CORRUPTION PERCEPTION AND FINANCIAL CULTURE IN HUNGARY[1]

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ABSTRACT

This study focuses on the correlation between corruption and financial inclusion using statistical methods. The population studied were the people of Hungary. The organisations publishing the source indices of the study took representative samples of the population. The authors used data available from public sources on the internet for their study. They analysed time series data of two indices of corruption perception and two indices measuring financial culture and inclusion. The data from secondary sources were analysed applying statistical methods. They surveyed the correlation between corruption indices, the connection between the two financial indices and also the links of corruption and financial indices. The findings of the study prove there is a close positive correlation between the indices measuring financial inclusion. The findings of indices measuring corruption are less compatible. Corruption indices relying more on statistics and less on subjective opinions and indices of financial inclusion have also provided positive correlation. Our findings offer practical benefits: corruption sensitivity can not only improve through legal means or by increasing prosperity but also by spreading economic knowledge and providing a larger group of people with access to financial services.

JEL codes: G53, D73, A20

Keywords: corruption, financial literacy, financial inclusion, financial behaviour

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1   BEVEZETÉS

In this study the authors have analysed the correlation between corruption and financial inclusion in Hungary. The latter concept is used in the literature in English. The authors wanted to answer a primary and two secondary research questions. The primary research question is the following:

Q1   Can a higher standard of financial culture increase corruption sensitivity?

Since the answer to the question depends on which indices of corruption and financial behaviour are used, the authors had to answer two further questions. They were the following:

Q2/a   Can one find a positive correlation between and joint changes of the indices measuring corruption perception?

Q2/b   Can one find a positive correlation between and joint changes of the indices measuring financial behaviour?

To answer the questions, the authors analysed time series data in two globally applied and regularly assessed indices supplemented with other surveys also covering several countries. The research used statistical methods. As for global indices, they used the data of the Corruption Perceptions Index (CPI) surveyed annually, while financial inclusion was analysed using data published in the World Bank Global Findex Report. Other indices included the Eurobarometer surveys of corruption by the European Union (EU) and the reports on financial culture by the International Network on Financial Education (OECD/INFE) published by the Organisation of Economic Cooperation and Development (OECD).

Firstly, in order to properly interpret the research findings, the authors have reviewed the relevant literature on corruption and financial inclusion. Next, they describe the current position of both phenomena in Hungary as learnt from the literature. Then the data bases and methodology used in the study are described, followed by their findings and comparison with the literature. Finally, the study is finished with a concise summary of the key findings.

2   CORRUPTION – ITS CONCEPT AND MEASUREMENT

2.1 The concept and significance of corruption

Cases of corruption come to light from time to time during our everyday life, which reduces and damages public trust in democracy. The loss of trust is particularly important if those affected are international institutions that must/should be run in an atmosphere of public trust. It is a major issue, however, there are many who do not think it is such a problem and take it for granted in everyday life. Although many people fail to understand the damages caused by corruption, they are there with us and you must fight them incessantly.

The term 'corruption' comes from the Latin word *corruptio.* Its original meaning is rottenness, degeneracy (Radó, 1942:53). According to Transparency International (TI), the concept today means the abuse of entrusted power / position for private gain (Nagy, 2018). Corruption is multi-disciplinary including moral, cultural, social and political aspects (Yunan, 2020). It is a crime that can be committed by powerful politicians, government actors, private businessmen or simple grassroot employees (Joseph & Smith, 2021). It usually occurs when government or private agents act on authority conferred on behalf of an institution for the personal gain of a limited group of people (Khan, 2022; Setor et al., 2021). Its gravest forms (e.g., bribery and its acceptance, racketeering or failure to report such cases) are penalised by effective criminal law in most countries including Hungary (Act C of 2012 on the Criminal Code). However, such cases are only the gravest cases of criminal corruption disclosed. They are simply parts of a larger category, that of corrupt behaviour penalised by law, which belongs to the phenomena of social corruption. Accordingly, there are forms of corruption that are not prohibited or sanctioned by law, but which cause moral and political damage.

Engels reviewed the history of the phenomenon from the beginning of modern history to the middle of the 20th century (2016). In his work, he focused on demonstrating that political corruption intensified side by side with the evolution of the modern state. The same connection still holds today. Suffice here to mention the corruption scandal Qatargate surfacing in 2022, in which several European Parliament representatives were involved (Wax et al., 2023). Corruption and the fight against it had already existed in antiquity, as you can read about it in the works of Herodotos, Thucydides, Xenophon and Polybios. They tell us that some have gained political influence for money or gifts (Szántó, 2018). Assessing and revealing corruption is difficult as it is acted out under the surface of rather than within the institutional framework. That is why, for example, it had remained a secret for a long time that EU leaders and pharmaceutical firms had been dis-

