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Financial literacy and responsible financial behaviour of Russian households

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Valentina Zvereva

Andrey Sinyakov

Tatyana Shelovanova

Valentina Zvereva

Lomonosov Moscow State University

Andrey Sinyakov

Bank of Russia, Research and Forecasting Department

E-mail: SinyakovAA@cbr.ru

Tatyana Shelovanova

Bank of Russia, Research and Forecasting Department

E-mail: shelovanovati@cbr.ru

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12 Neglinnaya Street 107016 Moscow

Tel.: +7495 771 91 00, +7495 621 64 65 (fax)

Bank of Russia website: www.cbr.ru

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Abstract

Data of the All-Russian Survey of Consumer Finances for 2020 and 2022 are used to analyse the relationship between financial literacy and responsible financial behaviour indices. Responsible financial behaviour involves consumption smoothing, asset diversification, non-speculative investments and a low/moderate debt burden, acquisition of information for decision-making, the appropriate perception of macroeconomic trends, the absence of naive decisions and confidence about the future. The role of financial literacy is controlled by including educational indicators, financial experience, personal preferences (risk tolerance, planning horizon / future discounting, overconfidence, optimism) and a large number of standard control variables.

The results show a positive relationship between financial literacy and overall responsible financial behaviour.

Our analysis of the aggregate indicator's components lead us to conclude that improved financial literacy at the individual level can help smooth out consumption (through diversification of savings) and, at the macroeconomic level, help development the economy and financial market instruments. In general, financial literacy fails to guarantee confidence in state pension initiatives and does not ensure a less risky investment profile or a lower debt burden.

Keywords: financial literacy, financial behaviour, saving behaviour of households, financial behaviour index, survey of consumer finances, Russia

JEL codes: C83, D14, G41

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1. Introduction

At the end of 2023, Russia updated its Strategy for Improving Financial Literacy and Developing Financial Culture Until 2030. Unlike the previous strategy, current strategic goals include not only financial literacy but also financial culture.¹ ‘Culture’ is normative and socially preferred behaviour. The updated strategy brings into focus the relationship between financial literacy and responsible financial behaviour, in particular the role of financial literacy programmes in promoting appropriate financial behaviour.²

There are two areas in the study of financial literacy effects on financial behaviour. The first area, which was the earlier to emerge, is research based on household survey data and the *observed financial literacy* index. A meta-analysis of results in this area is presented in Fernandes et al. (2014). The second area is the results of controlled experiments operating the *manipulated financial literacy* index. A meta-analysis of the results is presented in Kaiser et al. (2022). These studies explore the following aspects of financial behaviour:

- Objective aspects, which include saving activity, retirement planning (including saving for old age), behaviour in the credit market and debt burden, budgeting,

¹ The Strategy for Improving Financial Literacy and Developing Financial Culture Until 2030, approved by the Ministry of Finance in late 2023, provides the following definitions:

Financial literacy is the basic knowledge, skills and abilities required to make financial decisions in order to achieve financial well-being and manage financial risks.

Similar definitions of financial literacy are presented in the OECD INFE:

‘Financial literacy is a combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing.’
<https://www.oecd.org/finance/financial-education/49319977.pdf>

and the European Commission: Financial literacy means the knowledge and skills needed to make important financial decisions. https://finance.ec.europa.eu/consumer-finance-and-payments/financial-literacy_en

Financial culture is the totality of individuals’ financial values, attitudes and behavioural practices determined by education, financial literacy, financial decision-making experience and the maturity of the financial market and public institutions.

² Financial literacy programmes are a type of intervention by which the regulator seeks to shift financial behaviour of individuals towards the direction desirable for individuals themselves and/or public interests. Whenever the issue of regulatory interference in certain areas of financial market operation arises, the answer usually depends on three factors. First, it is the ability of individual economic agents (on the supply or demand side) to make optimal decisions under given constraints. Second, we need to know whether the constraints are market-based or not. Third, we need to know if optimal decisions of economic agents under market constraints lead to externalities for other economic agents (perhaps even in other markets).

To address the problem of financial behaviour of an individual being far from optimal (in the broad sense), regulatory intervention may be needed. One way to address the problem is increasing financial literacy. For example, household inflation expectations that are systematically elevated and overreact to inflation shocks (unanchored) means that people regularly underestimate real interest rates in making their decisions. This may carry potentially negative implications for price stability in the economy and personal financial well-being. This raises the question of choosing an effective policy to anchor inflation expectations. Should it be a standard communication policy as part of monetary policy decision-making, or would it deliver if the basics of monetary policy are taught at school (although it would take a decade for the effect to make the difference)? Another example is the high level of debt burden, which is typical of many countries, especially among low-income households or those most vulnerable to income declines. What role should demand-side (borrower-side) policy play in limiting the non-responsible behaviour of this group of people?

personal finance management (on a daily basis) and investment in financial market instruments.

- Subjective aspects, which include rationality, naivety and the completeness of information used in decision-making.

Kaiser et al. (2022) confirm the statistical and economic significance of financial literacy for downstream financial behaviour.

A number of studies identify undesirable (or unexpected) effects of financial literacy. For example, a study based on a survey of Japanese households by Kawamura et al. (2020) finds that consumers with a higher level of financial literacy tend to take too many investment risks and are likely to overborrow, while their ideas about the operation of financial markets are naive.

Research also finds that a significant role in the variation of financial behaviour is played by factors other than financial literacy, such as level of education (as opposed to financial literacy), financial experience, personal preferences (risk tolerance, future discounting / planning horizon, overestimation of one's financial literacy, optimism).

Therefore, the impact of financial literacy on financial behaviour may come with undesirable effects and may not be its key determining factor.

Such results for other countries bring in focus the central question of this research: how financial literacy and other financial behaviour factors in Russia are correlated with financial culture, that is with normative or responsible behaviour.

Current research for Russia is either focused on the relationship between financial literacy and certain aspects of financial behaviour (e.g. only saving activity), or explores a set of aspects, including in crisis periods, without systematising and analysing them for alignment with responsible behaviour (financial culture). To the best of our knowledge, there are no publications focusing on the relationship between financial literacy and regulatory behaviour on the basis of Russian data. This research is intended to fill this gap.

The key tasks include measuring financial literacy and normative (responsible) behaviour. We aim to answer the following questions:

- How do we measure financial literacy?
- How is responsible financial behaviour defined?
- What are the characteristics of responsible behaviour of an individual?

In identifying responsible financial behaviour, we rely on theoretical findings in macroeconomics. Of them, central to the consumer choice problem is the so-called Euler equation (Hall (1978), Tintner (1937), and Ramsey (1928)).

This equation defines the optimal behaviour dubbed 'consumption smoothing' – a strategy in response to temporary changes in income. Smoothing is realised through savings or lending. Thus, in its most general form, responsible behaviour should include saving or demand for loans.

Under the life cycle hypothesis of consumption, savings need to be accumulated for old age, see Modigliani and Brumberg (1954, 1980). Therefore, retirement planning well ahead of time is part of responsible financial behaviour.

As regards savings, the optimality principle requires excluding unsystematic risk from the savings portfolio. From this it follows that a diversified portfolio is another attribute of responsible financial behaviour.

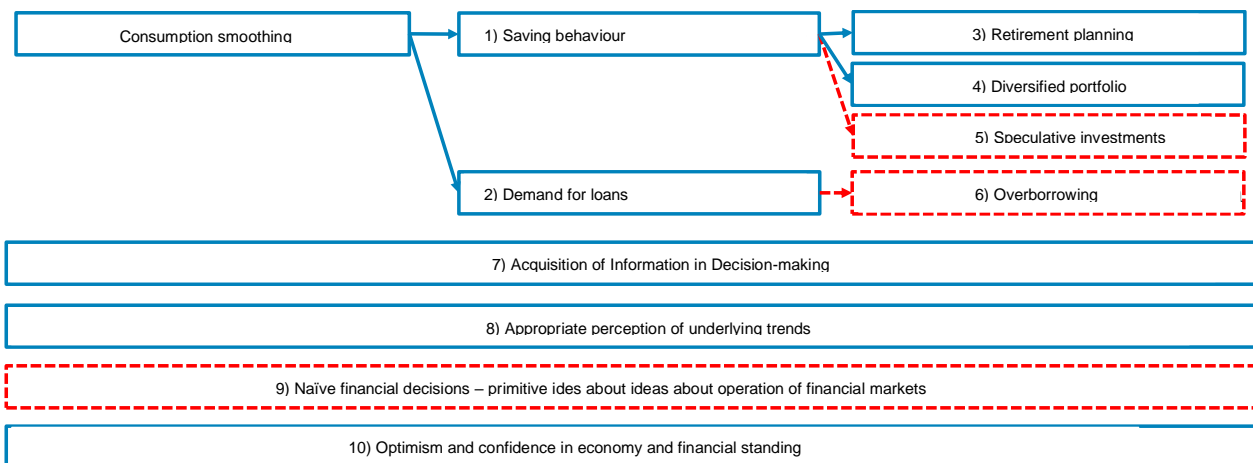
The regulator believes that use of credit as a smoothing consumption tool may cause excessive debt burdens. Saving consumers may invest in high-risk instruments (deliberate investment in pyramid schemes or leveraged cryptocurrency investments). Regulators including the Bank of Russia consider this behaviour undesirable and develop adjustment tools such as macroprudential policy and measures to limit high-risk investments of individual investors (e.g. introducing qualification-based investor types in the financial market). Therefore, responsible behaviour implies the absence of investment in high-risk instruments and of high debt burdens.

Finally, according to the literature, we view the following subjective aspects of financial behaviour as responsible:

- the acquisition of information in decision-making and making calculated decisions
- the appropriate perception of underlying trends in certain macroeconomic variables (prices, exchange and interest rates). Accurate (error-free) estimates of past or future economic trends (expectation errors as of the 2022 survey)
- non-naive financial decisions: individuals opting out of decisions that run counter to the basic principles of the financial market (for example, the no-arbitrage principle, which implies no free lunch)
- optimism about the short- and long-term economic outlook and confidence in one's financial standing. Our choice of this characteristic of a preferred financial behaviour is explained by the fact that optimism and confidence in financial standing, given the strong negative shock of 2022, help sustain confidence in the financial market in challenging macroeconomic conditions – and can therefore be considered preferred characteristics. At a more quiet time, this characteristic could be withdrawn from consideration. In the robustness check section, our analysis of the aggregate responsible financial behaviour index leaves out this characteristic – without any notable difference in the results.

Figure 1 schematically shows the components of responsible financial behaviour.³

³ Clearly, this set is not a result of thorough research and may need further improvement. In this paper, responsible financial behaviour is defined through the above ten components.

Figure 1. Components of responsible financial behaviour

Ultimately, we explore ten characteristics of financial behaviour: six actual (objective) (actual financial decisions) and four personal (subjective) characteristics.

We rely on data from the All-Russian Survey of Consumer Finances (Waves 2020 and 2022) to measure financial literacy and the above indicators⁴.

These ten indicators enable us to calculate the gauge we call *the responsible financial behaviour index*.⁵

The financial literacy index is calculated on the basis of eight questionnaire questions that have remained (almost) unchanged since the 2018 survey.⁶

We aim to empirically answer the following questions using data for Russia:

- How is the responsible financial behaviour index correlated with the indicators of financial literacy, general literacy, financial experience, personal preferences, controlling for other socio-demographic characteristics of respondents? Variation in what indicators contributes the most to variation in responsible behaviour?
- How are the personal and objective components of financial behaviour related to financial literacy indices and the other variables?
- How are certain aspects of financial behaviour – each of the ten indices – related to financial literacy indices?
- In particular, is it possible that higher financial literacy is correlated with undesirable aspects of financial behaviour (naive decisions, excessive debt burdens, speculative investment)? This correlation may be a ‘woe from wit’ effect: knowledge brings about confidence in decisions including risk awareness. There is empirical evidence of this correlation in the literature, e. g. Kawamura et al. (2020).
- Which aspects of financial behaviour are most closely related to the level of financial literacy, and which are more affected by the overall level of education, individual preferences or experience?

⁴ The algorithm for obtaining all dependent the variables from the initial data posted on the Bank of Russia website can be downloaded at: https://disk.yandex.ru/d/H7vVcgih_yBnUg

⁵ It could have been called *the financial culture index*, but with the term already reserved at the Bank of Russia, the index is assigned a different name to avoid confusion.

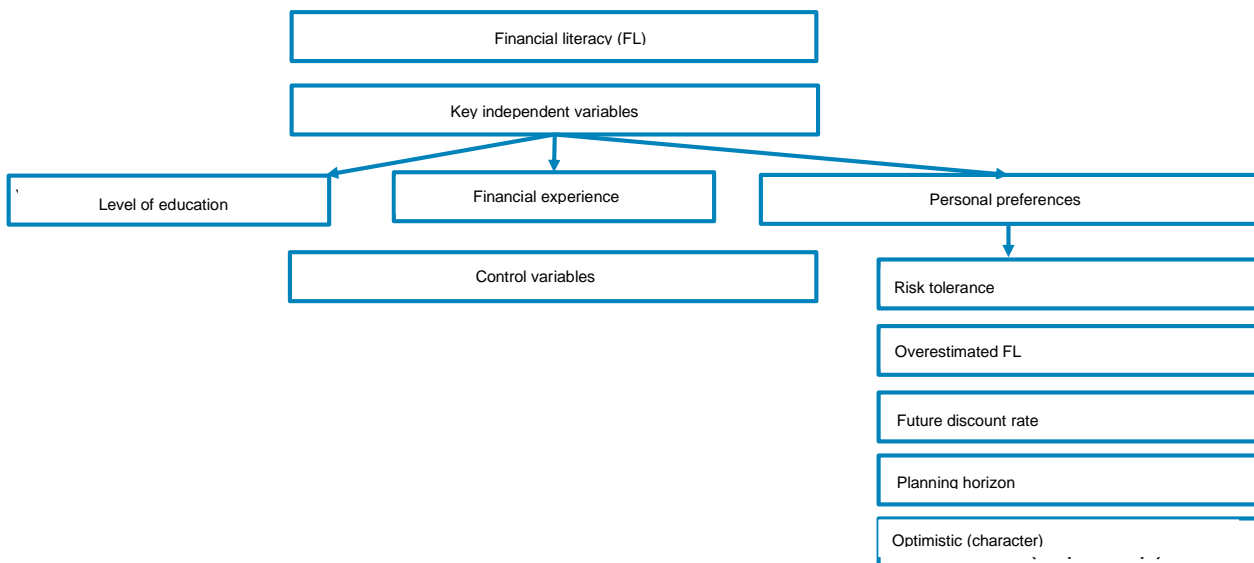
⁶ Our calculations use a balanced panel (as shown in the robustness check section); we repeat the calculations for an unbalanced panel taking into account the survival bias inherent in it.

A cause and effect analysis is outside the scope of this study considering that there is no exogenous variation in financial literacy.⁷ Endogeneity is the main obstacle to a causal analysis based on survey data. This problem is minimised through the use of the method of instrumental variables. Relying on a systematic description of possible instruments by Fernandes et al. (2014), we use three indicators as financial literacy instruments: the lagged value of financial literacy (from the 2020 survey), the average value of financial literacy of other adult household members relevant to the respondent, and the lagged average value of financial literacy in the respondent's region of residence.

As an instrument for financial literacy, we use average financial literacy of other adult household members with a lag (from the 2020 survey) for a given respondent, justifying the decision. To check robustness, we apply other instruments, which are systematically described by Fernandes et al. (2014).

In addition to financial literacy, following Kawamura et al. (2020), we take into account a wide range of control variables having a strong impact on individual financial behaviour – see Figure 2. This is another technique of isolating the exogenous variation in financial literacy. An important question is whether the financial literacy index, given these ‘competitors’, is able to explain the variation in financial behaviour.

Figure 2. Set of variables explaining financial behaviour



Key results:

- The calculated financial literacy index is statistically significantly and positively correlated with the responsible financial behaviour index. At the same time, the overall level of education is also significantly and positively correlated with responsible financial behaviour. In terms of numbers, a move from secondary to higher education comes with a smaller increase in responsible behaviour

⁷ In the data, a level of financial literacy is assigned to a person, and we cannot arbitrarily assign a different level of financial literacy to that person to analyse how their financial decisions are changing.

compared with a move from full financial illiteracy to full literacy. Essentially similar results are found by Kaiser et al. (2022):

- Of the ten components of responsible financial behaviour, financial literacy is expectedly positively correlated with saving activity and asset portfolio diversification, and negatively correlated with misperception of macroeconomic trends.
- Neither speculative investments nor excessive debt burdens are statistically significant for financial literacy. A positive correlation with financial literacy is found only for the financial naivety indicator, in which an important role is played by the preference for ruble liquidity and a large share of dollar cash (more than 50%) in total savings. This result may reflect the characteristics of the year 2022.⁸ Thus, Russian data only partially confirm the findings of Kawamura et al. (2020): literacy does not have a positive correlation with risky behaviour and high debt burdens; neither does it a notable negative correlation.

In addition to these results, risk tolerance is found to be positively correlated with irrational perception of reality and speculative investment. Notable is the positive correlation with retirement planning; this is probably a sign of retirement planning in Russia being a risky business.

Unlike Pikulina et al. (2017), the results do not reveal any significant role of overestimated financial literacy (self-confidence) in financial decision-making.

Our analysis of the components of the aggregate index shows that growing financial literacy can help – at the individual level – smooth out consumption (through diversification of savings) and – at the macrolevel – help in economic development and the development of financial market instruments. At the same time, financial literacy does not guarantee active pension planning and does not ensure a less risky investment profile or lower debt burdens.

The study is structured as follows. Section 2 presents a review of relevant literature and our contribution to this literature. Section 3 explains the method. Section 4 is focused on the description of the data. Section 5 presents the results of estimating the regressions with different specifications. Section 6 describes the robustness checks. The Conclusion summarises the results and presents findings.

⁸ The robustness check section presents the calculation of regressions with the financial naivety indicator. The calculation leaves out the components that may reflect economical rather than naive behaviour, explained by the nature of 2022. We note a high share of foreign cash in savings (more than 50%). In standard conditions, a high share of foreign cash is suboptimal due to lost interest income (purchasing power is lower due to external price inflation). However, given the high uncertainty that marked the peak of the 2022 crisis and the restrictions on operations involving deposits and transfers in foreign currency, this behaviour can hardly be considered naive. Nevertheless, we retain the indicators reflecting demand for foreign cash in our main results to ensure that the responsible financial behaviour index we build has more universal (long-term) properties. We interpret the rise in demand for foreign cash during the crisis of 2022 as a temporary deviation from the preferred long-term level (through the cycle). This approach saves us changing the concept of responsible financial behaviour depending on any short-term trends and, accordingly, the composition of the index. It also ensures that the results are comparable over time, which is important for future calculations based on subsequent surveys.

