Households. Emerging Markets Finance and Trade, 55(9), 1991–2003. https://doi.org/10.1080/1540496X.2018.1511421

[10] Finney, A., Jentzsch, N. (2008). Consumer Financial Vulnerability: Technical Report. *European Credit Research*, pp. 1–52. Available at: http://www.infohub.moneyadvicetrust.org/content_files/files/technicalreport_final.pdf

[11] Guarcello, L., Mealli, F., Rosati, FC (2010). Household Vulnerability and Child Labor: The Effect of Shocks, Credit Rationing, and Insurance. *Journal of Population Economics, 23*(1), pp. 169–198, https://doi.org/10.1007/s00148-008-0233-4

[12] Jackson, J. E. (2005). Varimax Rotation. In P. Armitage & T. Colton (Eds.), Encyclopedia of Biostatistics (1st ed.). Wiley. https://doi.org/10.1002/0470011815.b2a13091

[13] Lewis, J., AV Lewis, S. (2014). Processes of Vulnerability in England? Place, Poverty and Susceptibility. *Disaster Prevention and Management, 23*(5), pp. 586–609, https://doi.org/10.1108/dpm-03-2014-0044

[14] Lin, Y., & Grace, M. F. (2007). Household Life Cycle Protection: Life Insurance Holdings, Financial Vulnerability, and Portfolio Implications. Journal of Risk & Insurance, 74(1), 141–173. https://doi.org/10.1111/j.1539-6975.2007.00205.x

[15] Luksander, A., Németh, E., Zsótér, B. (2017). Financial Personality Types and Attitudes that Affect Financial Indebtedness. *International Journal of Social Science & Economic Research 2*(9), pp. 4687–4704. Available at: https://penziranytu.hu/sites/default/files/csatolmany/ijsser_02_297.pdf

[16] Nanjundan, S., Sankaran, S., Arjun, C. R., & Anand, G. P. (2019). Identifying the number of clusters for K-Means: A hypersphere density based approach. https://doi.org/10.48550/ARXIV.1912.00643

[17] Németh E., Béres D., Huzdik K., Zsótér B. (2016). Pénzügyi személyiségtípusok Magyarországon. Kutatási módszerek és primer eredmények [Financial Personality Types in Hungary. Research Methods and Primary Results, in Hungarian]. *Financial and Economic Review, 15*(2), pp. 153–172. Available at: http://real.mtak.hu/39312/

[18] Németh, E., Zsótér, B., & Luksander, A. (2017). A 18–35 évesek pénzügyi kultúrája–a pénzügyi sérülékenység háttértényezői [Financial Culture of 18–35-Year-Olds – Background Factors of Financial Vulnerability, in Hungarian]. *Esély: society and social policy journal* , *14*(3), pp. 3–34. Available at: http://real.mtak.hu/55795/

[19] Németh, E., & Zsótér, B. (2019). Anxious Spenders: Background Factors of Financial Vulnerability. *Economics and Sociology*, *12* (2), 147–169. Available at: https://www.economics-sociology.eu/?669,en_anxious-spenders-background-factors-of-financial-vulnerability

[20] Németh, E., Zsótér, B., & Béres, D. (2020). Financial Vulnerability of the Hungarian Population: Empirical Results Based on 2018 Representative Data. *Public Finance Quarterly*, *65*(2), pp. 284–311.

[21] Noerhidajati, S., Purwoko, A. B., Werdaningtyas, H., Kamil, A. I., & Dartanto, T. (2021). Household financial vulnerability in Indonesia: Measurement and determinants. Economic Modelling, 96, 433–444. https://doi.org/10.1016/j.econmod.2020.03.028

[22] Nordmann, J.-P., Mesbah, M., & Berdeaux, G. (2005). Scoring of Visual Field Measured through Humphrey Perimetry: Principal Component Varimax Rotation Followed by Validated Cluster Analysis. Investigative Opthalmology & Visual Science, 46(9), 3169. https://doi.org/10.1167/iovs.04-1214

[23] O'Connor GE, Newmeyer CE, Wong NYC, Bayuk JB, Cook LA, Komarova Y, Loibl C, Ong LL, Warmath D. (2019). Conceptualizing the Multiple Dimensions of Consumer Financial Vulnerability. *Journal of Business Research, 100*, pp. 421–430 https://doi.org/10.1016/j.jbusres.2018.12.033

[24] Pares-Casanova, P. M., Sinfreu, I., & Villalba, D. (2013). Application of varimax rotated principal component analysis in quantifying some zoometrical traits of a relict cow. Korean Journal of Veterinary Research, 53(1), 7–10. https://doi.org/10.14405/kjvr.2013.53.1.007

[25] Poh, LM, Sabri MF (2017). Review of Financial Vulnerability Studies. *Archives of Business Research, 5*(2), pp. 127–134. https://doi.org/10.14738/abr.52.2784