cussing about Covid vaccines in simple text messages (Stolton, 2023). Its hidden and institutional character is expressed in the relevant concept of micro-politics (Burns, 1961) characterised by networking, motivation based on the exchange of donations and resources or the desire of social integration or to excel. Koselleck (2010) emphasised the concept of the so termed saddle time (Sattelzeit) in connection with the phenomenon. It evolved in the period from 1750 to 1850, when the positive concepts of modern politics such as homeland, freedom or citizen appeared and became rooted. However, the modern interpretation of corruption also evolved at the same 'saddle time'. Criticism of corruption increased at the end of the 19th century; however, its critics had failed to make connections more transparent, so a shift in political styles was its only outcome. As a matter of fact, the modern concept of corruption is unsuitable to assess micropolitical activity, as personal networks continue to be the prerequisite of successful political action (Engels, 2016).

Since the phenomenon is hidden by nature and has innumerable forms of appearance, there has been no generally accepted uniform definition for corruption. Research to support the statement was carried out in Hungary (Fenyvesi, 2013), in which nearly two hundred people were asked to give their opinion on thirty situations. Participants had to decide whether or not a given situation should be deemed corruption or the threat of corruption. The result of the research was that respondents could not provide uniform assessment of even one of the thirty cases. So, you can only say with some certainty that corruption can be of two kinds depending on who makes an offer to the other party. If a customer bribes a competent person, you have active corruption. If a competent person requires compensation for their assistance, a passive form of corruption is the game (Keller–Sík, 2009).

2.2 Measuring corruption

Public discourse about the damages caused by corruption started in the 1970s. Italy is a good example, where the tight links between the state and the mafia could no longer be swept under the carpet. We will never learn which party had first asked the other one for assistance, but both of them had gained from the relationship: politicians got rid of their opponents and won elections, while the mafia received public procurement orders. It is unclear too which party controlled the relationship. According to the Lima-model (Italy On This Day's Editor, 2019), it was a relationship at par, while according to the Ciancimino-model (Ciancimino–Licata, 2013), it was clearly the maffia in control. mhf situation changed because of pressure by public opinion. The government became increasingly stricker in dealing with the mafia, however, the response did not fail to come either, just

think of the Chiesa murder in 1982 (Kamm, 1982) also made into a film entitled *'The murder of a general'* (Capitani, 2007), or of the murder of Giovanni Falcone (Montalbano, 1987).

The Italian example clearly underlines the problems of measuring corruption. On the one hand, its underwater nature renders obtaining a complete picture impossible. On the other hand, as a result of huge public outrage caused by the killings mentioned, everyday people had a stronger perception of the phenomenon and presence of corruption. However, perception is not equal to facts; it is more like pain thresholds: the same situation may cause different perceptions of pain in different people. The makers of corruption indices globally used and accepted today (Freedom House, the Open Society Institute, Transparency International, Gallup-monitor) as well as MÁST and TÁRKI in Hungary, in fact, measure the perception of corruption, or else they apply the so termed approximation method. The latter measures the frequency of the forms of corruption that can be easily identified (bribes, presents, paid trips), and draws conclusions from it regarding the general picture. The fundamental difference between the two methods is that the perception method is completely subjective with lot of room for interpretation and under- or overestimation. The approximation method is unambiguous. There are no external distortions either (media, politics). However, it underestimates the frequency of corruption as it only focuses on certain types of cases (Sík, 2001). As for methodology, surveys can be made via questionnaires or by analysing criminal statistics. The latter is objective, but it can only present a smaller part of reality.

Asking the population are used to measure the internal perception of corruption, while the responses by external observers represent external perception (Keller–Sík, 2009). The two perceptions usually differ. The population may deem certain countries more corrupt than external observers (Slovenia, Sweden), while the situation is just the opposite in other countries (Italy, Greece). The two kinds of indices can be summarised after the proper transformations are made resulting in a summary index on corruption perception. Corruption perception is also subject to the population's general attitude to corruption in a given country. A study made by TÁRKI in 2009 (Keller–Sík, 2009) demonstrated that both corruption perception and the frequency of its occurrence are higher in countries where the population is more lenient and forgiving with corruption. On the other hand, there are differences in whether the level of corruption perceived exceeds the population's tolerance level (Greece) or not (Sweden). Difference is made between the perception and the actual exercise of corruption. Accordingly, the report differentiates "partially blind" and "oversensitive" countries. In the former group, actual corruption is more widespread than its perceived level, while the situation is the opposite in the latter one. In the report, the population's attitude and the

indices of perceived and exercised corruption were combined to come up with an index of corruption culture.

2.3 Reliability of corruption indices

Corruption is fairly difficult to measure and quantify mainly because the public is usually excluded from the relevant processes mostly carried out under the radar. The indices used today either measure respondents' subjective feeling about the frequency of corruption or, if they are based on statistical data, they are only suitable to state its approximate frequency. That is why the reliability of the indices must be looked into. A judgement based on an incorrectly compiled index may cause major economic damage and may severely destroy a country's brand and estimation.