2. Literature review

The relationship between financial literacy and financial behaviour is explored in a large body of literature. This literature may be conventionally divided into two parts:

– one – based on survey data. The main findings are reported in Fernandes et al. (2014)

– two – based on experimental data. A review of main results is presented in Kaiser et al. (2022).

Fernandes et al. (2014) conducted a meta-analysis of 168 studies published between 1969 and 2013. Their conclusions did not speak in favour of financial literacy programmes. Kaiser et al. (2022) conducted a meta-analysis of the results of 76 randomised experiments and concluded that financial literacy has a positive effect on financial behaviour. This effect is even greater than that of general education.

We contribute to the survey data part of this literature.

Our study closely follows that of Kawamura et al. (2020), which is based on data from a survey of Japanese households.

In comparison with Kawamura et al. (2020), our paper:

- introduces and calculates the aggregate responsible financial behaviour index and analyses how this gauge correlates with financial literacy, level of education, financial experience and personal preference variables (risk tolerance, future discounting, financial planning horizon, overestimation of financial literacy, optimism)
- explores more groups of dependent variables, namely, in addition to the groups in the original work (Speculative Investments, Overborrowing, Financial Naivety, Retirement Planning), we explore another six groups: Optimism and confidence, Acquisition of Information, Irrational Assessment, Consumption Smoothing, Diversified Portfolio and Credit Demand
- considers more control variables, thanks to the availability of data on households' assets and liabilities
- uses the data of two survey waves rather than one. In particular, this makes it possible to use lagged values of financial literacy to minimise the endogeneity problem.

Our results confirm Kawamura et al. (2020) only partially. We do not find a significant positive correlation between speculative investments or excessive debt accumulation and financial literacy. In our case, this is explained by a small number of observations. Neither a significant negative relationship is found – a decrease in the manifestation of these aspects of behaviour as financial literacy improves.

Research on the basis of Russian data can be divided into two groups:

– Research of individual aspects of financial behaviour and their relationships with financial literacy. For example, Gilenko and Chernova (2021) find a positive correlation between financial literacy and saving behaviour of Russian students. Smirnov (2020) analyses the financial behaviour of customers of a Russian bank.

– Studies focused on several aspects of financial behaviour. Klapper et al. (2013) look into the relationship between financial literacy and the financial behaviour of Russians during the 2008 crisis. To this end, the authors draw on data from the All-Russian panel survey of 1,000 individuals in 2008 and 2009. The following aspects of financial behaviour are under study: keeping a bank account, taking out loans (including non-formalised loans), the propensity to spend, and unspent income (savings). The authors conclude that financial literacy helps individuals better cope with the consequences of an unexpected income shock. This study operates more financial behaviour aspects and relies on the available data to study more control variables and analyse a larger sample of data.

Fedorova et al. (2015) use a sample of 1,006 respondents to study the relationship between financial literacy and household behaviour in the financial market (overdue loans, retirement planning).

Kuzina and Moiseeva (2021) describe a methodology to study households' financial behaviour strategies and analyse whether households have a financial strategy based on the data of the Monitoring of Households' Financial Behaviour in 2009–2020.

This works expands and refines these studies; most important, our research is complemented with regulatory analysis.

3. Method

We follow the approach proposed by Kawamura et al. (2020). This approach is overall standard and grounded in linear econometric or (multi-dimensional) Probit models.

Below is the basic model specification for investigating the issues under study (in linear form):

$$Y_{i,t}^{k,j} = \alpha + \beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}^1 + \beta_5' X_{i,t-1}^2 + \varepsilon_{i,t}^{k,j} \quad (1),$$

where: $Y_{i,t}^k$ is the value of the k-th type of dependent variable j for i-th individual according to survey data as of t; $FL_{i,t}$ is the financial literacy index of the i-th individual according to survey data as of t; $Edu_{i,t}$ is the level of education; $FE_{i,t}$ are financial experience indicators; and $PerPref_{i,t}$ are individual (personal) preferences indicators. The indicators of this group include the following variables: risk tolerance, future discount rate, financial planning horizon, optimistic sentiment (proactive attitudes), financial self-confidence (over/underestimation of financial literacy, confidence gap), and other independent control variables $X_{i,t}^1$, $X_{i,t-1}^2$. This group includes standard control variables: socio-demographic characteristics, indicators of employment, income and wealth, indicators of their stability, place of residence (village/city), region and federal district code of residence), etc. Some control variables are taken with a lag to exclude the coincidence problem, i.e. their correlation with the regression error. Such indicators include employment, income and wealth.

For binary dependent variables j, a Probit model is estimated:

$$\Pr(Y_{i,t}^{k,j} = 1 | FL_{i,t}, Edu_{i,t}, FE_{i,t}, PerPref_{i,t}, X_{i,t}) = \Pr(\varepsilon_{i,t}^{k,j} > -(\alpha + \beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}) | FL_{i,t}, Edu_{i,t}, FE_{i,t}, PerPref_{i,t}, X_{i,t}) \quad (2),$$

where: $\Pr(X < x) = F(x)$ is the integral function of the normal distribution of random value X (its role is played by $\varepsilon_{i,t}^{k,j}$) with zero mathematical expectation and a certain variance.

For ordered discrete dependent variables, an ordered Probit model is estimated:⁹

$$Y_{i,t}^{k,j} = l_h$$

if

$$cut_{h-1} < \beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}^1 + \beta_5' X_{i,t-1}^2 + \varepsilon_{i,t}^{k,j} < cut_h,$$

where values l_h are ordered, that is, $l_h < l_m$ for $h < m$; $cut_0 = -\infty$, $cut_H = +\infty$; $\varepsilon_{i,t}^{k,j}$ has the standard normal distribution.

The logarithmic likelihood function takes on the following form:

$$\begin{aligned} \ln L = \sum_{i=1}^N \ln \left[I(Y_{i,t}^{k,j} = l_1) \Phi(-(\beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}^1 + \beta_5' X_{i,t-1}^2)) \right. \\ \left. + \sum_{h=2}^H I(Y_{i,t}^{k,j} = l_h) \{ \Phi(cut_h - (\beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}^1 + \beta_5' X_{i,t-1}^2)) \right. \\ \left. - \Phi(cut_{h-1} - (\beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}^1 + \beta_5' X_{i,t-1}^2)) \right] \\ \left. + I(Y_{i,t}^{k,j} = l_H) \Phi(\beta_1 FL_{i,t} + \beta_2 Edu_{i,t} + \beta_2' FE_{i,t} + \beta_3' PerPref_{i,t} + \beta_4' X_{i,t}^1 + \beta_5' X_{i,t-1}^2) \right] \quad (3), \end{aligned}$$

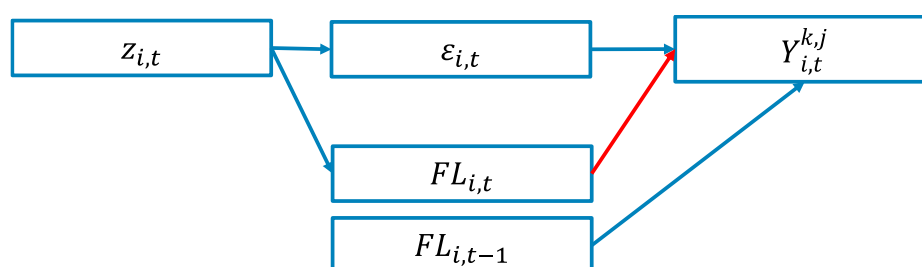
where $I(*)$ is the flag * indicator function, and $\Phi(x)$ is the integral function of the standard normal distribution.

Regressions allow us to calculate the conditional mathematical expectation of a dependent variable, given the values of other variables are fixed. In particular, for people of the same education level but different financial literacy, it is possible to identify the correlation between changes in financial literacy and the dependent variable.

It is important that estimates of equations (1)–(3) are adjusted for the potential endogeneity of financial literacy, which can be of two types.

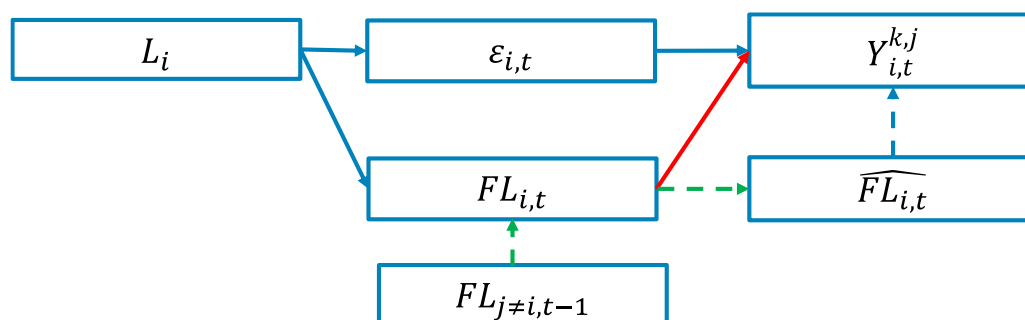
The first type is linked to the concurrent observation of financial literacy and financial behaviour. It is possible that both variables are influenced by a third variable at the time of the survey. The 2022 survey covered a period of a strong macroeconomic shock accompanied by a weakening of the ruble, rising inflation, and the introduction of foreign exchange controls. These events likely affected both financial literacy (the desire to study something to ensure the safety of savings in such turbulent times) and financial behaviour (the decision to change something) – see Figure 3.

⁹ The source of the description is Stata package documents.

Figure 3. Endogeneity of financial literacy driven by ‘simultaneity’

To eliminate the simultaneity problem, the work relies on financial literacy lags for 2020 survey respondents as an instrument for the current level of financial literacy, i.e. the 2022 survey. We believe that the *other control variables* ($X_{i,t}$) group includes multiple indicators that are affected by this problem: income indicators, assessments of financial standing, and employment. All such variables in the regressions are taken with a lag.

The second type of endogeneity is associated with unobserved individual characteristics of respondents – see Figure 4. In this paper, we control for a large number of important personal characteristics: risk attitude, future discount rate, planning horizon, optimism. However, some important characteristics may be unobserved, for example curiosity. Curiosity may propel respondents to change their financial behaviour and stimulate learning.

Figure 4. Endogeneity of financial literacy driven by incomplete observed characteristics of respondents

Fernandes et al. (2014) provides an overview of all the tools used for financial literacy to study the financial literacy and behaviour relationship, as of the time of publication of their paper (Tables A1 and A2 of the paper). As instruments, the authors use (in addition to financial literacy of other household members and financial literacy lags) the average level of financial literacy in the region (of the place of residence); the number of newspapers, universities and banks in the region; respondent's job in the relevant position or industry; costs of teaching financial literacy; respondent's performance in mathematics at school; financial education and demographic factors; fact of voting for a liberal party, and residing in a region with mandatory training in financial literacy. Some of these indicators are explicitly included in the regression as

control variables (including financial inclusion indicators); others are unavailable for measurement based on the data at our disposal.

To account for this type of endogeneity, the following two indicators are used as an instrumental variable for financial literacy:

One: the average financial literacy of adult household members (excluding a given respondent). To eliminate the simultaneity problem, this average rate is calculated based on the 2020 rather than 2022 survey. In Figure 4, this variable is designated as $FL_{j \neq i, t-1}$. For these purposes, Kawamura et al. (2020) use parental financial literacy (thus greatly narrowing the sample only to certain households with living parents).

Two: the average level of financial literacy at the respondent's region of residence (averaging based on this survey's data; 32 regions in total) according to the 2020 survey (that is, also with a lag). The choice of the average indicator for the region of residence as an instrument also makes it possible to account for the bias in sampling arising when the average value of financial literacy of other adult household members is used as a tool. In the latter case, single families (households of single member) exit consideration.¹⁰

We consider ten groups of dependent variables $Y_{i,t}^{k,j}$ (that is, $k = \{1, 2, \dots, 10\}$); their description is presented in Table 1. Each group reflects one of the aspects of financial behaviour and consists of several indicators (that is, $\text{sup}(j)$ is therefore different for different groups k).

Table 1. Groups of dependent variables

Group number	Dependent variable group name (group code)	Indicator
k=1	Optimism and Confidence (OC)	Inflation expectations, expectations of the economic situation or personal financial standing, and (for employees) confidence about finding a new job in the event of job loss.
k=2	Acquisition of Information (AI)	This group includes keeping records of income and expenses, using central bank information services, giving attention to financial information on the Internet, and avoiding impulse purchases.
k=3	Irrational Assessment (IRA)	These indicators point to a significant difference between respondents' estimates of key financial and macroeconomic indicators (ruble exchange rate, price movements over the year, deposit rates) and their actual values (dynamics).
k=4	Financial Naivety (FN)	Indicators in this group reflect naive (irrational) household decisions: keeping savings (including in foreign currency) for long-term purposes mainly in cash, a very low share of foreign currency in savings, experience of investing money at dubiously high

¹⁰ The properties of these tools are described in the Results section below.

		interest rates, experience of dealing with illegal lenders (resulting in money loss). ¹¹
k=5	Consumption Smoothing (CS)	Indicators in this group reflect respondents' propensity to smooth consumption both in the short run (accumulating a safety cushion out of precaution) and in the long term (saving for long-term purposes).
k=6	Diversified Portfolio (DP)	Holding financial market instruments: bank deposits in rubles and foreign currency, investments in shares, bonds and metals.
k=7	Speculative Investments (SI)	This group includes information on an active investing position, experience of investing in a well-known pyramid scheme, investments in cryptocurrency and leveraged investments in cryptocurrency.
k=8	Retirement Planning (RP)	The indicators include responsible attitude to retirement planning and contributions to NPFs or other savings for old age.
k=9	Credit Demand (CD)	Positive attitude to loans, history of loan requests, holding a credit card or consumer loans, outstanding mortgage / construction loans.
k=10	Overborrowing (OB)	This group includes indicators that are signs of frequent borrowing; loan rejections by lenders; a high loan rate which is however acceptable; a large number of loans or credit cards, delayed credit card payments; microfinance loans; outstanding mortgages and consumer loans, high consumer loan and credit card debt.

For each group of dependent variables, we form an aggregate dependent variable as a simple average of the (normalised) indicators that make up the group. It is critically important to ensure that the averaged indicators carry the same sense: an indicator's growth should reflect a more pronounced value of the characteristic under study, not a less pronounced one. In this case, the aggregate indicator – as it changes from minimum to maximum values – reflects the increased intensity with which the financial behaviour characteristic in question manifests itself.

The aggregates for the individual groups are then summed up into the responsible financial behaviour index $Y_{i,t}^{0,0}$ with indices $k=0$ and $j=0$.

First, we estimate the regression for this competent financial behaviour indicator and its two components. Then, we calculate ten regressions for each of the aggregate dependent variables. Finally, we expand this analysis by estimating regressions for all dependent variables, i.e. for all components of the aggregate dependent variables. As a result, we obtain 53 regressions.¹²

¹¹ In the robustness check section, the index is unadjusted for the demand for foreign cash, explained by the nature of 2022.

¹² It was not possible to estimate all the regressions since there is an insufficient number of observations (both the total and small number of observations with values other than zero or one). Finally, we obtain estimates for 26 dependent variables.

Since we estimate Probit models in most cases, we can compare the marginal effects of financial literacy on the dependent variables in order to identify those dependent variables that are most strongly correlated with financial literacy.

4. Data

4.1 All-Russian Survey of Consumer Finances

The study is based on combined data obtained from Wave 4 and 5 of the All-Russian Survey of Consumer Finances, a project under way since 2013.¹³

By global standards, this survey is a conventional approach to obtaining data on household income, expenditures, financial and non-financial assets, and financial liabilities. The survey also includes detailed information on socio-demographic characteristics of households. Survey questionnaires are made up of a large number of subjective questions about household sentiment and expectations. Wave 5 covered 6,082 households including 12,162 respondents residing in 32 constituent entities of the Russian Federation. This longitudinal survey is run every two years.

The previous waves' data have been used in studies. These data and their key characteristics are described in Artemova, M. et al. (2018), Mamedli, M. and Sinyakov, A. (2018), Sinyakov, A. and Ushakova, Yu. (2018), Tishin, A. (2020), and Bessonova, E. and Tsvetkova, A. (2023b).

All the variables are marked with the year of the corresponding survey wave (20 or 22) to which the data belong.

The merger of data led to a decline in the number of observations from more than 12,000 to 9,296 people. The number of observations and the shares of respondents are shown in Figures 5–6.¹⁴

¹³ Data source: Bank of Russia website (2022). Details of the survey description, methodology and questionnaires (for individuals and households), along with the data we use are available on the survey webpage of the Bank of Russia website, as well as in the following work: Bessonova, E. V. and Tsvetkova, A. N. (presentation, 2023).

¹⁴ In the robustness check section, we present the results obtained from non-merged data, that is data only from the 2022 wave.