[26] Polya, G. (1920). Über den zentralen Grenzwertsatz der Wahrscheinlichkeitsrechnung und das Momentenproblem. *Mathematische Zeitschrift*, *8*(3–4), 171–181. https://doi.org/10.1007/BF01206525

[27] Pritchard, W. S. (1984). PCAVR: A portable laboratory program for performing varimax-rotated principal components analysis of event-related potentials. Brain Research Bulletin, 13(3), 465–473. https://doi.org/10.1016/0361-9230(84)90099-6

[28] Runnemark E, Hedman J, Xiao X. (2015). Do Consumers Pay More Using Debit Cards Than Cash? *Electronic Commerce Research and Applications,14*(5), pp. 285–291. https://doi.org/10.1016/j.elerap.2015.03.002

[29] Schofield, DJ, Percival, R., Passey, ME, Shrestha, RN, Callander, EJ, Kelly, SJ (2010). The Financial Vulnerability of Individuals with Diabetes. *The British Journal of Diabetes and Vascular Disease, 10*(6), pp. 300–304, https://doi.org/10.1177/1474651410385864

[30] Seldal, NMM, Nyhus, EK (2022). Financial Vulnerability, Financial Literacy, and the Use of Digital Payment Technologies. *Journal of Consumer Policy 45*, pp. 281–306. https://doi.org/10.1007/s10603-022-09512-9

[31] Shahapure, K. R., & Nicholas, C. (2020). Cluster Quality Analysis Using Silhouette Score. 2020 IEEE 7th International Conference on Data Science and Advanced Analytics (DSAA), 747–748. https://doi.org/10.1109/DSAA49011.2020.00096

[32] T. Kárász, J., Nagybányai Nagy, O., Széll, K., & Takács, S. (2022). Cronbach-alfa: Vele vagy nélküle? *Magyar Pszichológiai Szemle*, *77*(1), 81–98. https://doi.org/10.1556/0016.2022.00004

[33] Yusof, SA, Rokis, RA, Jusoh, WJW (2015). Financial Fragility of Urban Households in Malaysia. *Journal Economi Malaysia, 49*(1), pp. 15–24, https://doi.org/10.17576/jem-2015-4901-02

[34] Zhou, H. B., & Gao, J. T. (2014). Automatic Method for Determining Cluster Number Based on Silhouette Coefficient. Advanced Materials Research, 951, 227–230. https://doi.org/10.4028/www.scientific.net/AMR.951.227

[35] Zsótér B., Németh E., Luksander A. (2017). A társadalmi-gazdasági környezet változásának hatása a pénzügyi kultúrára. Az OECD 2010-es és 2015- ös kutatási eredményeinek összehasonlítása [The impact of Changes in the Socio-Economic Environment on Financial Culture. Comparison of the OECD's 2010 and 2015 Research Results, in Hungarian]. *Public Finance Quarterly, 2017*(2) pp. 151–166. Available at: http://real.mtak.hu/56965/

Annexes

Annex 1. The questionnaire

1)	"Sometimes, when shopping, I spend more than I previously expected.
2)	I know exactly what things cost.
3)	I have a hard time resisting when I am offered something at a great price.
4)	I don't enjoy cooking; we rather eat ready meals.
5)	I like it when it's warm at the apartment.
6)	If I pay in cash, I never ask for the change.
7)	Before going shopping, I always carefully think through of what I need.
8)	Only when I clean up do I realise the amount of my unnecessary purchases.
9)	I enjoy going shopping with friends.
10)	I often have to borrow at the end the month.
11)	I always make a shopping list.
12)	I tend to browse a lot before purchasing a product.
13)	I keep good track of my expenses.
14)	I always compare prices before purchasing anything.
15)	I am good at budgeting my money.
16)	Bills are killing me.
17)	I keep my household in order.
18)	I don't like throwing out things that can still be used.
19)	I often reward myself.
20)	I prefer preparing sandwiches rather than shopping at the cafeteria.
21)	I have a few bad habits that cost me a lot of money.
22)	I enjoy going out with my friends.
23)	I would like to provide everything for my children.
24)	I love cool stuff.
25)	I sometimes end up paying a few bills late.
26)	When I am short of money, I will save on my expenses.
27)	I always have enough savings for unexpected expenses.
28)	When I need more money, I take up extra work.
29)	If I take a liking to something, I will buy it.
30)	I am puzzled about where my money goes.

31)	I know exactly how much money I have in cash and on my bank account.
32)	When grocery shopping, I am often surprised how much I have to pay at the end.
33)	I am in a desperate fix with debts.
34)	I enjoy trying my luck.
35)	I often surprise my loved ones with homemade gifts.
36)	I spend a lot on healthy food and mineral water."