Many factors affect reliability (Németh et al., 2019): the set-up of the group surveyed, the transparency of the methodology applied, the reliability of sources or even the political independence of the body conducting the research. Those are the factors most frequently criticised. Let us see an actual example. The Corruption Perceptions Index (CPI) regularly published by Transparency International is one of the most frequently applied indices. Despite its general acceptance, a number of reliability issues have arisen about the indicator. You can find a list of its donors on pages 29 and 39 of its 2022 financial report (Transparency International, 2023). The list includes organisations such as the Foreign Ministries of the USA, Denmark and the Netherlands, the European Committee, the Open Society Foundation or the international NGO FERN as well as unnamed individual supporters. Many further government agencies, funds and bodies are also included. The amount of donations received is over EUR twenty million. Therefore, the political and business independence of TI as an assessment organisation is, to say the least, questionable.

One cannot learn about a part of data sources used to calculate CPI, the composition of the experts asked or whether the sample used for a survey is representative or not (Németh et al., 2019). However, reliability is not simply essential because of the potentially negative impact the image of corruption may cause on the economy and image of a country. It should also be noted that, although indices usually measure the perception of corruption, the reports talk about corruption as a fact violating in that way the rules of political correctness so often proclaimed. The title of a report by Portfolio.hu (2021) is a telling example, 'Hungary has become the most corrupt country of the EU in a three-way tie according to the index of Transparency International'. The title of an article on Index.hu also referring to CPI is similarly unfair, 'We are at the same level as South Africa regarding corruption' (Előd, 2020).

3   CONCEPT OF AND MEASURING FINANCIAL CULTURE

3.1 The concept of financial culture

As it is true for many other research areas, the concept of 'financial literacy' has been defined in various ways by researchers and organisations. Atkinson and Messy, (2011:4) defined it as 'a combination of awareness, knowledge, skills, attitude and behaviours necessary to make sound financial decisions and ultimately achieve individual financial wellbeing'. Defined from the aspect of knowledge, financial literacy is the fundamental skill necessary to survive in modern society (Kim, 2001). Focusing on financial literacy as a capability, it is about assessing new, complex financial instruments and selecting them based on sound assessment, which allows them to be used matching our own long-term interests (Mandell, 2008).

It is clear than financial culture has no uniform definition, on the other hand, it does have a common point linked to the use of money and financial instruments, to how the necessary information is obtained, and applied to financial decision making. Thus, financial literacy is not simply the knowledge of basic financial concepts. Decision making also belongs there as well answering questions such as how respondents select certain products and how they use them later on. It basically means understanding different financial skills based on knowledge and their effective use, which allows making short and long term personal financial decisions effectively in today's world (Fernandes et al., 2014; Potrich et al., 2016; Remund, 2010).

In the world today the ability to manage personal finances becomes increasingly important. People must make short and long-term financial decisions. To do so correctly, they need at least an elementary knowledge of the basic financial concepts (Chen–Volpe, 2002). Research findings have proven that higher-level financial skills result in better financial decisions (Lusardi–Mitchell, 2014).

3.2 Measuring financial culture/literacy

Two milestone publications were published in 2010 (Huston, 2010; Remund, 2010) that provide insight into defining and measuring financial literacy. Questionnaires are the most frequently used tools where the researchers compiling the questionnaires ask about information regarded to be relevant using direct or indirect questions. The method is used by the Organisation of Economic Cooperation and Development (hereinafter: OECD) in their survey of financial literacy covering many countries which is conducted every three years. (Atkinson–Messy, 2011;

Kossev, 2020). The OECD questionnaire comprises three groups of questions: financial knowledge, financial behaviour, and financial attitude.

1. Score of financial knowledge (from 0 to 7)

2. Score of financial behaviour (from 0 to 9)

3. Score of financial attitude (from 1 to 5).

The score of financial literacy is a quantity derived with no unit of measurement by simply summing up the scores of the three areas. Its value varies from 1 to 21. That is the methodology used by OECD in its surveys repeated every three years.

4   RELATIONSHIP OF FINANCIAL LITERACY AND CORRUPTION

The initial research of the topic focused on the correlation between corruption and economic growth (Murphy et al., 1993; Sachs–Warner, 1997), and researchers have presented two basic views. According to one group, corruption has an adverse effect on economic growth. The impact can be felt through many channels (Neeman et al., 2008; Tanzi–Davoodi, 1997; Wei, 2000). Other researchers, however, referring to the example of Asian countries, which had been deemed corrupt but became economically prosperous, believe a certain lower-level corruption may contribute to economic growth (Ahlin–Pang, 2008). Still, the academic appraisal of corruption is mostly negative (Yu et al., 2023) saying its evolution is contrary to financial development.