Figure 5. Number of observations in the sample for each year (composition of respondents' changes across waves)

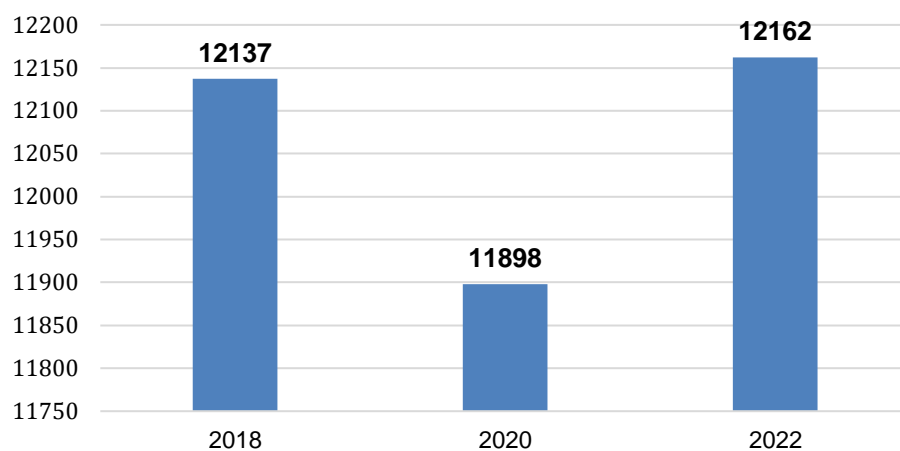
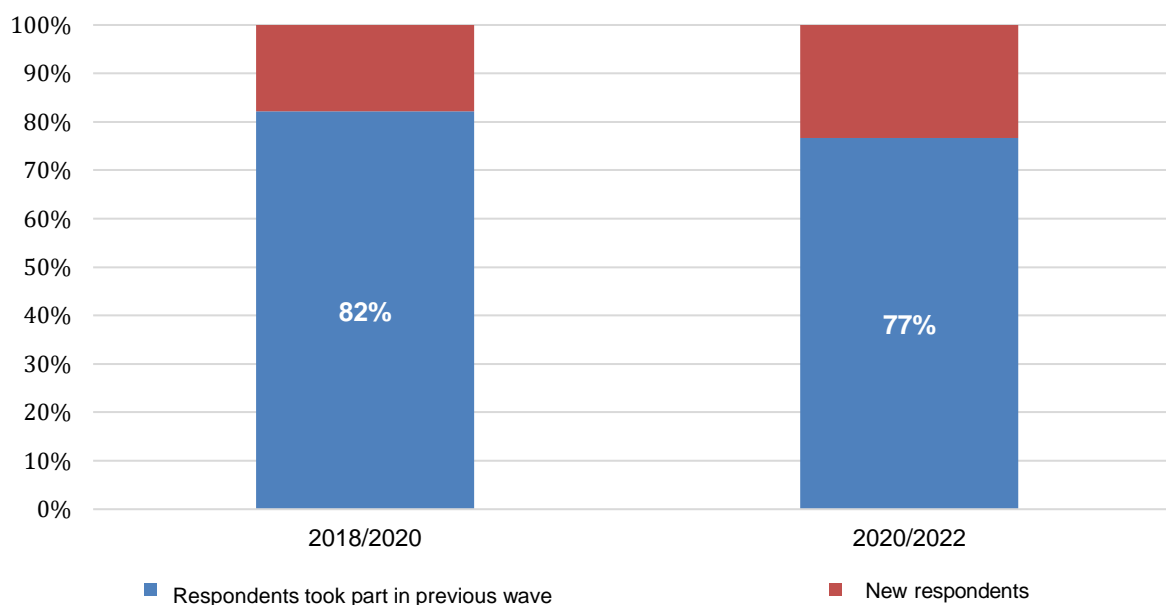


Figure 6. Share of respondents in previous waves of 2020 and 2022 surveys respectively



4.2 Dependent variables

4.2.1 Initial dependent variables

See Table 2 for the list of all dependent variables from the survey, including their brief description and code designation.

Table 2. List of key dependent variables used to calculate aggregate dependent variables and (responsible) financial behaviour index

No.	k	Group	j	Name
1	1	OC	1	Inflation expectations (IEs) for 12 months ahead < median
2	1	OC	2	Economic conditions in 2 years
3	1	OC	3	Economic conditions in 5 years
4	1	OC	4	Financial standing in 1 year
5	1	OC	5	Confidence about finding a new job in the event of job loss
6	2	AI	1	No impulse purchases
7	2	AI	2	Keeping records of incomes and expenses
8	2	AI	3	Using central bank information resources
9	2	AI	4	Attention to financial information in social media
10	2	AI	5	Attention to deposit rates
11	3	IRA	1	Mistaken estimate for ruble exchange rate for 2 years ahead
12	3	IRA	2	Mistaken estimate for price growth over past 12 months
13	3	IRA	3	Mistaken estimate for change in deposit rates over past 2 years
14	3	IRA	4	IEs for 1 year ahead above actual inflation in June 2022 (15,9% YoY)
15	4	FN	1	Cash holdings for <u>long-term</u> purposes (=0, deposit=1, securities =2)
16	4	FN	2	Share of ruble cash in all financial assets >25%
17	4	FN	3	Share of foreign exchange <u>cash</u> in savings >50%
18	4	FN	4	Share of foreign currencies in savings for <20%
19	4	FN	5	Experience of investing at dubiously high interest rates
20	4	FN	6	Experience of dealing with illegal lenders
21	4	FN	7	Experience of money loss because of illegal lenders
22	5	CS	1	Self-assessed propensity to save
23	5	CS	2	Savings being accumulated (individual questionnaire)
24	5	CS	3	Holding savings (household questionnaire)
25	5	CS	4	Savings being accumulated for long-term purposes
26	5	CS	5	Total savings to income of household above median
27	6	DP	1	Equity holding
28	6	DP	2	Bond holding
29	6	DP	3	Time deposit / savings bank account
30	6	DP	4	Of term deposits, at least one in foreign currency
31	6	DP	5	Investment in metal bank accounts
32	7	SI	1	Active investing position
33	7	SI	2	Experience of investing in an obvious pyramid scheme over 2 years
34	7	SI	3	Positive financial result from investing in a pyramid scheme
35	7	SI	4	Cryptocurrency holdings
36	7	SI	5	Leveraged investment in cryptocurrency
37	8	RP	1	Self-assessment of responsible retirement planning
38	8	RP	2	Payments to National Pension Fund
39	8	RP	3	Other savings for old age
40	8	RP	4	No savings because of young age
41	9	CD	1	Positive attitude to loans
42	9	CD	2	Loan requests over the past 2 years
43	9	CD	3	Holding a credit card
44	9	CD	4	Outstanding consumer loans (except card)

45	9	CD	5	Outstanding mortgage or construction loans
46	10	OB	1	History of loan requests over past 2 years above median (>0)
47	10	OB	2	History of loan rejections
48	10	OB	3	Acceptable loan rate > median
49	10	OB	4	More than 2 outstanding loans
50	10	OB	5	More than 3 credit cards
51	10	OB	6	Delayed (as of today or over three months) credit card payments
52	10	OB	7	Outstanding pawnshop or microfinance loans
53	10	OB	8	Debt burden >80% of personal income

The full list of dependent variables and questions to measure them is presented in Appendix 1. The values of dependent variables are shown in square brackets in Appendix 1. The 53 key dependent variables are then used for obtaining aggregate indicators and the responsible financial behaviour index (the authors believe this behaviour is competent – which may coincide with ‘responsible’ behaviour in the regulator’s view).

Appendix 2 presents a detailed algorithm for calculating dependent variables.

In Appendix 3, we provide descriptive statistics for all the dependent variables. The descriptive statistics for the 53 dependent variables show that they are discrete. In most cases, these are binary (or ordered discrete) variables. This representation simplifies the formation of aggregate qualitative indicators by simply adding/subtracting individual indicators. In this case, an increase in the indicator reflects growing intensity of the manifestation of a particular attribute.

The table of statistics shows that there are many gaps in the database for some indicators. Some questions received very few responses. For example, as regards experience of dealing with illegal creditors, only 827 people gave meaningful answers (other than *difficult to answer* or *refuse to answer*). Of them, only 11 gave meaningful answers to the question about the loss of money as a result of such dealings. The reason for this is that the question about losses is addressed only to those who had relevant experience (out of 827 people, exactly 11 pointed to such experience). Such gaps in the data are adjusted at the aggregation stage.¹⁵

4.2.2 Aggregate dependent variables

The dependent variables are aggregated into ten groups (see Table 2 above). This aggregation is meant to capture all the indicators of similar meaning into one aggregate indicator. The aggregate indicators for each of the groups are calculated as a regular

¹⁵ There are two ways to adjust for gaps in the calculation of the average index: calculating the average for each respondent only for indicators without gaps, or assuming, as in the example, that those who previously have not dealt with illegal creditors have never lost money (that is, fill in zeros for such individuals instead of the gap). This affects only the denominator of the average, and not the numerator, with the weight of the ‘root’ indicators artificially skewing upwards in this replacement. To check robustness, it is possible to make a calculation with this replacement.

average. All the indicators should reflect the rise in intensity of the aspect of financial behaviour being measured.¹⁶

In each case (k from 1 to 10) the calculation of the aggregate index $Y_{i,t}^{k,0}$ was carried out as follows (indicator codes are consistent with Appendix 1). The aggregate index k (where k ranges from 1 to 10) for respondent i in survey t:

$$Y_{i,t}^{k,0} = \frac{\sum_{j=1}^{J_i} Y_{i,t}^{k,j}}{J_i},$$

where j is the indicator index inside group k, $J_i = \sum I(Y_{i,t}^{k,j} \neq \emptyset)$, if $\exists j$, leading to $Y_{i,t}^{k,j} \neq \emptyset$

$$Y_{i,t}^{k,0} = \emptyset, \text{ if } \nexists j \text{ such that } Y_{i,t}^{1,j} \neq \emptyset,$$

where $I(*)$ is the flag * indicator function.

Descriptive statistics for the ten aggregate indices are shown in Table 3.

Table 3. Descriptive statistics for ten aggregate indices – components of aggregate financial behaviour index

k	Name	Code	n	mean	sd	min	max	median	Q25%	Q75%
1	Optimism and confidence	OC	9179	0.24	0.28	0.00	1.00	0.20	0.00	0.40
2	Acquisition of Information	AI	9296	0.20	0.17	0.00	1.00	0.20	0.00	0.25
3	Irrational Assessment	IRA	9196	0.38	0.31	0.00	1.00	0.33	0.00	0.50
4	Financial Naivety	FN	9246	0.09	0.17	0.00	1.00	0.00	0.00	0.00
5	Consumption Smoothing	CS	9295	0.41	0.34	0.00	1.00	0.33	0.08	0.75
6	Diversified Portfolio	DP	9295	0.03	0.09	0.00	0.80	0.00	0.00	0.00
7	Speculative Investments	SI	9277	0.00	0.03	0.00	0.75	0.00	0.00	0.00
8	Retirement Planning	RP	9291	0.08	0.16	0.00	1.00	0.00	0.00	0.25
9	Credit Demand	CD	9296	0.11	0.19	0.00	1.00	0.00	0.00	0.25
10	Overborrowing	OB	9291	0.05	0.12	0.00	1.00	0.00	0.00	0.00

¹⁶ All the individual dependent variables are binary in nature. At the same time, some indicator values for some respondents in the group may be missing. That is, there may be missing values for some indicators (this is solely due to refusals to answer or difficulties answering questions). This incompleteness of data may lead to the aggregate indicator as a sum of binary values causing a larger aggregate indicator simply due to fewer gaps for an individual. The average value of answers (the sum divided by the number of questions answered) helps avoid this. In other words, a comparable aggregate indicator can be calculated not only for the intersection of the sets of respondents answering individual indicators.

The first group of aggregate indicators is Optimism and Confidence (code OC). This group's Indicators are subjective characteristics of expectations and sentiment. The higher the indicator, the higher respondents' optimism and confidence.¹⁷

The second group of aggregate indicators also represents a subjective characteristic – Acquisition of Information (code AI). This indicator reflects respondents' attention to their own finances and to information on the Internet or in the financial market, which is relevant for financial decision-making. The greater the indicator, the more actively the respondent uses the information and the more closely the respondent monitors their finances.

Another subjective characteristic of behaviour is the accuracy of respondents' assessments of reality or future (code IRA). The following qualitative measures were used to calculate the level of accuracy: errors in expectations for the direction of ruble exchange rate movements (made as of the 2022 survey for two years ahead, i.e. through 2024 Q2); errors in the assessment of actual consumer price changes over the past year before the survey date and in the assessment of changes in bank deposit rates over the past two years; expectations for future price growth in excess of adaptive (naive) expectations – expectations for current annual price growth to persist, that is, for actual price changes as of the survey date to persist. The reasons for such errors may vary: inattention to information due to the absence of relevant activities (foreign currency investments or bank deposits) or low financial literacy and attention to web information shaping a distorted view of the economy. The choice of such sources may be explained by poor financial culture. The growth of this indicator reflects a rise in errors in assessments of reality and the future.

The final subjective characteristic of financial behaviour is the indicators in the Financial Naivety group (code FN). These obvious suboptimal (naive) decisions of respondents include:

- Holding cash savings largely in cash for long-term purposes (the variable is equal to zero). The alternative options include bank deposits (= 1) and securities (= 2).¹⁸ Positive inflation a priori makes this option suboptimal.
- Cash holdings in roubles account for >25% of total savings (financial assets). Cash may be needed for transactions. However, with cashless payments dominating in today's economy, cash is increasingly irrelevant in this role. Fears over impossible cash withdrawals through ATMs or banks' cash desks are no longer justified in today's monetary system, with the central bank targeting interest rates and providing as much liquidity as the money market needs. As the past four years (the lockdown and the shock in February 2022) show, the banking system can easily cope with peak demand for cash. Therefore, fears over banks running out of liquidity are naive.
- Foreign exchange cash accounts for >50% of all personal savings (financial assets).¹⁹ This threshold value of foreign currency holdings in households' financial assets is selected based on estimates for the shares of foreign currency holdings in emerging economies, adjusted for specific Russian conditions as of

¹⁷ In the robustness check section the responsible behavior index is calculated without Optimism and Confidence Group indicators.

¹⁸ For calculation purposes, this component rearranges to the following form: $(2 - \text{response})/2$.

¹⁹ In the robustness check section, the index is unadjusted for the behaviour driven by demand for foreign cash, explained by the nature of 2022.

the survey dates. The sanctions and restrictions on foreign withdrawals may have lifted demand for cash. Nevertheless, a very high amount of cash in a financial portfolio is suboptimal, with inflation (in foreign currency) eating up these savings. That is, it will probably be possible to maintain purchasing power in terms of rubles but not relative to tradable goods.

- Under certain conditions, it is rational to hold a share of savings in foreign currency. Therefore, a strategy of keeping less than 20% of holdings in foreign currency is considered far from optimal. The choice of this threshold level is based on equilibrium levels of dollarisation in the household sector (Krupkina, Ponomarenko (2015)).
- The experience (over the past two years) of investing at dubiously high interest is another characteristic of naivety, which may reflect respondents' failure to see the relationship between returns and the risk or inadequate risk assessment.
- The experience of dealing with illegal lenders and the resulting money loss are also classified as suboptimal decisions due to the potential underestimation of risks.

An increase in the financial naivety indicator implies an increase in naive financial decisions.

The remaining six aggregate indicators are objective; they measure respondents' actual decisions in the financial market.

Consumption smoothing is one of the key desirable characteristics of financial behaviour. Consumption smoothing is a sign of optimal consumption from the standpoint of modern macroeconomic theory (Hall (1978), Friedman (1956), Tintner (1937)). In practice, this manifests itself in either accumulating savings or requesting loans to smooth consumption over time (in the course of a lifetime). Saving or lending activity is therefore a prerequisite for optimal (responsible) behaviour.

To measure saving activity (code CS), five indicators are used to gauge the propensity to save and the stock and flow of savings. The other five indicators are used to measure credit activity (code CD). These reflect demand for loans and the presence of outstanding loans. Growth in one or the other indicator reflects a growing propensity to smooth consumption.

As regards saving activity, theory suggests that a diversified asset portfolio is optimal. Diversification of the portfolio of accumulated savings (financial assets) is measured by the aggregate Diversified Portfolio indicator (code DP). This shows that the respondent's portfolio includes a broad class of standard financial assets, i.e. shares, bonds, ruble and foreign currency deposits, and metal accounts. The higher DP is, the more assets there are in the respondent's portfolio.

The Speculative Investments indicator (code SI) measures respondents' acceptance of very high financial risks. Regulators often consider this behaviour as undesirable, especially when it comes to individuals (as a result of information asymmetry inherent in the sellers of such assets, as well as the inability of most individual investors to adequately assess risks, the lack of a regulatory framework to protect investors against loss, and potentially large externalities due to bubbles). Speculative investments take into account active portfolio management, prior experience of investing in a well-known financial

pyramid scheme and a positive financial result of such investments, cryptocurrency holdings and leveraged cryptocurrency investments. Growth in this indicator is a sign of growth in the speculative component of financial behaviour. This characteristic signals irresponsibly, reflecting a low level of financial culture.

In terms of activity in the lending market, non-responsible financial behaviour involves borrowers taking on excessive (high) debt burdens – overborrowing. The Overborrowing indicator (code OB) measures excessive activity in the lending market based on the available indicators. To this end, the regulator uses, beyond the estimated debt service ratio for unsecured consumer loans and credit cards as applied to the respondent's monthly income, such measures as the number of outstanding loans, the number of credit cards, and loan refusals over the past three months among others. Growth in the aggregate indicator is a sign of a greater propensity to overborrow.

The formation of pension savings is an important characteristic of consumption smoothing in the course of the life cycle. The Retirement Planning indicator (code RP) takes into account the formation of payments to NPFs and other forms of savings for old age. The indicator recognises that it is normal for respondents who have another 15 years before retirement (for reasons of simplicity, the same value for men and women is 65) to only *think about* accumulating savings. Growth in the aggregate indicator is evidence of more correct retirement planning.

The correlation matrix of aggregate indicators is presented in Table 4.

Table 4. Correlation matrix of aggregate indicators

	OC	AI	IRA	FN	CS	DP	SI	RP	CD	OB	
Optimism and Confidence	OC	1									
Acquisition of Information	AI	0,07	1								
Irrational Assessment	IRA	-0,04	-0,06	1							
Financial Naivety	FN	0,04	0,17	-0,05	1						
Saving behavior	CS	0,11	0,30	-0,04	0,64	1					
Diversified Portfolio	DP	0,04	0,26	-0,06	0,17	0,37	1				
Speculative Investments	SI	0,02	0,04	0,00	0,02	0,01	0,06	1			
Retirement Planning	RP	0,10	0,11	0,00	0,05	0,08	0,07	0,06	1		
Credit Demand	CD	0,08	0,03	-0,02	-0,09	-0,14	-0,05	0,04	0,11	1	
Overborrowing	OB	0,03	0,03	-0,05	0,02	-0,01	0,00	0,00	0,01	0,10	1

The strongest correlations can be seen for saving behaviour and financial naivety (0.64); that is, those who save are guided by primitive rules. A small correlation is also found between portfolio diversification and financial naivety (0.17). This means that some naive investment rules require the formation a diversified portfolio (rubles and foreign currency). Saving activity, asset portfolio diversification and acquisition of information are also positively correlated.

Expectedly, lending activity and saving behaviour are negatively correlated.

Figures 7–16 show distribution histograms of aggregate indicators.

Figure 7. Optimism and Confidence

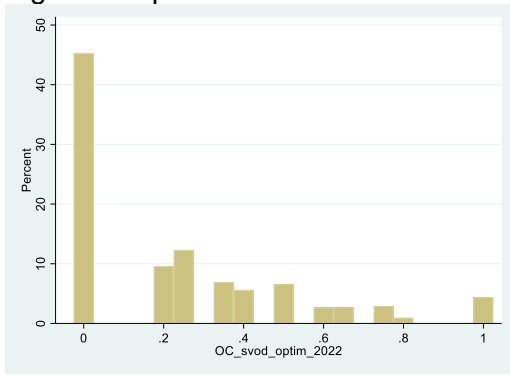


Figure 8. Acquisition of Information

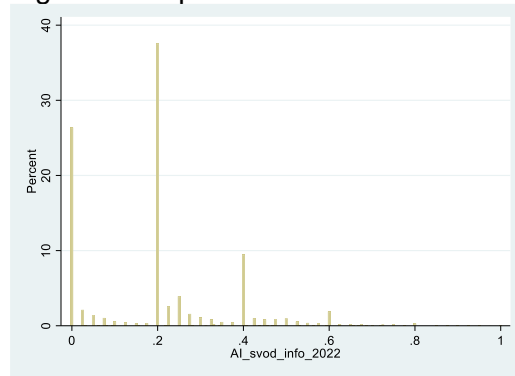


Figure 9. Irrational Assessment

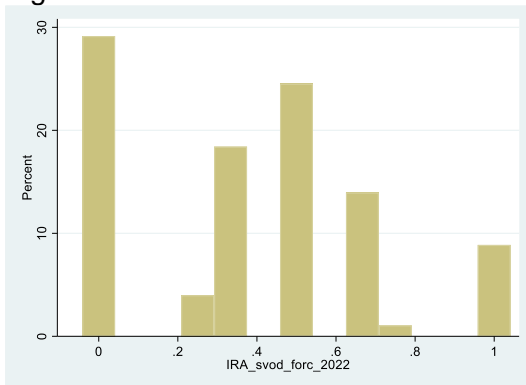


Figure 10. Financial Naivety

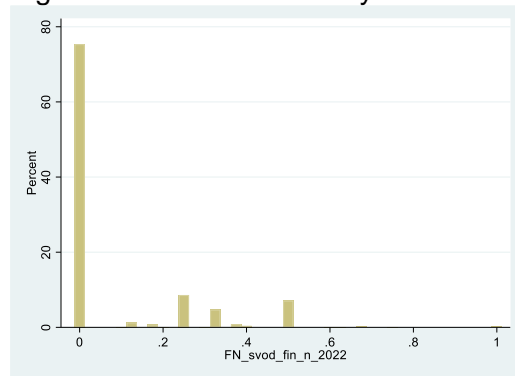


Figure 11. Consumption Smoothing

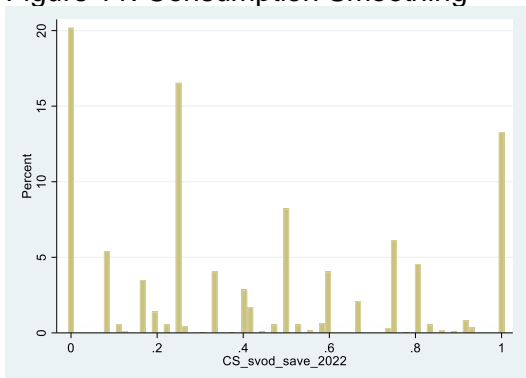


Figure 12. Diversified Portfolio

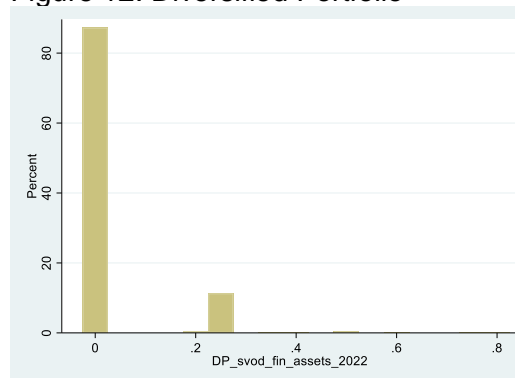


Figure 13. Speculative Investments

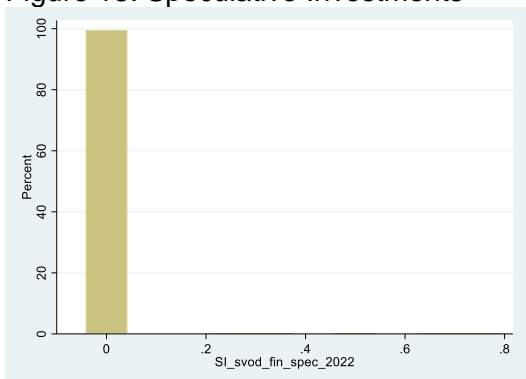


Figure 14. Retirement Planning

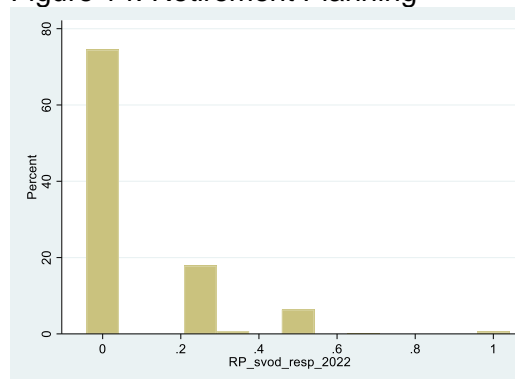


Figure 15. Credit Demand

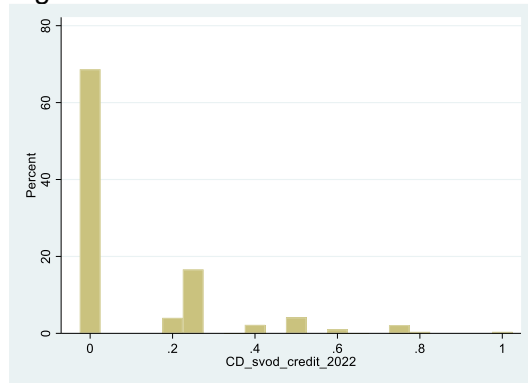
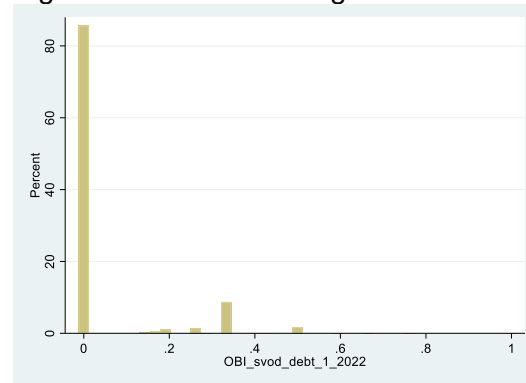


Figure 16. Overborrowing



The histogram analysis shows that the distribution of *Financial Naivety*, *Speculative Investments* and *Overborrowing* indicators is close to singular: there are very few non-zero values in the sample. This may well affect the quality of econometric estimates of individual models for such indicators.

4.2.3 Responsible financial behaviour index

The ten aggregates presented in the previous section are further clustered into two groups:

- personal (subjective) financial behaviour indicator – *PCFB* (*personal characteristics of financial behaviour*)
- actual financial decisions – *FD* (*financial decisions*).

The aggregate indicator of (responsible) financial behaviour is calculated as the sum of these two: $FinBeh = PCFB + FD$.

All the three indicators are calculated so that a higher value of one respondent relative to another reflects more competent, in the authors' view, financial behaviour of the respondent (which may generally coincide with regulator-preferred behaviour) or a higher level of their financial culture.

The indicator of subjective characteristics of financial behaviour is calculated from individual aggregate indicators (which are comparable to each other since each of the components is a binary value) as follows:^{20 21}

$$\begin{aligned}
 PCFB = & \\
 & + \text{Optimism and Confidence (OC)} \\
 & + \text{Competent decision-making: Acquisition of Information (AI)} \\
 & - \text{Irrational Assessment (IRA)} \\
 & - \text{Financial Naivety (FN)}
 \end{aligned}$$

²⁰ In these data, the values of the ten aggregate indicators (calculated according to the formula) are observed in almost all the individuals except 263. Thus, after losing 263 observations out of more than 6,000, we decide to simply sum up the values of the indicators rather than apply a denominator-adjusted procedure.

²¹ The Robustness Check section includes the calculation and analysis of the responsible financial behaviour index without the optimism and confidence indicator.

The first two are summed up, and the second two are subtracted. The growth of the latter two indicators is interpreted as a deterioration in financial behaviour – a digression from competent behaviour (according to the authors).

The actual financial decisions indicator is calculated in the same logic:

$$\begin{aligned}
 \text{FD} = & \\
 & + \text{Consumption Smoothing (CS)} \\
 & + \text{Decisions regarding asset structure and investment in financial instruments} \\
 & \text{(diversified portfolio, DP)} \\
 & - \text{Speculative (high-risk) investments (SI)} \\
 & + \text{Retirement planning (for non-pensioners, RP)} \\
 & + \text{Credit Demand (CD)} \\
 & - \text{Overborrowing (OB)}
 \end{aligned}$$

In this case, two aggregate characteristics of financial behaviour are undesirable (they reflect a low level of financial culture): Speculative Investments and Overborrowing.

Theoretically, the two FD components are negatively correlated: the indicators accounting for saving activity and those accounting for lending activity. Based on theoretical assumptions, a sign of responsible behaviour is either a respondent having diversified savings and taking no excessive risk as investors can do, or having loans but without an excessive debt burden. Summing up these indicators is analogous to using the logical OR operator, which fully aligns with theoretical assumptions. In terms of the FD indicator, undesirable behaviour is the absence either saving or borrowing activity.

The theoretical upper bound of the aggregate responsible financial behaviour indicator is +6. The theoretical lower bound is -4.

Descriptive statistics of these three indicators are presented in Table 5.

Table 5. Descriptive statistics of responsible financial behaviour index and its two components

		count	mean	sd	min	max	median	25%quantile	75%quantile
Subjective financial behaviour indicator									
Financial decisions	PCFB	9044	-0,04	0,48	-1,67	2,00	-0,05	-0,33	0,25
Resulting responsible financial behaviour index	FD	9265	0,60	0,47	-1,00	2,85	0,50	0,25	0,98
	FinBeh	9033	0,57	0,69	-1,75	3,70	0,50	0,08	1,00

Figures 17–18 show distribution histograms of the aggregate (desirable) financial behaviour indicator and its two components.

Figure 17. Distribution histograms of PCFB indicator

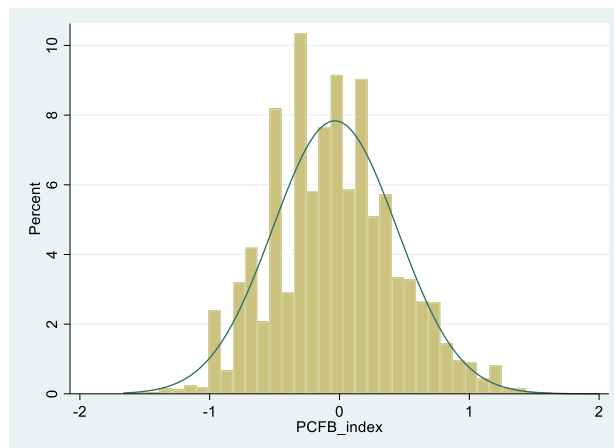
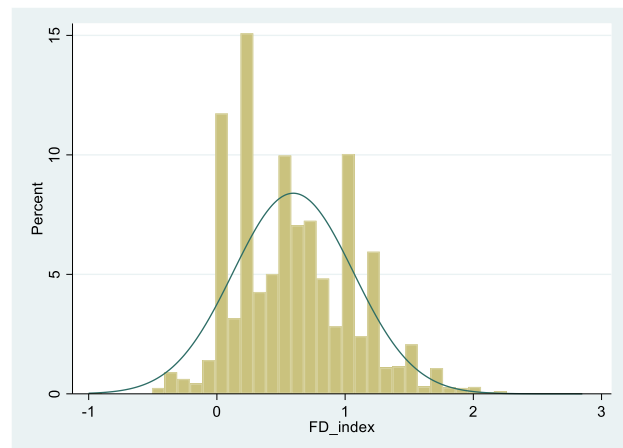


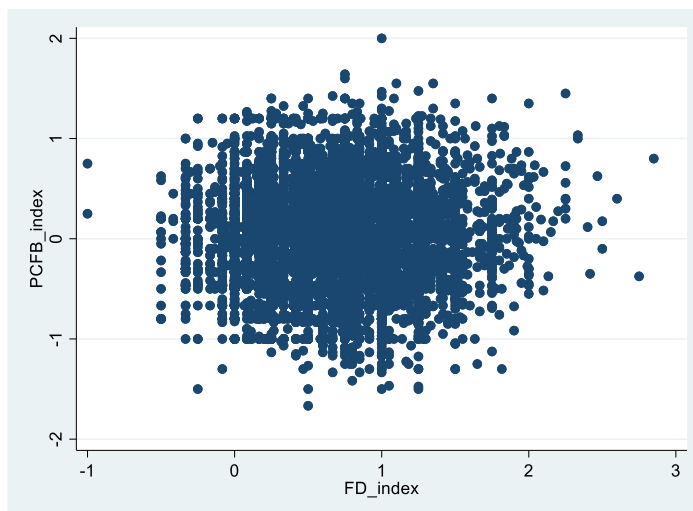
Figure 18. Distribution histograms of FD indicator



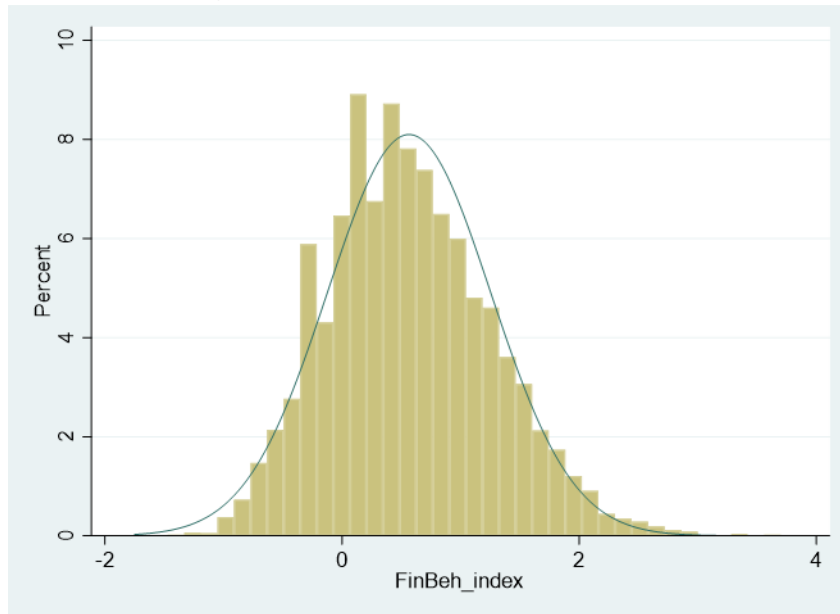
It can be seen that the distribution of both subindices is already approaching the normal distribution (especially for the financial behaviour index). Therefore, to estimate econometric model 1 (for PCFB $k=11$, for FD $k=12$) for these indicators, we use a linear model as well as a model for a discretised ordered dependent variable (PCFB and FD breakdown into quartiles).

The scatter plot in Figure 19 shows that the two subindices are not correlated with each other.

Figure 19. Scatter plot of subjective (PCFB) and objective (FD) financial behaviour components



The distribution diagram of the aggregate responsible financial behaviour index is shown in Figure 20. The indicator does not reach its theoretical bounds $[-4, +6]$.

Figure 20. Distribution diagram of responsible financial behaviour index

We can see that the distribution of the indicator (as a sum of a large number of binary random variables) is close to continuous.²² For this reason, a linear regression model is used for this indicator.

The responsible financial behaviour index is skewed to the right, but its significant amount is concentrated below zero – when the undesirable characteristics (which are a minority) prevail over the responsible characteristics.

Therefore, in terms of aggregate behaviour, the data contain sufficient variation to identify statistical relationships with financial literacy, education, experience, preferences, and other control variables.

4.3 Independent variables: Financial literacy index

The analysis involves an estimated financial literacy index based on consumer finance survey data (see Appendix 4). The indicator is based on eight questions describing economic and mathematical aspects of financial literacy. First, the choice of questions takes into account the number of individuals answering these questions (respondents could refuse or find it difficult to answer) to make a quite large sample size of those whose financial literacy is measured. Second, we select the questions that have been included in the surveys since 2018 (with a minor modification in one case).²³

²² The formal normality tests do not confirm the normality of distribution of these sample data. Thus, the skewness and kurtosis test in the Stata package, as a chi-square with two degrees of freedom, took the value 177.98, which is implausibly large for a chi-square statistic. The test failed to meet the distribution skewness parameter. The Shapiro–Francia test also had zero p-value, thereby rejecting, at the 5% significance level, the hypothesis about the normal distribution of the responsible financial behaviour index.

²³ The correlation between the index for only 13 questions in 2022 and the 2022 index consisting of 8 questions was 0.89.

Three financial literacy indices were calculated. The first is the main one, and the other two are used for a robustness check. The main variable is *fin_litr_idx_2022*. All the indicators are obtained by averaging individual components.²⁴ The descriptive statistics are shown in Table 6.

Table 6. Descriptive statistics of three financial literacy indices

vars	n	mean	sd	median	min	max	Q0.25	Q0.75
<i>fin_litr_idx_2022</i>	9296	0.622	0.259	0.625	0	1	0.5	0.875
<i>fin_litr_idx_2_2022</i>	4145	0.798	0.160	0.875	0.125	1	0.75	0.875
<i>fin_litr_idx_3_2022</i>	9211	0.720	0.231	0.75	0	1	0.6	0.875

The distribution of financial literacy index for the 2020 and 2022 surveys in full and pooled samples is shown in Figures 21–24.