Lederman et al., (2005), and Serra (2006) state the industrialised countries can afford to devote more resources to exploring and preventing corruption, so they can control corruption much better. Improvements result in better schooling and educational standards, which increase the probability of revealing and punishing acts of corruption. Thornton (2010) had proved the increase of financial literacy would reduce corruption about fifteen years before the wide-spread appearance of modern financial services. An increasing number of recent publications are dealing with the correlation between corruption and financial literacy. Setor et al (2021) demonstrated the options for corruption have become narrower as digital payment solutions have been spreading. According to Jungo et al (2023), financial inclusion and easier access to financial services and education play an important part in pushing back corruption particuarly in the developing countries. Barik–Lenka, (2023) have come to a similar conclusion. The above statements are not only valid for emerging economies but globally as well (Song et al., 2021).

5   CORRUPTION AND FINANCIAL LITERACY IN HUNGARY

5.1 Corruption panorama in Hungary, 2022/23

Although internet research on the global position of corruption mostly brings up hits based on the TI index, there are also other surveys and reports. For instance, the Global Corruption Index (GCI) surveyed and published by the Swiss Global Risk Profile. Its methodology focuses on measures based on data. Although they mention CPI published by TI among their sources, GCI is a composite index covering 19 countries, relying in addition to TI reports, on data by organisations such as the World Bank, the World Economic Forum, the UN and the OECD (Thurnherr, 2023). The index surveys, in addition to citizens' opinions, legal and political regulations as well as government measures. Hungary was ranked 71 in 2022 with its score of 40.89; the score places Hungary in the 'medium' category and ranks it 30 among the 41 European countries surveyed.

The ranking for the rule of law by the World Justice Project considers many factors including the occurrence of corruption, openness of the government, civil and criminal justice, fundamental rights, order, and security (WJP, 2022). Although corruption is just one component of the composite index, other sub-indices are closely related to it. In the report Hungary was ranked 45 among 102 countries surveyed in 2015 achieving the best performance in the sub-index of order and security and fundamental rights. In the latest report of 2022 Hungary was ranked 73 among 140 countries, while its performance in the sub-index of order and security had improved significantly achieving the 10th place in a tie with Finland and Canada. The Dutch pollster Kantar commissioned by the European Committee (EC) surveyed corruption perception and acceptance in the European Union in 2022 (EC, 2022). Their findings have shown that 4% of the Hungarian population accept the presence of corruption, 57% tolerate it while 39% strongly reject it. The 4% as the rate of the population accepting corruption presents a positive image of Hungary, since it is not only lower than the 10% measured in Greece but also lower than the average 5% of EU-27. Even more, it outperformed countries such as the Netherlands (6%) or Austria (8%). The full picture, however, is not so rosy. Its main reason is tolerance level. It means 57% of Hungarians asked tolerate corruption, i.e., they are aware of it but do nothing against it.

The EC published recent survey findings in 2023 (EC, 2023). The image of Hungary has somewhat improved as the ratio of people regarding corruption unacceptable has increased by 4 percentage points to 43%. Another positive change is the decline of the ratio of people tolerating corruption by 6 percentage points (from 57% in 2022 to 51%).

5.2 Financial literacy in Hungary

Viewed from a Hungarian aspect, the latest results of the OECD surveys of financial literacy in this country (Kossev, 2020) are quite promising. Out of the three components reviewed, Hungary performs best in the area of financial literacy with an average of nearly 66%. That important issue gained particular significance during the 2008 financial crisis, when millions of consumers realised the necessity of managing their finances. The lack of financial literacy cannot only cause individual or family tragedies but also economic crises, such as the global crisis in 2008 originating in defaulted loans as proved by an Standard and Poor's (S&P) survey of financial awareness (Klapper–Lusardi, 2020). Although the crisis could be overcome, deficiencies in financial literacy have been with humanity for over a thousand years. The US Treasury had already carried out relevant research prior to the 2008 crisis. As a result, a national strategy had been developed to improve financial literacy (De Beckker et al., 2019).

Having reviewed the literature, the authors found there were many studies dealing with the survey and analysis of corruption, particularly of corruption perception. The number of publications about financial literacy and inclusion is also high. Articles were published about the correlation between corruption and the field of finance (Barik–Lenka, 2023; Ekşi–Dogan, 2020). However, there are no up-to-date surveys of the situation in Hungary based on research findings. The authors are trying to make up for that deficiency with their research.