Figure 21. Distribution of financial literacy index in full sample, 2020 survey

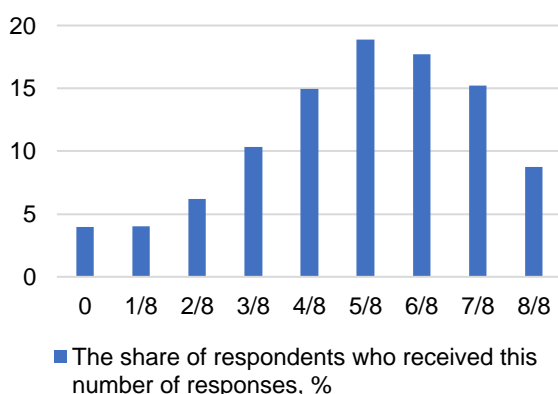


Figure 22. Distribution of financial literacy index in full sample, 2022 survey

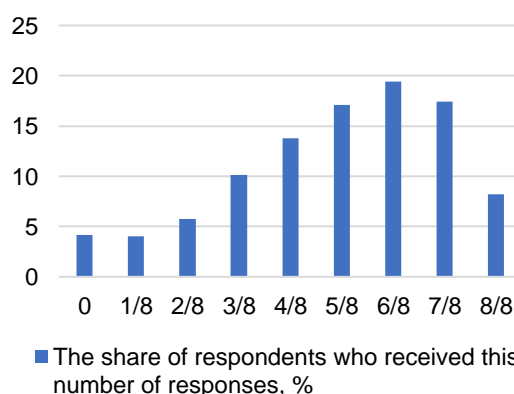


Figure 23. Distribution of financial literacy index in pooled sample, 2020 survey

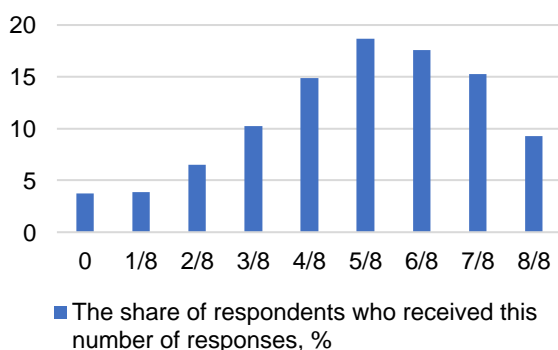
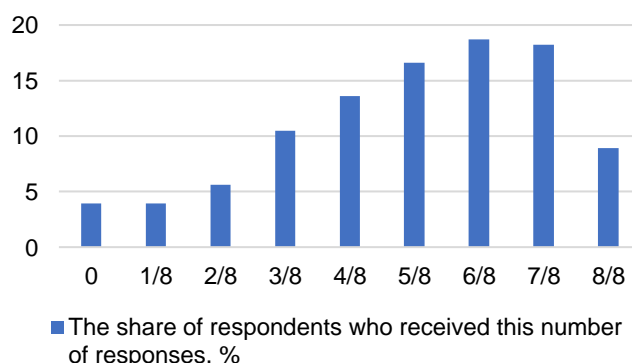


Figure 24. Distribution of financial literacy index in pooled sample, 2022 survey

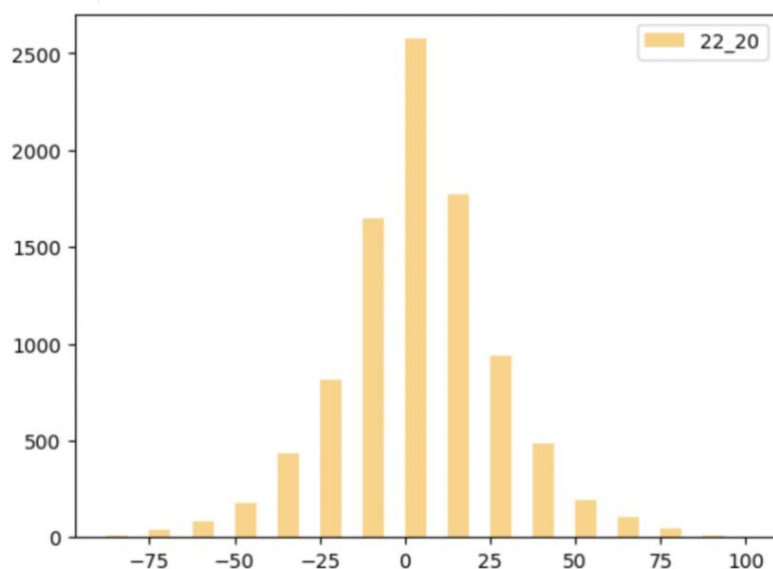


We can see that the distributions have a ‘thick’ left tail, that is, households with lower levels prevail. We can see a slight right shift in the distribution over time.

Figure 25 shows that the distribution of financial literacy increments between the two surveys *among the same people who answered the same questions*.

²⁴ The problem of choosing weights for the financial literacy index (searching for a benchmark) is beyond the scope of the objectives of this work. One approach may be weighing individual eight financial literacy indicators so that the aggregate index best correlates with responsible financial behaviour. This analysis will help understand which literacy parameters are most important for responsible behaviour.

Figure 25. Distribution of financial literacy between two surveys among same people who answered same questions, number of respondents



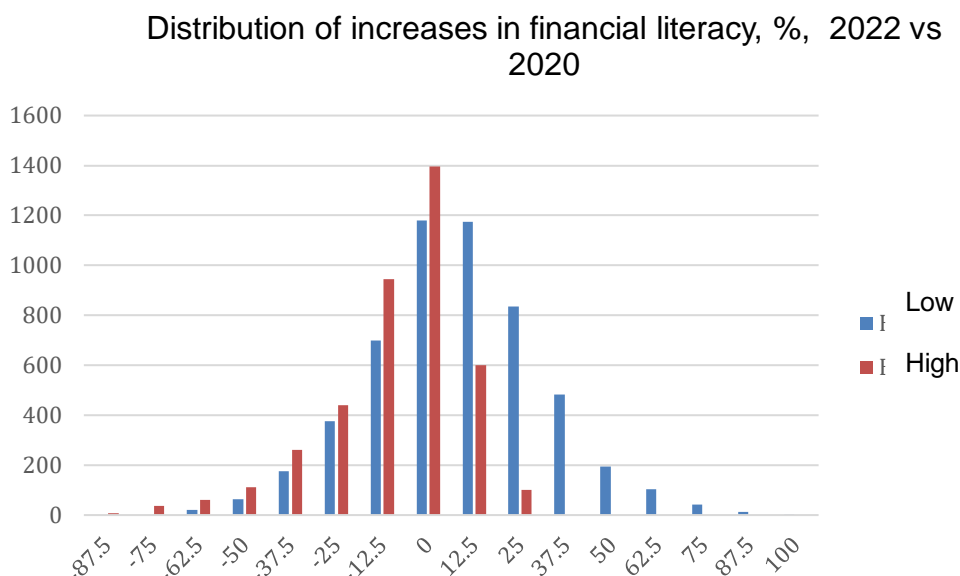
The prevalence of positive increments is evident. However, in general, the distribution of increments is close to being symmetrical around zero, with about three thousand people showing a decline in financial literacy between waves (given responses to the same questions from year to year). There can be several explanations for the deterioration: as a result of fatigue when completing questionnaires (or questionnaire completion with poor quality) to inattention of respondents in completing questionnaires, the irrelevance of questions to their daily life, and that they do not keep the right answers in mind.

The main conclusion is that people who correctly answer the same questions of financial literacy cannot be expected to continue to do so over time. Financial literacy may also decline at the individual level. At the level of a particular population, however, it improves a little over time on average, that is, there are more of those who show an improvement than those showing a deterioration.

Figure 26 shows the distribution of financial literacy increments between the two surveys depending on the literacy level in 2020.²⁵

²⁵ The level of financial literacy is low if the indicator for an individual obtained from 2020 survey data is below 62.5 (its median in 2020). The level of financial literacy is high if the indicator for an individual obtained from 2020 survey data is higher than 62.5.

Figure 26. Distribution of increases in financial literacy, %. The X-axis shows percentage points (of an increase in correct responses). The Y-axis shows the number of respondents with a specified literacy level of the total number



Note: Low financial literacy (FL), if FL in the previous survey is < median. X axis – percentage points (increase in the percentage of correct answers), Y axis – the number of respondents with a given level of literacy from their total number

Sources: All-Russian Survey of Consumer Finances 2022, authors' calculations.

Low-literate people show a marked improvement, but many respondents who had high levels of financial literacy in 2020 did not show near-zero change but worsened their responses. It is them who migrate to the low-literacy group, accounting for its stability. That is, literacy proves unstable. Although some low-literacy people also remain in the same group, most of them show an increase in level.

The result is confirmed by breaking down the results of the 2018 wave responses and analysing how the levels of the same people change according to the 2020 survey results.

Incorrectly answered questions (although previously correctly answered) are mostly questions about general economic patterns, rather than mathematics. The most frequent case of regress is the relationship between returns and the risk of different instruments, the relationship between nominal income growth and price growth (changes in real income), and the relationship between nominal rates and inflation rates (implications for real interest rates). These are marked by most changeovers from right to wrong. There are also many changeovers for the question about what the insurance system insures.

It is clear that respondents have no clear risk ranking of financial instruments, and they lack basic economic knowledge. Nevertheless, they are relatively better with financial mathematics. This is confirmed by the analysis of the two financial literacy indicators made out of the questions for the initial indicator. The first is based on economic questions, the second on counting (financial mathematics).²⁶ The correlation of the indicators is 0.42.

²⁶ There are four economic questions, they are given in Appendix 4. When calculating, it was assumed that refusal to answer and difficulty in answering are zeros, not missing values. Therefore, the denominators of the indicators are equal to 4.

Figures 27–28 show the distribution of increases of the corresponding type of financial literacy between the 2020 and 2022 waves among the same respondents.

Figure 27. Distribution of increases in economic literacy indicator, share of all respondents

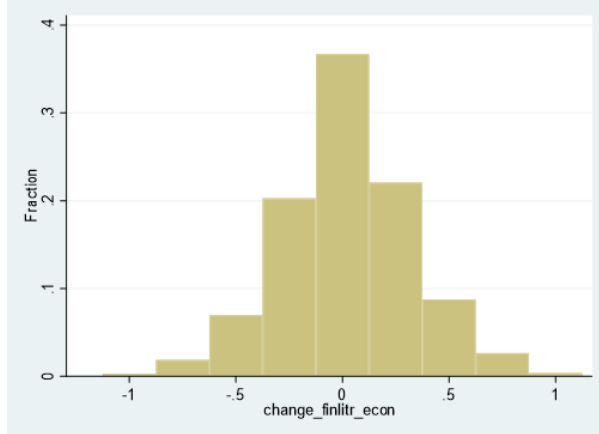


Figure 28. Distribution of increases in mathematical literacy indicator, share of all respondents

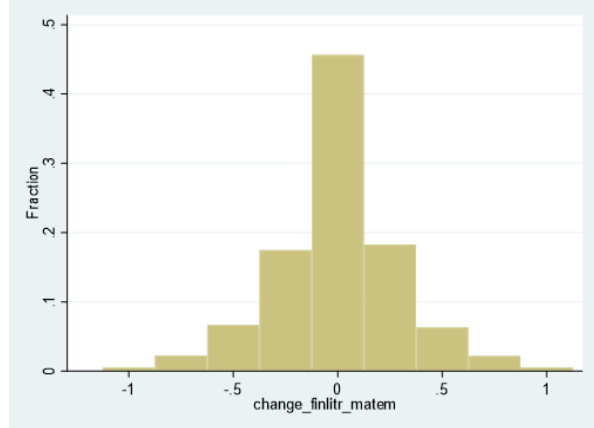
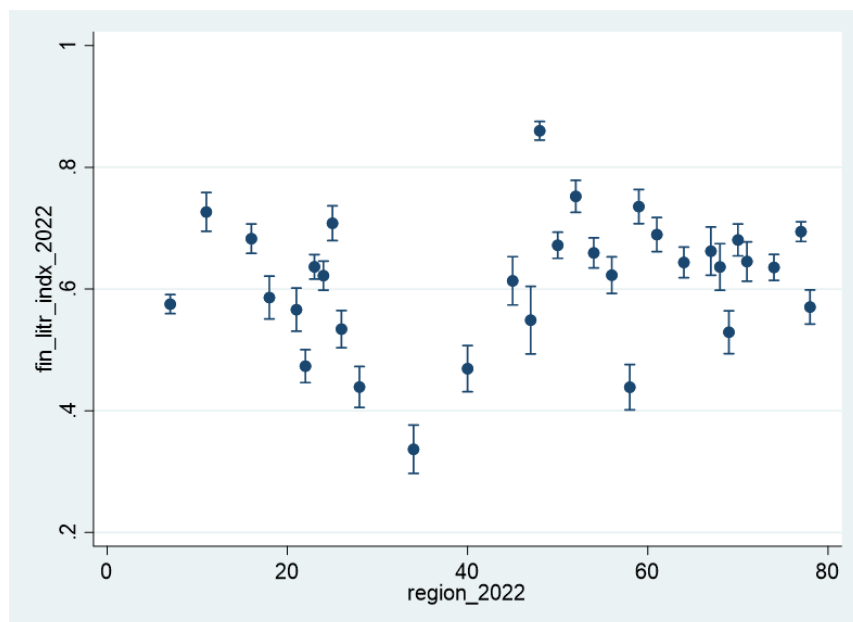


Figure 28 shows that in terms of mathematical literacy the distribution mode (at zero) is higher and the share of respondents with worse responses is lower.

Figure 29 shows the distribution of the financial literacy index by surveyed region (32 in total). It can be seen that the regions in the sample differ in literacy (the lowest average level is in the Volgograd Region, and the highest in the Lipetsk Region). We intend to use this heterogeneity at a later stage when average financial literacy in a respondent's region of residence is used as an instrument for their financial literacy.

Figure 29. Average values of financial literacy indicator by region



Note: Confidence intervals for the mean were calculated based on the binsreg command in the Stata package. X-axis shows region codes; Y-axis represents the average financial literacy index in a region in 2022. There are 32 regions in total.

4.4 Other key independent variables

Other key independent variables are shown in Table 7; the survey questions used to measure them are also shown. Appendix 5 presents a full description of the methodology to calculate these indicators.

Table 7. Other key independent variables

Variable group name	Indicator code	Indicator code in database Question text from questionnaire (The values of dependent variables are shown in square brackets)
Education	Edu	Edu. Which is your highest level of education confirmed by a certificate or diploma? [university, postgraduate course, advanced degree = 1]
Financial experience	FE1	FinEdu1. Let us discuss your day job. If you have several jobs, please focus on your primary employment. Please describe your current position and occupation. [Related to finance and economics = 1] FinEdu2. Which sector does this job belong to? [FINANCES AND INSURANCE, REAL ESTATE = 1]
	FE2	FC. Please look at the card and say which of the listed events has affected your financial standing the most. [One of the crises affected financial standing = 1]
	FE3	Enterpr. Have you ever attempted to start your own business? [(I have, and have succeeded = 2)/2 = 1]
	FE4	
Personal preferences	Risk attitude	risk-aver. Which of the statements best describes you personally? [Willing to take on significant or rather significant risks = 1]
	Overconfidence	bias_up_finlit1 and bias_up_finlit2. Do you consider yourself financially literate? [Mismatch between self-assessment and financial literacy index - upward bias (calculated in two ways) = 1]
	Discount_rate1	high_discount_rate. If you had money to spare, which is the minimal interest rate at which you would agree to deposit it with a bank for one year? [If 'I would not deposit no matter which interest rate' or 'at more than 20% p.a., then = 1] discount_rate. Suppose your household have a certain amount put aside for a big-ticket purchase. What annual deposit rate would make your household postpone this planned purchase and deposit the money with a bank? [number in reply]
	Discount_rate2	plan_horizon1. What time span do usually take into account when you (or your family) plan how much money to save and how much to spend? [answer more than one year = 1] plan_horizon2. I read out several statements now for you to say whether or not you agree with each. There are no right or wrong answers to such questions. We are interested in what you think of yourself. ['Do you only think about the near future or do you live for the day

	plan_horizon1 Optimism1	rather than think about the future?' = 0]. Optimism. I read out several statements now for you to say whether or not you agree with each. There are no right or wrong answers to such questions. We are interested in what you think of yourself. ['You are always looking for opportunities to improve your financial standing', 'You have many wishes and aspirations', 'You always work hard to be one of the best at what you do' = 1].
	Optimism2	econ_or_work. People's response to price changes is varied. Some think about ways to save in the first place. Others think about additional earnings. Do you rather belong to the former or the latter? [To the latter = 1]

The descriptive statistics of these explanatory variables are shown in Table 8.

Table 8. Descriptive statistics of key independent variables

Name	Indicator code	n	mean	sd	median	min	max	Q25%	Q75%
Education									
Education level	Edu	9282	0.28	0.45	0.00	0.00	1.00	0.00	1.00
Financial experience									
Relevant position	FE1	5032	0.05	0.22	0.00	0.00	1.00	0.00	0.00
Relevant industry	FE2	5057	0.02	0.15	0.00	0.00	1.00	0.00	0.00
Loss in financial crises	FE3	9245	0.98	0.12	1.00	0.00	1.00	1.00	1.00
Entrepreneur's experience	FE4	4821	0.08	0.33	0.00	0.00	2.00	0.00	0.00
Personal preferences									
Risk attitude	Risk_attitude	9130	0.08	0.27	0.00	0.00	1.00	0.00	0.00
Overconfidence_1	Overconfidence	9059	0.01	0.12	0.00	0.00	1.00	0.00	0.00
Overconfidence_2	Overconfidence	9054	0.06	0.25	0.00	0.00	1.00	0.00	0.00
High future discount rate	Discount_rate1	9296	0.82	0.39	1.00	0.00	1.00	1.00	1.00
Future discount rate	Discount_rate2	5454	21.84	10.91	20.00	0.00	250.00	15.00	25.00
Planning horizon_1	Plan_horizon1	9023	0.03	0.17	0.00	0.00	1.00	0.00	0.00
Planning horizon_2	Plan_horizon2	9179	0.33	0.47	0.00	0.00	1.00	0.00	1.00
Optimism	Optimism1	9296	0.75	0.34	1.00	0.00	1.00	0.67	1.00
Proactive attitudes	Optimism2	8804	0.29	0.45	0.00	0.00	1.00	0.00	1.00

The correlation matrix of these independent variables (including the financial literacy index) is shown in Table 9.

Table 9. Correlation matrix of key independent variables (including financial literacy indices)

	Уровни	Релевант	Релевант	Опыт п	Опыт п	Склонн	Переоц	Переоц	Высока	Ставка	Длина г	Длина г	Оптимиз	Проактив	fin_litr	ifin_litr	ifin_litr	ifin_litr
Education level	1,0																	
Relevant job	0,1	1,0																
Relevant industry	0,1	0,0	1,0															
Financial crises	0,0	0,0	0,0	1,0														
Entrepreneur's experience	0,1	0,0	0,0	0,0	1,0													
Risk tolerance	0,0	0,0	0,0	0,0	0,0	1,0												
FL bias up_1	0,0	0,0	0,0	0,0	0,0	0,1	1,0											
FL bias up_2	0,0	0,0	0,0	0,0	0,0	0,1	0,4	1,0										
High future discount rate	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	1,0									
Future discount rate	-0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0								
Planning horizon_1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,3	1,0								
Planning horizon_2	0,1	0,0	0,0	-0,1	0,0	0,0	0,0	0,1	-0,1	0,0	1,0							
Optimism	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,2	1,0						
Proactivity	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-0,1	-0,1	0,0	0,1	1,0					
Проактивность	0,0	0,0	0,0	0,0	0,1	0,1	0,0	0,0	0,0	0,0	0,0	0,1	0,1	1,0				
fin_litr_idx_2022	0,2	0,0	0,1	0,0	0,0	0,0	-0,2	-0,1	-0,1	-0,1	0,0	0,0	0,1	0,0	1,0			
fin_litr_idx_2_2022	0,2	0,0	0,1	0,0	0,0	0,0	-0,2	-0,1	-0,1	-0,1	0,0	0,0	0,1	0,0	1,0	1,0		
fin_litr_idx_3_2022	0,2	0,0	0,1	0,0	0,0	0,0	-0,2	-0,1	-0,1	-0,1	0,0	0,0	0,1	0,0	1,0	1,0	1,0	

It is clear that regressors show very weak correlations.