6   RESEARCH METHODOLGY

6.1 Data used

The authors collected data from different sources for the study. Two databases were used to review the position of corruption in Hungary. One of them includes the findings of Eurobarometer surveys of corruption by the European Commission, where the number of respondents was at around 1000 (986–1036) in each year surveyed. The other database is the Corruption Perceptions Index (CPI) of Transparency International. CPI is compiled from data collected from 13 sources, so TI do not publish specific item numbers broken down by countries. Financial literacy data related to Hungary were taken from regular surveys made by OECD/INFE (Kossev 2020), in which at least 1000 people were asked in each country surveyed. The data on financial behaviour are supplemented by data series of the GFR index of the World Bank, which provides the ratio of people having access to financial services as a percentage of the total population of the countries studied.

Considering the above data sources are not updated at the same frequency, the authors have selected six periods for comparison, each of them containing the data of two years. They are: 2009–2010, 2011–2012, 2013–2014, 2017–2018, 2019–2020, 2021–2022. As surveys do not take place every year and are not made in the same years, there are data missing in the samples. Data seem to be missing in almost every database. They must be managed somehow, they cannot be simply omitted from the sample, because estimates of population parameters might be distorted unless the lack of data is completely random. Missing data must be managed to eliminate the distortion. Different methods are used for the purpose depending on how correctly the characteristic features of the lack of data can be identified and modelled. So, missing values must be replaced so that they can be processed, for which several methods are used (He et al., 2021; Van Buuren, 2018). In this study, the authors applied the imputation algorithm of the free software WEKA with DMI filter setting to establish the missing data (Rahman–Islam, 2011; 2016). Using a decision-making tree, the algorithm breaks down the data set into horizontal segments and arranges the leaves into nodes. Then, the missing data are filled in via an average/mode imputation within the leaves.

Transparency International introduced a new methodology in 2012 (Saisana–Saltelli, 2012), in which the earlier 0-10 score scale (Lambsdorff, 2008) was replaced by a scale 0-100. The main difference between the calculations used in the two methodologies is that the earlier one was rank based. The new one is score based, i.e. the relative differences of the countries are given more emphasis. Thus, the two data series cannot be compared without applying a proper conversion, but you cannot find a way for it in GFR methodology, since the sources of the data are ambiguous. Therefore, the authors decided to omit the 2009–2011 period from the study using the data of the period 2012–2022 only.

Of the Eurobarometer data, the authors used the percentage ratio of respondents in agreement with the selected statements expressed in decimals compared to the total number of respondents. For CPI, interpreting the 100-grade scale to be percentage-type quantity, the scores by respondents were also converted into decimals.

OECD measures financial literacy by summing up the scores of three factors (financial knowledge, behaviour, and attitude). In addition to the three factors, the authors also used total score values in their study taking the maximum values in *3.1* to be 100% and expressing the performance of the Hungarian population in decimals. OECD surveys are not bi-annual, so the authors provided data for the missing years using extrapolation. They also extrapolated the data of Global Findex, conducted more or less in every fourth year, for the missing years. In the case of OECD/INFE surveys, the periods 2013-2014 and 2021-2022 include extrapolated data, while they can be found for the period 2021-2022 in the Global

Findex database. The authors have selected the following statements from the full Global Findex database to survey financial literacy:

- Has an account.
- Has a financial institution account.
- Saved at a financial institution.
- Borrowed from a formal financial institution.

The survey included the ratio of participants aged 15+ responding with 'yes' compared to the total population of 15+ in decimal form.

In every year studied, over 1000 Hungarians responded to the Eurobarometer questions. Although the answers first appear on a scale of seven, in fact, a four-grade scale measures corruption-related answers. In theory, such a scale has the advantage of providing every respondent with the option of really giving their opinion. Unfortunately, point 5 (not answered) allows avoiding the answer. The apparent point 6 is a summary of the values of those fully or rather agreeing, while point 7 is a summary of the values of people fully or rather disagreeing. So, the authors only used points 6 and 7 to prepare this study. The following statements have been selected for inclusion in the study:

- Corruption is a major problem in (OUR COUNTRY).
- There is corruption in local institutions in (OUR COUNTRY).
- There is corruption in regional institutions in (OUR COUNTRY).
- There is corruption in national institutions in (OUR COUNTRY).
- There is corruption within the institutions of the EU.*
- There are enough successful prosecutions in (OUR COUNTRY) to deter people from giving or receiving bribes.
- (NATIONAL) Government efforts to combat corruption are effective.
- Court sentences in corruption cases are too light in (OUR COUNTRY)
- EU helps in reducing corruption in (OUR COUNTRY).*
- Corruption is unavoidable, it has always existed.