4.5 Other independent variables

Auxiliary (control) independent variables consist of the following groups:

- Social and demographic characteristics: gender, age (+ squared age to account for non-linear age effects), marital status, number of adult members in the household, number of children in the household, head of family status of the respondent.
- Employment status.
- Geographical characteristics: type of settlement and federal district of residence.
- Financial standing: self-assessment of the current situation and financial situation, self-assessment of financial standing stability and sufficiency of savings in case of income loss, the logarithm of personal income over the last month, entire average monthly total household income, the logarithm of monthly household expenses (as estimated income resistant to information hiding), and the indicator of monthly income stability over a year.
- Wealth. Household-owned real estate to which the respondent belongs; evaluation of all properties, outstanding mortgage loans
- Financial inclusion indicators
- Month of survey.

Their measurement based on survey data is described in Appendix 6. Descriptive statistics of these variables are presented in Table 7.

Table 10. Descriptive statistics of other independent variables

Name	код в базе	n	mean	sd	median	min	max	Q25%	Q75%
Sex (F=1)	gender_2022	9296	0.59	0.49	1,00	0,00	1,00	0,00	1,00
Age	age_2022	9296	52,30	16,60	53,00	19,00	97,00	39,00	65,00
Age squared	age2_2022	9296	3010,28	1772,38	2809,00	361,00	9409,00	1521,00	4225,00
Survey month	month_2022	9296	5,41	0,89	5,00	3,00	9,00	5,00	6,00
Marital status (married=1)	marriage_2022	9271	0,54	0,50	1,00	0,00	1,00	0,00	1,00
Number of household members	size_2022	9296	2,94	1,54	3,00	1,00	15,00	2,00	4,00
Number of children	size_18_2022	9296	0,34	0,77	0,00	0,00	7,00	0,00	0,00
Head of family	head_2022	7805	0,38	0,48	0,00	0,00	1,00	0,00	1,00
Employment	employment_2022	9289	0,55	0,50	1,00	0,00	1,00	0,00	1,00
Region of residence	region_2022	9296	45,35	22,75	50,00	7,00	78,00	23,00	67,00
City/village (city=1)	region_size_2022	9296	0,72	0,45	1,00	0,00	1,00	0,00	1,00
Self-assessed position	wealthbeing1_2022	9182	0,25	0,44	0,00	0,00	1,00	0,00	1,00
Self-assessed financial standing_1	wealthbeing2_2022	8996	3,06	0,98	3,00	1,00	6,00	2,00	4,00
Self-assessed financial standing_2	wealthbeing3_2022	8996	0,26	0,44	0,00	0,00	1,00	0,00	1,00
Self-assessed stability of financial standing	wealtbeing4_2022	8740	0,27	0,44	0,00	0,00	1,00	0,00	1,00
Self-assessed adequacy of savings	wealtbeing5_2022	8709	0,36	0,48	0,00	0,00	1,00	0,00	1,00
Logarithm of pers. monthly income	ln_income1_2022	8106	9,65	2,23	10,08	0,00	13,85	9,68	10,46
Logarithm of pers. income for 12 months	ln_income2_2022	5631	12,00	2,65	12,53	0,00	15,83	12,14	12,95
Logarithm of household's aggregate monthly income	ln_income3_2022	8950	10,95	0,67	10,93	0,00	13,35	10,48	11,41
No. of decile of hh's monthly income	ln_income4_2022	7208	5,22	2,86	5,00	1,00	10,00	3,00	8,00
Logarithm of household's monthly spend.	ln_income5_2022	8630	10,66	0,60	10,71	7,60	13,12	10,31	11,05
Stability of monthly income	ln_income6_2022	6780	5,01	2,83	5,00	1,00	10,00	3,00	8,00
Home ownership	income_stability_2022	9079	4,33	0,98	5,00	1,00	5,00	4,00	5,00
Logarithm of self-est. value of all prop.	home_ownership_2022	9294	0,23	0,42	0,00	0,00	1,00	0,00	0,00
Outstanding mortgage loan	ln_ownership_value_2022	6635	12,89	4,53	14,56	0,22	17,41	13,59	15,20
Financial inclusion (offline and online)	active_mortgage_2022	1055	0,51	0,50	1,00	0,00	1,00	0,00	1,00
Financial inclusion offline	fin_acs_2022	8632	0,66	0,40	1,00	0,00	1,00	0,50	1,00
Financial inclusion online	fin_acs_offline_2022	7711	0,80	0,40	1,00	0,00	1,00	1,00	1,00
	fin_acs_online_2022	6918	0,53	0,50	1,00	0,00	1,00	0,00	1,00

5. Results

First, we estimate the model for the aggregate financial behaviour indicator and its consolidated components (two large groups divided into 10 groups in total). Then we estimate the regressions for the individual constituents of the ten group dependent variables.

5.1 Results for responsible financial behaviour index

The resulting estimates for the baseline specification are summarised in Table 11, providing estimates for six regressions. The first four of these are ordinary linear models estimated using the least squares method and the generalised method of moments (for IV regressions); the last two are the Probit model for an ordered discrete dependent variable, which is estimated by the maximum likelihood method. This discrete ordered variable is an indicator of belonging to one of the four quartiles of financial behaviour.

Table 11. Results for responsible financial behaviour index

	FinBeh		
	Responsible financial behaviour		
Type of dependent variable	Sum of discrete		Discrete ordered
Model	OLS	IV OLS	Ordered Probit

Financial literacy		0.389*** (0.053)	0.639*** (0.126)	0.816*** (0.169)	0.576*** (0.201)	0.686*** (0.067)	0.637*** (0.094)
Education		0.175*** (0.025)	0.155*** (0.027)	0.129*** (0.030)	0.160*** (0.030)	0.285*** (0.032)	0.305*** (0.043)
Financial experience	Relevant job	0.111 (0.082)	0.111 (0.081)	0.136 (0.094)	0.111 (0.081)	(-) (-)	0.054 (0.134)
	Relevant industry of employment	0.212*** (0.078)	0.199** (0.078)	0.162* (0.083)	0.202*** (0.078)	(-) (-)	0.285** (0.139)
	Financial crises loses	-0.099 (0.092)	-0.095 (0.092)	-0.097 (0.095)	-0.096 (0.092)	-0.261** (0.122)	-0.205 (0.163)
	Entrepreneur's experience	0.115*** (0.034)	0.111*** (0.034)	0.111*** (0.038)	0.112*** (0.035)	(-) (-)	0.133** (0.056)
Personal preferences	Risk tolerance	-0.009 (0.054)	-0.010 (0.054)	-0.005 (0.058)	-0.010 (0.054)	-0.265*** (0.059)	-0.079 (0.085)
	FL bias up	0.002 (0.056)	0.126 (0.080)	0.234** (0.100)	0.094 (0.111)	0.124* (0.068)	-0.031 (0.108)
	High time discounting	-0.212*** (0.028)	-0.204*** (0.028)	-0.182*** (0.032)	-0.206*** (0.029)	-0.400*** (0.035)	-0.309*** (0.048)
	Long planning horizon1	0.151** (0.059)	0.144** (0.060)	0.080 (0.067)	0.146** (0.060)	0.215*** (0.083)	0.264** (0.106)
	Long planning horizon2	0.047** (0.022)	0.035 (0.023)	0.016 (0.025)	0.038 (0.024)	0.144*** (0.030)	0.058 (0.039)
	Optimism	0.153*** (0.040)	0.135*** (0.041)	0.138*** (0.046)	0.139*** (0.042)	0.173*** (0.044)	0.290*** (0.071)
Controls	Gender (F=1)	0.020 (0.022)	0.019 (0.022)	0.025 (0.024)	0.020 (0.022)	0.090*** (0.028)	0.046 (0.038)
	Age	-0.007 (0.006)	-0.008 (0.006)	-0.009 (0.007)	-0.008 (0.006)	-0.033*** (0.005)	-0.026** (0.011)
	Age^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000* (0.000)
	Marital status (M=1)	0.059** (0.023)	0.056** (0.023)	0.066** (0.027)	0.057** (0.023)	0.114*** (0.030)	0.139*** (0.041)
	Family size	-0.011 (0.008)	-0.011 (0.008)	-0.012 (0.008)	-0.011 (0.008)	-0.022** (0.010)	-0.021 (0.014)
	Number of children	-0.017 (0.013)	-0.017 (0.013)	-0.028** (0.014)	-0.017 (0.013)	-0.018 (0.017)	-0.029 (0.024)
	Employment_2020	-0.020 (0.045)	-0.031 (0.046)	-0.020 (0.053)	-0.028 (0.046)	0.116*** (0.037)	-0.044 (0.081)
	Type of residence (town=1)	0.073** (0.030)	0.062** (0.031)	0.061* (0.035)	0.064** (0.032)	0.231*** (0.036)	0.173*** (0.053)
	Well-being_2020	0.299*** (0.024)	0.294*** (0.024)	0.265*** (0.027)	0.295*** (0.025)	0.405*** (0.030)	0.469*** (0.042)
	Ln_income_2020	0.017*** (0.006)	0.016*** (0.006)	0.014** (0.006)	0.016*** (0.006)	0.023*** (0.007)	0.028** (0.012)
	Home ownership_2020	-0.031 (0.024)	-0.028 (0.024)	-0.015 (0.027)	-0.029 (0.024)	-0.020 (0.031)	-0.047 (0.042)

	Financial access	0.106*** (0.036)	0.095*** (0.036)	0.083** (0.040)	0.098*** (0.037)	0.029 (0.042)	0.144** (0.063)
	Month	0.030** (0.012)	0.030*** (0.012)	0.027** (0.013)	0.030*** (0.012)	0.041*** (0.015)	0.047** (0.020)
Statistics	N	3,554	3,554	2,930	3,554	6,819	3,554
	Wald chi2 (*)	31.399	757.350	590.413	751.649	1,255.371	612.094
	p-value	0	0	0	0	0.000	0.000
	Pseudo R2 (**)	0.1841	0.1793	0.1502	0.1815	0.072	0.065
Instruments	FL in 2020		+				
	Av. FL of other HH's members in 2020			+			
	Av. FL at regional level in 2020				+		
Instruments' tests	GMM C-statistic for endogeneity of financial literacy, Chi2(1)		4.686	9.022	0.891		
	p-value of C-statistic		0.030	0.002	0.345		
	First-stage F-value		656.624	321.46	277.32		
	p-value first stage		0	0	0		
	Hansen J		-	-	-		

Note: * - $p < .1$; ** - $p < .05$; *** - $p < .01$

Robust standard errors are calculated in each case.

(*) - F-statistics for OLS (const is included in regression)

(**) - R2 for OLS

Source: Authors' own calculations.

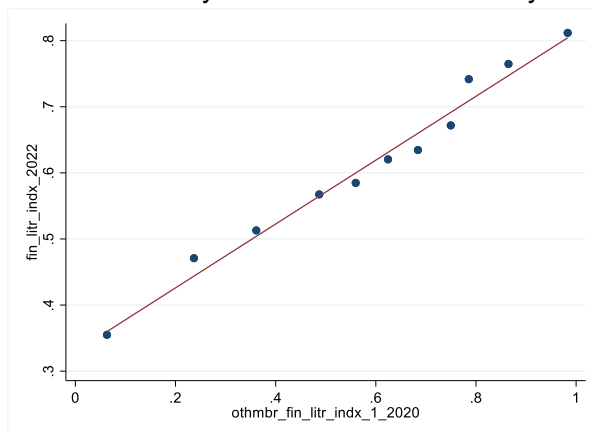
The OLS model in the first column ignores the potential endogeneity of financial literacy. The other three OLS models use GMM in which the role of tools for financial literacy is first played by the financial literacy value of the same respondent in the 2020 survey (second column of the table), then by the average financial literacy value of other household members in the 2020 survey (third column), and finally by the average value in the region of residence. The models in the fourth and fifth columns are Probit estimates for a discrete ordered variable (an indicator of belonging to one of the four quartiles of financial behaviour). These models differ only in that the model in the fourth column excludes the greater part of financial experience variables, almost doubling the sample size. This enables us to analyse the stability of the ratios when the sample size changes and some relevant variables are simultaneously excluded.

For regressions with instrumental variables, test statistics are shown:²⁷

²⁷ Separately, we calculate a regression that includes all the three instruments (it is not shown in the results due to the limited size of Table 8, with results that are qualitatively identical to those of the IV estimates with separate instruments). Since the number of instruments is greater than the number of endogenous variables, we can apply the Sargan–Hansen test for the relevance of instruments. The null hypothesis is a correlation of tools with zero regression error (i.e. the instruments are relevant). The test statistic is 2.55. For $\chi^2(2)$

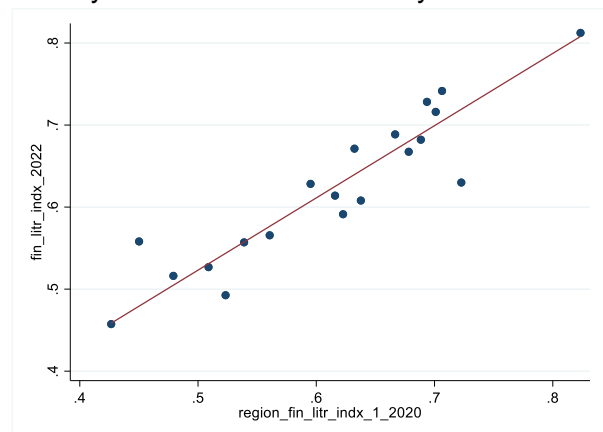
- the values of C-statistics to test the null hypothesis about the exogenous nature of financial literacy. The differences in the values of the statistics are associated with a different number of observations and the composition (namely, different instruments) of the regressions. The firm conclusion about the exogenous nature of financial literacy at the 5% level is impossible. This justifies the use of instruments.
- the values of F-statistics for instrument weakness (first-stage regression). Clearly, all the three instruments are significantly correlated with financial literacy in 2022. The same is clear from Figures 30–32 for the two instruments that are not directly related to individuals. Individual financial literacy is closely linked to the literacy of other adult household members as well as to region-level literacy. There are also statistically significant differences in the level of financial literacy across regions (sufficient regional variation), which should help identification.

Figure 30. Binscatter plot. The X-axis is the financial literacy index of other household members in the 2020 survey; the Y-axis is the financial literacy index in the 2022 survey



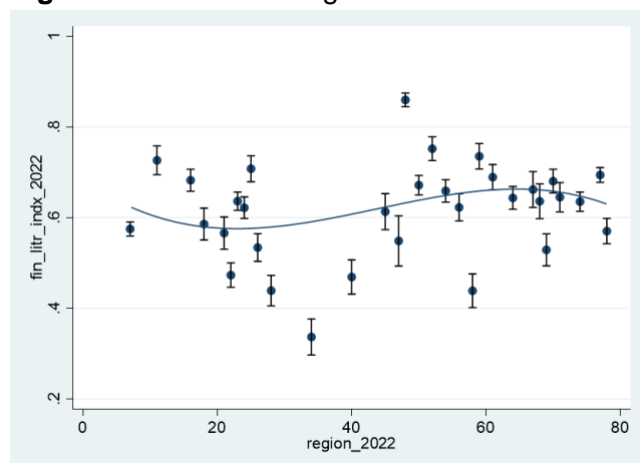
Note: The X-axis is the financial literacy index of other household members in the 2020 survey; the Y-axis is the financial literacy index in the 2022 survey.

Figure 31. Binscatter plot. The X-axis is the regional average financial literacy index in the 2020 survey; the Y-axis is the financial literacy index in the 2022 survey



Note: The X-axis is the regional average financial literacy index in the 2020 survey leaving out this individual; the Y-axis is the financial literacy index in the 2022 survey.

of a random variable, we cannot say that it differs from zero at the 5% level. Therefore, there are grounds to consider these instruments relevant.

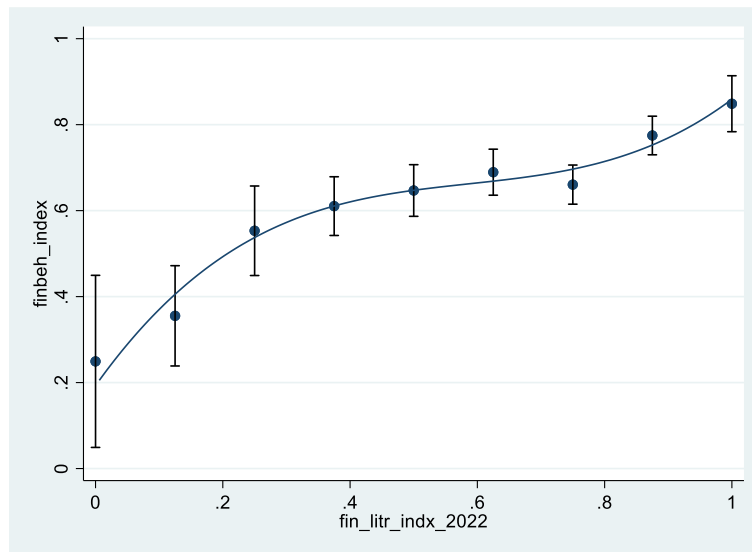
Figure 32. Binscatter regression

Note: The X-axis is the region number (32 regions in the 2020 survey); the Y-axis is the financial literacy index in the 2022 survey.

The regression results show that the financial literacy index is statistically significantly and positively correlated with the aggregate responsible financial behaviour index. The elasticity value in the model adjusted for endogeneity is higher than in the unadjusted model. A similar result was obtained in Kawamura et al. (2020). Each additional correct answer to the question (1/8) is associated with an increase of 0.1pp (1/8*8/10) in the aggregate index.

The analysis of the binscatter regression by Cattaneo et al. (2024) in Figure 33, controlling for the set of regressors in Tables 7 and 10, shows that the relationship is likely non-linear, with the highest increase in the responsible behaviour being typical of the lowest-literacy groups. The second wave of stronger correlation is shown by highly-literate respondents.²⁸

²⁸ In addition, given the potential non-linearity of the relationship between financial literacy and responsible financial behaviour, we estimate the models including the financial literacy square, the interaction term of financial literacy, with the indicator of respondents' low financial literacy in 2022, and the interaction term that respondents' financial literacy deteriorated in late 2022. The results are presented in Appendix 17. Non-linearity is detected in the model without regard for the endogeneity of financial literacy. In models with instrumental variables, there is no reason to consider the relationship non-linear.

Figure 33. Binscatter regression for responsible financial behaviour index

Note: The control variables include all variables from Tables 5 and 7.

The overall level of education is also significantly and positively correlated with responsible financial behaviour. However, the move from secondary to higher education is statistically associated with a numerically lower increase in responsible financial behaviour.

Of the financial experience variables, a significant positive relationship with behaviour is found for those employed in finance-related industries and for people with entrepreneurial experience. One of the models highlights a significant variable of losses from the financial crises of the past 20 years: people with such losses show less responsible financial behaviour.

Of the personal characteristics, high future discounting is negatively correlated with responsible behaviour. That is, impatient people are characterised by a lower value of the aggregate financial behaviour indicator. This result is intuitively expected.

Conversely, a long planning horizon is positively correlated with responsible financial behaviour. Respondents' optimism indicator has the same attribute.

Willingness to take significant risks is negligible in most models but negatively associated with responsible behaviour.

Overestimation of one's financial literacy is positively correlated with the aggregate indicator. The financial behaviour of people overestimating their knowledge is broadly more correct. In this context, it is interesting to analyse the relationship between overestimation and individual components of the aggregate indicator.

Overall, individual preferences have major implications for the variation in the aggregate index.

As regards the control variables we observe the following.

More correct financial behaviour is common to people who are married, city residents, and those who live in areas with good financial inclusion, earn high incomes

and have a high self-assessment of their savings. Behind this correlation may lie the causal relationship in either or both directions (when the third variable, such as motivation or personal values, affects both financial behaviour and incomes or the decision to live in a large city). These results do not suggest that should all people relocate to large cities, their financial behaviour would become more responsible. Given the role of individual preferences, these findings confirm that correct financial behaviour is most likely determined by some underlying individual factors that extend beyond financial literacy.

Additionally, we calculate regressions (accounting for financial literacy endogeneity) for the economic and mathematical financial literacy indicators as independent variables (Table 12).

Table 12. Results for responsible financial behaviour index with economic/mathematical literacy measures as regressors

		FinBeh		
		Responsible financial behaviour		
Type of dependent variable		Sum of discretres		
Model		IV OLS		
Economic literacy		0,091 (0,139)	X X	0,281** (0,128)
Mathematical literacy		0,500*** (0,103)	0,526*** (0,094)	X X
Level of education		0,168*** (0,028)	0,176*** (0,025)	0,177*** (0,028)
Financial experience	Relevant job	0,122 (0,082)	0,125 (0,082)	0,104 (0,082)
	Relevant industry of employment	0,223*** (0,079)	0,233*** (0,078)	0,203** (0,079)
	Financial crises	-0,083 (0,093)	-0,081 (0,094)	-0,109 (0,091)
	Entrepreneur's experience	0,107*** (0,035)	0,106*** (0,035)	0,120*** (0,034)
Personal preferences	Risk tolerance	-0,010 (0,054)	-0,010 (0,054)	-0,008 (0,054)
	FK bias up	0,132* (0,080)	0,109 (0,073)	-0,072 (0,074)
	High time discounting	-0,205*** (0,028)	-0,207*** (0,028)	-0,216*** (0,028)
	Long planning horizon_1	0,156** (0,061)	0,161*** (0,061)	0,146** (0,059)
	Long planning horizon _2	0,046* (0,024)	0,052** (0,022)	0,046* (0,024)
	Optimism	0,143*** (0,042)	0,149*** (0,041)	0,158*** (0,042)
Control variables	Gender (w = 1)	0,015 (0,022)	0,014 (0,022)	0,023 (0,022)

	Age	-0,007 (0,006)	-0,007 (0,006)	-0,008 (0,006)
	Age 'squared'	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
	Marital status (married= 1)	0,058** (0,024)	0,058** (0,024)	0,059** (0,024)
	Family size	-0,013 (0,008)	-0,013* (0,008)	-0,010 (0,008)
	Number of children	-0,013 (0,013)	-0,012 (0,013)	-0,020 (0,013)
	Employment_2020	-0,027 (0,045)	-0,024 (0,045)	-0,017 (0,045)
	Type of residence (town = 1)	0,054* (0,032)	0,054* (0,032)	0,084*** (0,030)
	Well-being_2020	0,290*** (0,024)	0,290*** (0,024)	0,304*** (0,024)
	Income logarithm _2020	0,017*** (0,006)	0,017*** (0,006)	0,017*** (0,006)
	Home ownership _2020	-0,022 (0,024)	-0,020 (0,024)	-0,037 (0,024)
	Financial access	0,100*** (0,037)	0,104*** (0,036)	0,109*** (0,037)
	Month of survey	0,030** (0,012)	0,030** (0,012)	0,029** (0,012)
Statistics	N	3554	3554	3554
	Wald chi2 (*)	757,350	759,968	722,873
	p-value, Wald	0	0	0
	Pseudo R2 (**)	0,1793	0,172	0,177
Tests for instrumental variables	GMM C- statistic of financial literacy endogeneity , Chi2(1)	9,31078	10,2605	,372
	p-value of C-statistic	0,010	0,001	0,542
	F- statistic FG is economic on step one	223,941	X	425,857
	p-value of F-statistic	0	X	0
	F-statistic FG-is mathematical on step	340,431	679,573	X
	p-value of F-statistic	0	0	X
	Hansen J	-	-	-

Note: * – p<.1; ** – p<.05; *** – p<.01

Robust standard errors are calculated in each case.

(*) – F-statistics for OLS (the constant is included in the regression)

(**) – R2 for OLS.

Instrument(s): FL of the corresponding period in 2020.

As follows from Table 12, when the two indicators are simultaneously included, mathematical literacy wins over the responsible financial behaviour correlation; however, when included one at a time, both the indicators are statistically significant (with economic

significance showing a lower correlation ratio). The statistical significance of mathematical literacy when included simultaneously may be explained by the fact that this indicator allows a more accurate measurement of the mathematical side of literacy than the four questions about economics allow the measurement of economic literacy. In other words, economic knowledge may not be accurately measured. Therefore, even when such knowledge is important for proper financial decision-making, its measure in the regression may be insignificant. Mathematical questions are more universal for measuring the level of mathematical literacy. Therefore, it cannot be argued that economic literacy is not linked to right financial decisions. The importance of economic literacy is indirectly confirmed by the statistical significance of the type of activity (employment sector) of respondents, which is relevant for obtaining economic knowledge – the source of this type of literacy.

Table 13 shows the model estimates for the two aggregate components of responsible behaviour: Personal Characteristics of Financial Behaviour (PCFB) and Financial Decisions (FD).

Table 13. Regression results for subjective (PCFB) and objective (FD) components of responsible financial behaviour

		PCFB				FD		
		Personal Characteristics of Financial Behaviour				Financial Decisions		
Type of dependent variable		Sum of discrete	Discrete ordered	Discrete ordered	Discrete ordered	Discrete ordered	Discrete ordered	Discrete ordered
Model		OLS	Ordered Probit	IV Ordered Probit	IV Ordered Probit	Ordered Probit	IV Ordered Probit	IV Ordered Probit
Financial literacy		0.188*** (0.039)	0.476*** (0.094)	0.451*** (0.165)	0.802*** (0.214)	0.438*** (0.092)	0.966*** (0.092)	0.805*** (0.210)
Education		0.029 (0.018)	0.022 (0.043)	0.023 (0.043)	0.010 (0.047)	0.316*** (0.043)	0.316*** (0.043)	0.319*** (0.047)
Financial experience	Relevant job	0.069 (0.052)	0.066 (0.117)	0.067 (0.116)	0.133 (0.132)	-0.005 (0.129)	-0.005 (0.129)	-0.008 (0.131)
	Relevant industry of employment	0.069 (0.049)	0.199 (0.125)	0.200 (0.125)	0.307** (0.144)	0.172 (0.138)	0.172 (0.138)	0.111 (0.147)
	Financial crises	-0.109* (0.059)	-0.333** (0.154)	-0.333** (0.156)	-0.376** (0.162)	0.043 (0.158)	0.043 (0.158)	0.037 (0.160)
	Entrepreneur's experience	0.041* (0.021)	0.113** (0.052)	0.113** (0.055)	0.106* (0.062)	0.130** (0.060)	0.130** (0.060)	0.130** (0.063)
Personal preferences	Risk tolerance	-0.037 (0.034)	-0.106 (0.083)	-0.106 (0.081)	-0.118 (0.087)	-0.017 (0.077)	-0.017 (0.077)	0.014 (0.087)
	FL bias up	-0.002 (0.043)	0.061 (0.101)	0.062 (0.106)	0.073 (0.116)	0.024 (0.105)	0.024 (0.105)	-0.027 (0.114)
	High time discounting	- (0.019)	- (0.047)	- (0.047)	- (0.053)	-0.158*** (0.048)	- (0.048)	- (0.053)
	Long horizon of planning1	-0.065* (0.037)	-0.080 (0.092)	-0.080 (0.101)	-0.081 (0.111)	0.485*** (0.116)	0.485*** (0.116)	0.385*** (0.117)
		-0.027* (0.011)	-0.074* (0.031)	-0.074* (0.031)	-0.085** (0.031)	0.150*** (0.011)	0.150*** (0.011)	0.137*** (0.011)

	Long planning horizon2	(0.016)	(0.038)	(0.038)	(0.042)	(0.038)	(0.038)	(0.042)
	Optimism	0.033 (0.031)	0.106 (0.075)	0.107 (0.077)	0.139 (0.087)	0.303*** (0.074)	0.303*** (0.074)	0.294*** (0.085)
Controls	Gender (F=1)	-0.022 (0.016)	-0.042 (0.038)	-0.042 (0.038)	-0.055 (0.041)	0.118*** (0.038)	0.118*** (0.038)	0.150*** (0.041)
	Age	0.002 (0.004)	0.009 (0.011)	0.009 (0.011)	0.008 (0.012)	-0.046*** (0.011)	- 0.046*** (0.011)	- 0.044*** (0.012)
	Age^2	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
	Marital status (M=1)	0.010 (0.017)	0.017 (0.041)	0.017 (0.041)	0.065 (0.046)	0.133*** (0.040)	0.133*** (0.040)	0.082* (0.046)
	Family size	0.004 (0.006)	0.006 (0.014)	0.006 (0.014)	0.019 (0.015)	-0.037*** (0.013)	- 0.037*** (0.013)	- 0.055*** (0.015)
	Number of children	- 0.028*** (0.010)	-0.058** (0.023)	-0.058** (0.024)	-0.065** (0.026)	0.019 (0.024)	0.019 (0.024)	0.014 (0.026)
	Employment_2020	0.042 (0.032)	0.081 (0.074)	0.082 (0.077)	0.101 (0.086)	-0.128* (0.074)	-0.128* (0.074)	-0.068 (0.085)
	Type of residence (town=1)	0.075*** (0.022)	0.185*** (0.054)	0.186*** (0.053)	0.182*** (0.058)	0.005 (0.052)	0.005 (0.052)	-0.007 (0.057)
	Well-being_2020	0.031* (0.017)	0.042 (0.042)	0.042 (0.041)	0.028 (0.045)	0.604*** (0.042)	0.604*** (0.042)	0.562*** (0.046)
	Ln_income_2020	-0.004 (0.004)	-0.005 (0.010)	-0.005 (0.010)	-0.005 (0.011)	0.045*** (0.010)	0.045*** (0.010)	0.041*** (0.011)
	Home ownership_2020	-0.022 (0.017)	-0.067 (0.041)	-0.067 (0.041)	-0.025 (0.046)	-0.007 (0.041)	-0.007 (0.041)	-0.010 (0.046)
	Financial access	0.043* (0.026)	0.109* (0.063)	0.110* (0.061)	0.120* (0.067)	0.116* (0.061)	0.116* (0.061)	0.087 (0.066)
	Month	0.035*** (0.008)	0.077*** (0.021)	0.077*** (0.021)	0.071*** (0.024)	-0.010 (0.021)	-0.010 (0.021)	-0.001 (0.024)
Statistics	N	3557	3557	3557	2933	3589	3589	2951
	Wald chi2 (*)	9.787	221.370	179.968	168.422	597.881	597.881	437.985
	p-value	0	0.000	0.000	0.000	0.000	0.000	0.000
	Pseudo R2 (**)	0.067	0.023			0.064	0.064	
Instruments	FL in 2020							
	Av. FL of other HH's members in 2020							

Note: * - p<.1; ** - p<.05; *** - p<.01

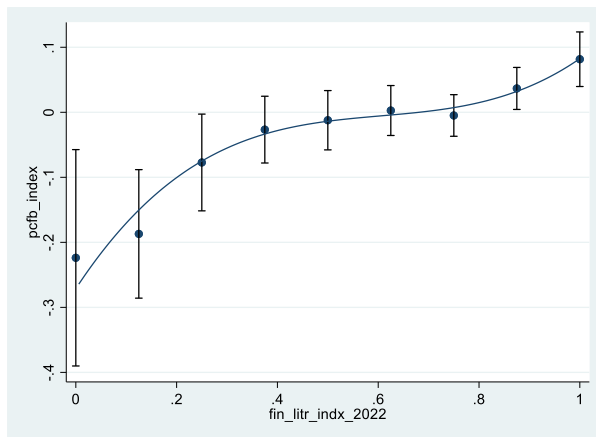
Robust standard errors are calculated in each case.

(*) - F-statistics for OLS (const is included in regression)

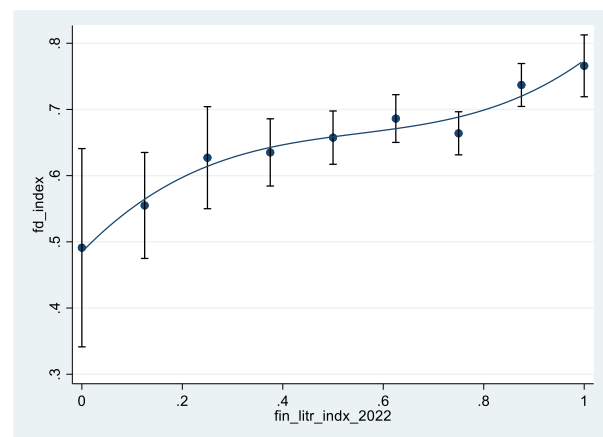
(**) - R2 for OLS

Given that the distribution of the PCFB index resembles a continuous normal distribution, the ordinary linear model is also estimated for this indicator. The discrete ordered variables for which the ordered Probit models are built suggest that PCFB and FD belong to the quartiles of their distributions. As in the case of the aggregate index, three models were estimated: unadjusted for the endogeneity of financial literacy and adjusted for it in two ways. Financial literacy is positively associated with both indicators. The analysis of binscatter regressions (Figures 34–35) suggests that a marginal improvement in the subjective and objective components of responsible financial behaviour is more typical of respondents with low levels of financial literacy.

Figures 34. Binscatter regression for subjective (PCFB) component of responsible financial behaviour



Figures 35. Binscatter regression for objective (FD) components of responsible financial behaviour



Note: The control variables include all variables from Tables 5 and 7.

Notably, the level of education is not significant in any regression for the subjective component of responsible behaviour and is significant in all regressions for the objective component. Of the variables accounting for financial experience, the difference in effects arises only for loss experience in financial crises. The experience of such loss statistically significantly deteriorates the subindex of the subjective component of financial behaviour, but it is not associated with objective financial decisions. This suggests that such respondents may make more mistakes in their estimates of economic indicators and skip relevant information, but they will make actual decisions just as well as others.

Of personal characteristics, a long planning horizon improves objective financial decisions (in the desirable direction), but is negatively correlated with the subjective component of responsible behaviour. That is, people who are characterised by less appropriate perception of reality and the future, make more naive financial decisions, skip relevant information and are more pessimistic about the future tend to make more correct financial decisions: they attempt to save, try to avoid overborrowing and give attention to retirement planning.

It follows from the analysis of the coefficients of control variables that women make better financial decisions. Furthermore, older people tend to make less correct decisions

(the dependence is quadratic but economically insignificant). Married people tend to make more correct financial decisions, but the objective behaviour characteristics deteriorates as the number of family members grows. A large number of children is not associated with the objective characteristic, but it is negatively correlated with the subjective characteristic, i.e. irrationality and financial naivety. The subjective component tends to be a mark of city residents: they are less naive or less irrational in their perception of reality, and they tend to monitor more financial information.

Interestingly, the wealth indicators do not correlate with subjective behaviour patterns, but only with objective financial decisions.

Another notable result is that subjective behavioural characteristics improved as the macroeconomic shock of February 2022 abated. This may mean that the crisis resulted in people becoming more focused on what was happening and gave some takeaways, which finds its way in the subjective component.

To understand these relationships in more detail, the components of these subindices are analysed in the section that follows.

5.2 Results for indices making up the responsible behaviour indicator

The aggregate financial behaviour indicator consists of ten indices. Each of these indicators is used as a dependent variable in the regression on financial literacy, education level, personal behavioural characteristics, and other control variables. In this part of the research, we closely follow Kawamura et al. (2021).

Appendix 7 shows binscatter plots (essentially, paired correlations) of the financial literacy index with each of the dependent variables, stripping out any controls, as a preliminary analysis before econometric calculations. In most cases, the signs of such paired dependencies are consistent with intuition. Among the exceptions are the positive correlation of financial literacy with:

- financial naivety,
- speculative investments, and
- a high payment-to-income ratio.

These results are also found by Kawamura et al. (2021).

The results for financial naivety may well reflect the characteristics of the period under study – 2022. The period likely saw a deepening mistrust of the financial system.

Figures 36–45 show the visual analysis of data with controls for education level, financial experience and personal preferences based on binscatter regressions.

Of the intuitively unexpected results obtained with simple binscatter plots, this type of analysis only confirms a positive relationship between financial literacy and the financial naivety indicator.

As regards simple diagrams, after applying control for the additional variables, the relationship between literacy and credit activity changes sign to negative.