The two statements marked with * had only been included in the Eurobarometer questionnaire until 2013. The authors think it worth noting that, after 2013, the EU was not curious to learn people's opinion on how much the EU was corrupt. It was also not asked after 2013 how much EU citizens believed the EU institutions were reducing corruption. Two scandals mentioned earlier, Qatargate beginning in 2022 and still undecided in the European Parliament in 2023 and the also undecided case known as 'von der Leyen's Pfizer texts' (Stolton, 2023; Wax et al., 2023) indicate that even higher-ranking political groups of the EU might be involved

in corruption. Therefore, the authors think to promote the expression of public opinion, those two statements should not have been omitted from the post-2013 versions of the questionnaires. Another methodological task has been to solve the issue of the changes in the statements of the Eurobarometer corruption questionnaire in 2013 during the period studied. Some statements used in this research were not included in the questionnaires later on, while new statements, equivalent in content but worded differently, were included.

So, to set up a time series, the authors needed to find which of the statements they had selected could be matched to other ones in latter versions of the questionnaires. *Table 1* is a summary of the matches found. To simplify data processing, the authors used the older versions of the statements in this study to characterise the whole period.

Table 1
Old and new statements of Eurobarometer

Earlier statements	Statements changed	Year of change
Corruption is a major problem in (OUR COUNTRY)?	How widespread do you think the problem of corruption is in (OUR COUNTRY)?	2013
Court sentences in corruption cases are too light in (OUR COUNTRY).	High-level corruption cases are not pursued sufficiently in (OUR COUNTRY).	2013
Corruption is unavoidable, it has always existed	Corruption tolerance (6=acceptable, 7=inacceptable, 5=tolerated)	2013

Source: EC, 2023; European Commission, 2012 – edited by authors

Aspects of research ethics must be considered today with respect to data management (Emanuel et al., 2011). Voluntary participation and anonymity must be provided. Since the authors used international databases that are public and available for all, they did not have to deal with issues of research ethics.

6.2 Procedures and software applied

6.2.1 Software types and tests

The authors used the findings of statistical analysis of the sample to select the method of inquiry used during the research. The software types used were MS-Excel v.17.75.2 and Jamovi v.2.3.21.0 for the inquiry. A detailed description of the

findings of the descriptive statistics is presented at the beginning of *Chapter 7*. Based on the findings, parametric tests were selected for further research. Although non-parametric tests are not subject to sample normality, researchers are rarely interested in significance tests for their own sake. They would rather want to say something about the population providing the samples, which can be best achieved by estimating parameters and confidence intervals. In addition, parametric tests usually have more statistical power. It means major differences, if they exist, can be perceived with higher probability.

6.2.2 Comparison of corruption indices

The next step of the research was to reveal if there is correlation or difference in the performance of Hungary as shown in the two corruption indices (Eurobarometer, CPI). So, the authors reviewed the nature of the connection between the Eurobarometer statement on the problem of corruption (Corruption is a major problem in OUR COUNTRY) and the CPI index of Transparency International. To achieve that, the authors reviewed the correlation between the two statements (Pearson's r).

6.2.3 Correlation of financial literacy indices

Following the review of the corruption indices, the authors performed the same tests to reveal the correlation or difference of the Hungarian scores as shown by the OECD/INFE financial behaviour indicator and the statements of the Global Findex database also exploring financial behaviour. To be fair in their methodology (equal variances), the authors averaged the statements of Global Findex, which were three times as large as those of OECD/INFE, to make the two samples the same size.

6.2.4 Correlation between corruption and financial literacy indices

Finally, the authors studied the nature of correlation and difference between corruption and financial literacy indices. They wanted specifically to learn if there is a correlation between corruption perception found in the Eurobarometer survey, which is considered more dependable by the literature and their own findings, (Corruption is unavoidable, it has always existed) and the score of financial behaviour as per OECD/INFE.

7   FINDINGS AND DISCUSSION

7.1 Descriptive statistics of the sample

Firstly, the authors provide their findings with descriptive statistics (Table 2). It is not simply an overview of the sample, but it also helps to identify the type of tests to be conducted. Considering that the number of items studied changes in the surveys of different organisations every year, the authors considered it irrelevant to provide the number of items of the whole sample studied in the Tables presented.

Missing values are only included in two cases. They are the statements about the spread of corruption in the EU and about the anti-corruption measures of the EU, which were not included in the Eurobarometer questionnaire after 2013. Because of the small size of the sample, the normality test was performed using the Shapiro-Wilk test. Its result was (W = 0.694-0.983) and, except for one statement marked with * (Corruption is unavoidable, it has always existed, p=0.005), it did not show the lack of normality (p = 0.094-0.967). However, that one statement has come from the Eurobarometer survey, where the normality of the sample has already been assumed because of the high number of items in the sample. Based on the above, after reviewing the histograms and Q–Q plots belonging to the individual statements, the authors decided to perform parametric tests, so the statement in question did not have to be excluded from the analysis either.

Table 2
Descriptive statistics of the sample

	N	Missing	Mean	Median	SD	Minimum	Maximum	Skewness	Kurtosis	Shapiro-Wilk W	Shapiro-Wilk p
Corruption is a major problem	6	0	0.907	0.894	0.041	0.8632	0.959	0.5715	-1.8783	0.867	0.214
There is corruption in local institutions	6	0	0.82	0.816	0.0665	0.7409	0.917	0.3449	-1.2263	0.948	0.726
There is corruption in regional institutions	6	0	0.82	0.816	0.0666	0.7409	0.913	0.2331	-1.6484	0.946	0.707
There is corruption in national institutions	6	0	0.814	0.819	0.0694	0.7182	0.908	-0.0783	-0.9656	0.983	0.967
There is corruption within the institutions of the EU	3	3	0.678	0.737	0.1351	0.5232	0.773	-1.5942	Na/N	0.856	0.256
There are enough successful prosecutions to deter people from giving or receiving bribes	6	0	0.305	0.311	0.0752	0.219	0.387	-0.1061	-2.6471	0.864	0.204
Government efforts to combat corruption are effective	6	0	0.292	0.31	0.104	0.12	0.41	-0.8472	0.5006	0.944	0.692
Court sentences in corruption cases are too light	6	0	0.815	0.822	0.0149	0.79	0.828	-1.1952	-0.0283	0.823	0.094
EU helps in reducing corruption	3	3	0.322	0.308	0.0264	0.3044	0.352	1.6887	Na/N	0.812	0.143
Corruption is unavoidable, it has always existed *	6	0	0.317	0.113	0.353	0.0581	0.778	0.9524	-1.8719	0.694	0.005
CPI performance (0=corrupt, 100= free of corruption)	6	0	0.47	0.455	0.0456	0.42	0.54	0.778	-0.7813	0.918	0.488
OECD/INFE total score (OECD_INFE_SCORE)	6	0	0.652	0.642	0.0749	0.5775	0.763	0.4934	-1.522	0.876	0.253
OECD/INFE knowledge	6	0	0.737	0.72	0.1527	0.5186	0.935	-0.0842	-0.8487	0.97	0.895
OECD/INFE behaviour	6	0	0.51	0.51	0.0352	0.4669	0.554	0.0332	-1.8443	0.941	0.67
OECD/INFE attitude	6	0	0.696	0.703	0.0355	0.65	0.743	-0.2315	-1.224	0.944	0.688
Has account	6	0	0.77	0.738	0.0975	0.6469	0.893	0.3886	-1.3839	0.887	0.304
Has a financial institution account	6	0	0.77	0.738	0.0975	0.647	0.893	0.39	-1.3851	0.887	0.304
Saved at a financial institution	6	0	0.23	0.215	0.0914	0.1095	0.351	0.179	-1.24	0.959	0.813
Borrowed from a formal financial institution	6	0	0.151	0.16	0.0548	0.0792	0.222	-0.2253	-1.2775	0.934	0.609

Source: authors' research

7.2 Correlation of corruption indices

The next research step was to examine the nature of correlation between corruption indices. The data in Table 3 demonstrate it. Table 4 presents the findings. The findings merely demonstrate a slight positive connection between the two corruption indices. The result proves the statement discussed in the literature review, according to which no close relationship can be revealed between the evolution of the indices because of the deviance of methodologies used to measure corruption.

Table 3
Descriptive statistics of the study of correlation between corruption indices

	Min	Max	Mean	Median	SD	IQR
Corruption is a major problem	0.8632	0.959	0.907	0.894	0.041	0.0638
CPI score	0.42	0.54	0.47	0.455	0.0456	0.0550

Source: authors' research

Table 4
Correlation between corruption indices

		Corruption is a major problem	CPI score
Corruption is a major problem	Pearson's r	—	
	p-value	—	
CPI score3	Pearson's r	0.227	—
	p-value	0.665	—

Source: authors' research

7.3 Correlation between financial literacy indices

Tables 5 and *6* sum up the research findings into the correlation between financial behaviour indices.

Table 5
Descriptive statistics of correlation research
between financial behaviour indices

	Minimum	Maximum	Mean	Median	SD	IQR
OECD/INFE behaviour	0.4669	0.554	0.51	0.51	0.0352	0.0548
OECD/INFE attitude	0.65	0.743	0.696	0.703	0.0355	0.0464
Has account	0.6469	0.893	0.77	0.738	0.0975	0.1254
Has account at a financial institution	0.647	0.893	0.77	0.738	0.0975	0.1254
Saved at a financial institution	0.1095	0.351	0.23	0.215	0.0914	0.1208
Borrowed from a financial institution	0.0792	0.222	0.151	0.16	0.0548	0.0715

Source: authors' research

Table 6
Correlation between OECD/INFE behaviour indicator
and selected GFR statement

	OECD_INFE_behaviour
Has account	Pearson's r = 0.764 (p = 0.077)
Has account at a financial institution	Pearson's r = 0.764 (p = 0.077)
Saved at a financial institution	Pearson's r = 0.866 (p = 0.026)
Borrowed from a financial institution	Pearson's r = 0.906 (p = 0.013)

Source: authors' research

There is a strong positive correlation between indices of OECD and GFR financial behaviour components ($r > 0.6$), which is significant at $p < 0.1$ for questions of having an account and at $p < 0.05$ for questions about savings and borrowing. It means, with respect to the two indices of financial behaviour, that any change of one index in a given direction is expected to trigger a change of the other index in a similar direction.

The correlation findings indicate that, despite the two indices approaching financial behaviour differently, their changes take place in the same direction. The findings are supported by the analysis of the literature. Accordingly, one can state OECD/INFE measures behaviour by analysing financial decision-making while GFR measures financial inclusion, i.e., how frequently financial services are used.

7.4 Correlation between corruption and financial indices

The next research step was to reveal if there is a correlation between Hungarian citizens' corruption perception and their scores in the field of financial literacy. *Table 7* is a summary of the descriptive statistics of the data used for the correlation analysis while *Table 8* presents the findings of the correlation study.

Table 7
Descriptive statistics of correlation between corruption perception and financial behaviour

	Min	Max	Mean	Median	SD	IQR
Corruption is unavoidable, it has always existed	0.0581	0.778	0.317	0.113	0.353	0.5206
OECD/INFE score	0.5775	0.763	0.652	0.642	0.0749	0.1019
OECD/INFE knowledge	0.5186	0.935	0.737	0.72	0.1527	0.1849
OECD/INFE behaviour	0.4669	0.554	0.51	0.51	0.0352	0.0548
OECD/INFE attitude	0.65	0.743	0.696	0.703	0.0355	0.0464

Source: authors' research

Table 8
Correlation between corruption perception and financial behaviour

	Corruption is unavoidable, it has always existed
OECD/INFE score	r = 0.818 (p = 0.046)
OECD/INFE knowledge	r = 0.868 (p = 0.025)
OECD/INFE behaviour	r = 0.865 (p = 0.026)
OECD/INFE attitude	r = 0.801 (p = 0.056)

Source: authors' research

Based on the findings, the authors have stated there is a strong positive correlation between the level of corruption perception and the financial literacy score (r = 0.818, p = 0.046). The result is significant, still the cause and effect of the parallel movements of the two indicators need to be studied further. Considering the relatively low number of items in the sample used for the research, the Grange test, which is widespread for studying causal relationship, cannot be applied; a higher number of items in the sample and a longer period of time would be needed. Therefore, the interpretation of the term 'correlation' in the title of this

study needs to be specified to some extent: it is not a causal relationship but a joint (assumed to be positive) change we are talking about. Our findings show corruption perception mainly follows the measure of financial knowledge (r = 0.868, p = 0.025), but its correlation with financial behaviour is not much weaker either (r = 0.865, p = 0.026). The two indicators have a stronger correlation with corruption perception than the summary score of financial literacy. The correlation between corruption perception and financial attitude is weaker but still strong (r = 0.80,1, p = 0.056). However, the latter can only be regarded significant in a more lenient approach.

7.5 Limitation of research and potential further directions

This study is clearly based on representative samples taken from the population of Hungary. Therefore, research can be continued in several directions. On the one hand, other countries can be included, on the other hand, the correlation between the two indicators can be analysed regionally or globally. The latter, however, limits the group of indices to be used, since CPI and GFR only cover the majority of the world's countries (nearly 130 countries appear at the same time in both surveys). The research can be modified so that the correlation between the behaviour or attitude components of financial culture is studied. The authors mention another limitation, i.e., the research question may suggest the presence of a causal relationship between the corruption and financial indices. On the other hand, no actual real causal study, i.e., Granger test can be made because of the sample size and the length of time series. Therefore, the authors have only studied the correlation between the two data series for the present study.

8   SUMMARY

This study has been looking into corruption perception and the behaviour component of financial literacy in Hungary. The authors' answer to the main research question is there is a significantly strong positive correlation between the financial behaviour of the Hungarian population and their perception of corruption. In other words, how much financial services are used and applied correspond to the corruption perception of the individuals. Increased financial inclusion improves corruption perception.

The answer is supported by the fact that a strong and significant positive correlation has been revealed between the indices measuring financial behaviour studied (answer to question 2/b). The findings are somewhat weakened by the fact that the authors have only found weak correlation between the corruption indices

studied (answer to question 2/a). That was why they analysed the connection of the two kinds of indices by including the EU index, which is less subjective, and its methodology is more transparent.

The research findings must be interpreted considering the limitations of the research, still, their practical benefits are obvious. The results of the authors suggest corruption cannot only fought using the law but also by improving living standards and well-being in general. Based on the lessons of this study, another option is to develop financial knowledge and facilitate access to groups of financial services, which may increase corruption sensitivity and rejection as financial behaviour develops.

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