Figure 36. Binscatter regression, Optimism and Confidence

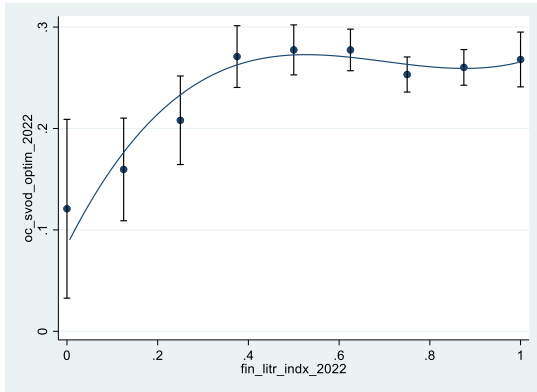


Figure 37. Binscatter regression, Acquisition of Information in decision-making

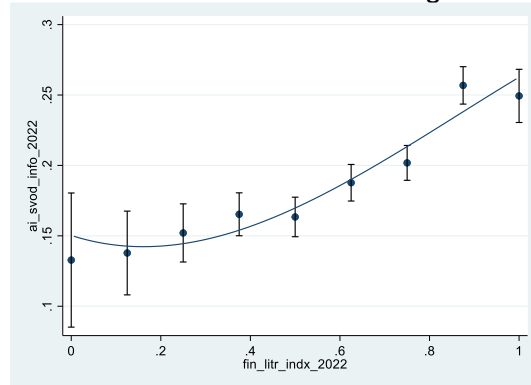


Figure 38. Binscatter regression, Irrational Assessment (current and future)

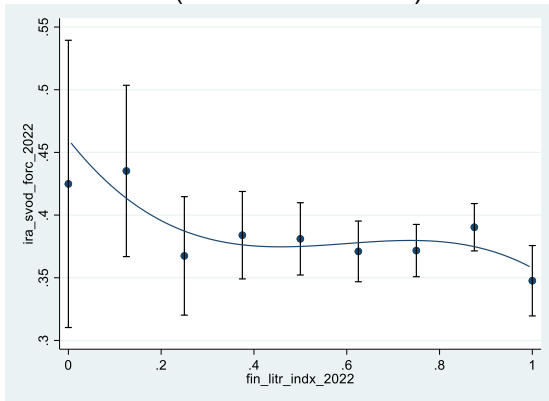


Figure 39. Binscatter regression, Financial Naivety

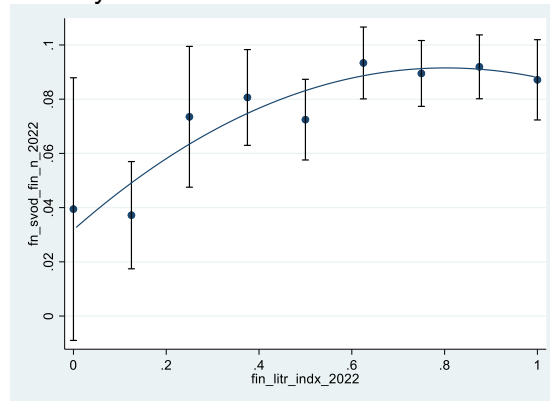


Figure 40. Binscatter regression, Consumption Smoothing

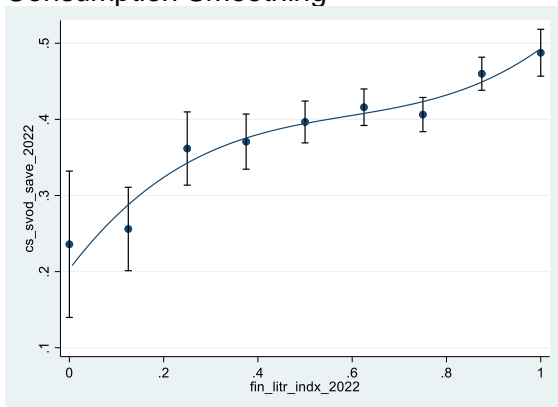


Figure 41. Binscatter regression, Diversified Assets

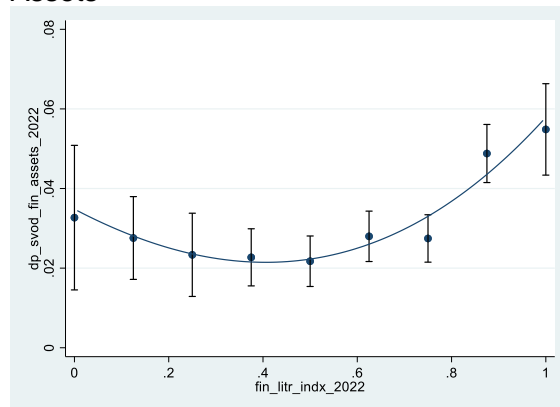


Figure 42. Binscatter regression, Speculative Investments

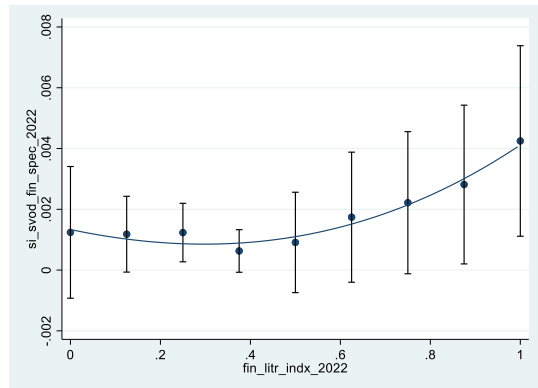


Figure 43. Binscatter regression, Retirement Planning

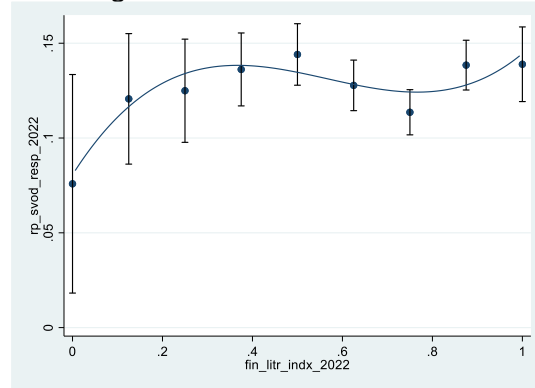


Figure 44. Binscatter regression, Credit Demand

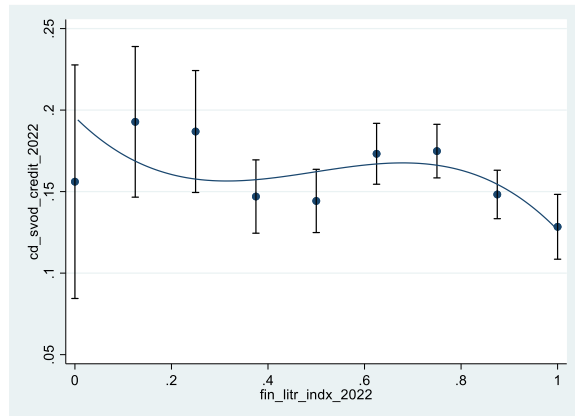
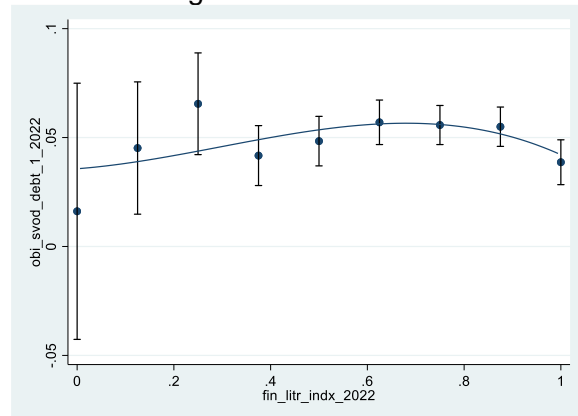


Figure 45. Binscatter regression, Overborrowing



We now proceed to a formal econometric analysis of the ten dependent variables.

Tables 14–15 present estimates of regressions of each of the responsible behaviour components (by column) on financial literacy (instrumented by the lag of financial literacy of other household members), level of education, financial experience, personal preferences, and other control variables. For each of them, we estimate ordered Probit models adjusted for endogenous variation in financial literacy.

Table 14. Estimates of regressions for constituents of the subjective component of responsible financial behaviour

	OC	AI	IRA	FN
	Optimism and Confidence	Acquisition of Info	IrRational Assessment	Financial Naivety
Type of dependent variable	Discrete ordered			
Model	IV Ordered Probit			
Financial literacy	0.245 (0.214)	1.236*** (0.195)	-0.580*** (0.206)	0.782*** (0.251)

Education		-0.009 (0.045)	0.339*** (0.045)	0.057 (0.045)	0.135** (0.055)
Financial experience	Relevant job	0.058 (0.130)	0.280** (0.123)	-0.114 (0.127)	-0.073 (0.160)
	Relevant industry of employment	-0.025 (0.137)	0.751*** (0.132)	0.108 (0.136)	-0.002 (0.168)
	Financial crises	-0.071 (0.156)	-0.308** (0.139)	0.191 (0.157)	0.289 (0.196)
	Entrepreneur's experience	0.100* (0.059)	0.050 (0.059)	-0.101* (0.059)	0.144** (0.070)
Personal preferences	Risk tolerance	0.021 (0.085)	0.075 (0.084)	0.322*** (0.084)	-0.125 (0.112)
	FL bias up	-0.193* (0.116)	0.230** (0.114)	0.031 (0.112)	-0.086 (0.157)
	High time discounting	-0.218*** (0.051)	-0.236*** (0.050)	0.051 (0.051)	0.023 (0.062)
	Long planning horizon1	-0.037 (0.107)	0.121 (0.105)	0.063 (0.107)	0.483*** (0.119)
	Long planning horizon2	-0.044 (0.041)	0.096** (0.040)	0.108*** (0.040)	0.100** (0.051)
	Optimism	0.103 (0.087)	0.319*** (0.084)	-0.026 (0.084)	0.291** (0.115)
Controls	Gender (F=1)	-0.057 (0.040)	-0.037 (0.040)	0.016 (0.040)	0.078 (0.050)
	Age	-0.014 (0.012)	0.013 (0.009)	-0.001 (0.012)	-0.019 (0.012)
	Age^2	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000** (0.000)
	Marital status (M=1)	-0.010 (0.045)	0.102** (0.044)	-0.044 (0.044)	-0.076 (0.055)
	Family size	0.035** (0.014)	0.026* (0.014)	0.012 (0.015)	-0.026 (0.019)
	Number of children	-0.041 (0.026)	0.004 (0.025)	0.092*** (0.025)	0.001 (0.031)
	Employment_2020	-0.114 (0.085)	0.115 (0.084)	-0.242*** (0.083)	-0.023 (0.107)
	Type of residence (town=1)	0.273*** (0.058)	0.316*** (0.056)	0.058 (0.055)	0.054 (0.072)
	Well-being_2020	0.175*** (0.044)	0.247*** (0.043)	0.072* (0.043)	0.316*** (0.053)
	Ln_income_2020	0.019* (0.011)	-0.008 (0.010)	0.017 (0.011)	0.030** (0.014)
	Home ownership_2020	-0.069 (0.045)	0.047 (0.045)	0.036 (0.045)	-0.087 (0.056)
Financial access	0.130* (0.067)	-0.033 (0.064)	-0.132** (0.064)	0.074 (0.083)	

	Month	0.073*** (0.023)	-0.097*** (0.022)	-0.093*** (0.023)	-0.007 (0.027)
Statistics	N	2954	2956	2942	2949
	Wald chi2	206.738	492.759	93.245	205.358
	p-value	0.000	0.000	0.000	0.000
Endogeneity test	P-value of corr(e_main;e_auxiliary)	0.527	0.189	0.012	0.020

Note: * - $p < .1$; ** - $p < .05$; *** - $p < .01$

Robust standard errors are calculated in each case.

Instrument: Average financial literacy of other HH's members in 2020

Table 15. Estimates of regressions for constituents of the objective component of responsible financial behaviour

		CS	DP	SI	RP	CD	OB
		Consumption Smoothing	Diversified Portfolio	Speculative Investments	Retirement Planning	Credit Demand	Over borrow.
Type of dependent variable		Discrete ordered					
Model		IV Ordered Probit					
Financial literacy		1.211*** (0.188)	0.804** (0.356)	1.932 (1.483)	0.078 (0.244)	-0.795*** (0.213)	-0.467 (0.290)
Education		0.230*** (0.044)	0.474*** (0.070)	0.168 (0.262)	0.224*** (0.051)	-0.008 (0.049)	-0.108* (0.064)
Financial experience	Relevant job	-0.053 (0.123)	0.219 (0.179)	-4.745 (2,557.938)	0.021 (0.147)	0.202 (0.135)	0.192 (0.169)
	Relevant industry of employment	0.051 (0.135)	0.270 (0.179)	-4.511 (2,821.897)	0.190 (0.149)	0.152 (0.146)	0.214 (0.177)
	Financial crises	0.187 (0.140)	0.068 (0.260)	3.446 (339.684)	-0.098 (0.178)	-0.181 (0.152)	-0.262 (0.199)
	Entrepreneur's experience	0.064 (0.058)	0.143* (0.085)	0.492** (0.193)	0.126* (0.066)	0.217*** (0.061)	0.048 (0.081)
Personal preferences	Risk tolerance	-0.152* (0.083)	0.435*** (0.128)	0.865*** (0.312)	0.263*** (0.091)	0.171* (0.088)	0.044 (0.116)
	FL bias up	-0.043 (0.111)	-0.069 (0.266)	-3.668 (2,169.384)	0.177 (0.127)	-0.148 (0.120)	0.111 (0.152)
	High time discounting	-0.129*** (0.049)	- 0.317*** (0.075)	0.357 (0.404)	-0.116* (0.059)	-0.089 (0.054)	-0.127* (0.069)
	Long planning horizon1	0.478*** (0.108)	0.313** (0.145)	-4.605 (2,194.634)	0.148 (0.121)	-0.074 (0.117)	-0.196 (0.164)
	Long planning horizon2	0.165*** (0.040)	0.150** (0.067)	0.418 (0.268)	-0.027 (0.047)	0.065 (0.044)	-0.054 (0.057)
	Optimism	0.320*** (0.082)	0.363** (0.166)	-0.722 (0.487)	0.186* (0.103)	-0.009 (0.090)	-0.083 (0.117)

Controls	Gender (F=1)	0.161*** (0.039)	0.281*** (0.068)	-0.415 (0.273)	-0.058 (0.047)	0.037 (0.043)	0.019 (0.056)
	Age	-0.047*** (0.009)	-0.008 (0.020)	-0.101 (0.077)	0.059*** (0.016)	0.027** (0.011)	-0.002 (0.017)
	Age^2	0.001*** (0.000)	0.000 (0.000)	0.001 (0.001)	- (0.000)	-0.000*** (0.000)	-0.000 (0.000)
	Marital status (M=1)	-0.015 (0.043)	0.074 (0.075)	-0.096 (0.284)	0.178*** (0.052)	0.032 (0.048)	-0.026 (0.062)
	Family size	-0.034** (0.014)	-0.030 (0.027)	-0.145 (0.122)	- (0.017)	-0.018 (0.016)	0.015 (0.020)
	Number of children	0.034 (0.025)	-0.025 (0.043)	-0.253 (0.244)	0.010 (0.029)	-0.028 (0.028)	-0.013 (0.036)
	Employment_2020	-0.049 (0.081)	0.013 (0.152)	4.494 (340.025)	-0.233** (0.098)	-0.072 (0.090)	-0.198* (0.116)
	Type of residence (town=1)	0.056 (0.054)	0.300*** (0.105)	-0.445 (0.331)	0.048 (0.065)	-0.213*** (0.061)	0.241** (0.082)
	Well-being_2020	0.660*** (0.044)	0.365*** (0.068)	0.145 (0.251)	0.345*** (0.050)	-0.171*** (0.048)	-0.072 (0.063)
	Ln_income_2020	0.039*** (0.010)	0.040* (0.022)	0.077 (0.149)	0.025** (0.012)	0.030*** (0.011)	0.044** (0.016)
	Home ownership_2020	-0.056 (0.044)	-0.104 (0.074)	0.246 (0.311)	0.183*** (0.053)	-0.055 (0.048)	-0.057 (0.062)
	Financial access	0.053 (0.063)	0.077 (0.117)	-0.154 (0.409)	-0.010 (0.076)	0.223*** (0.071)	-0.090 (0.092)
	Month	-0.054** (0.021)	- (0.038)	0.198 (0.134)	-0.054** (0.027)	0.136*** (0.024)	-0.029 (0.032)
Statistics	N	2956	2956	2952	2956	2956	2955
	Wald chi2	690.685	240.451	29.451	447.219	156.814	45.193
	p-value	0.000	0.000	0.245	0.000	0.000	0.008
Endogeneity test	P-value of corr(e_main;e_auxiliary)	0.000	0.929	0.802	0.717	0.006	0.168

Note: * - $p < .1$; ** - $p < .05$; *** - $p < .01$

Robust standard errors are calculated in each case.

Instrument: Average financial literacy of other HH's members in 2020

Financial literacy is expectedly positively correlated with the use of financial information, saving activity and asset portfolio diversification. We also find an expected negative correlation with misperception of reality and the future.

We confirm the previously obtained result regarding the positive relationship with financial naivety. This necessitates more thorough analysis (which is discussed in the section that follows, and is based on regression results for the financial naivety components).

We find no statistical significance for the optimism and confidence, speculative investments, retirement planning, and overborrowing indicators. In the robustness section (Chapter 6), we find that the Retirement Planning indicator net of voluntary contributions in non-government pension funds) is negatively correlated with financial literacy.

The education variable is positively correlated with acquisition of information, financial naivety, saving activity, asset diversification and retirement planning. Financial literacy is not relevant for this variable. The level of education has a negative relationship with the propensity to overborrowing.

Of the financial experience variables, relevant position, employment sector, and loss experience in financial crises are only significant in accounting for the variation in the variables of financial information acquisition. At the same time, loss experience reduces attention to such information.

Entrepreneurial experience decreases misperception of reality and the future, but is positively correlated with financial naivety. This experience improves portfolio diversification, is positively correlated with retirement planning and lending activity, as well as with the propensity for speculative investments.

Of the personal characteristics, risk tolerance is positively correlated with irrational perception of reality and speculative investments. Notable is the positive correlation with retirement planning; this is probably a sign of retirement planning in Russia being a risky business. This is similar for the indicator of asset portfolio diversification, which reflects the wide use of financial market instruments. Risk tolerance is negatively correlated with saving behaviour but positively correlated with credit activity. The latter result, along with the positive correlation between risk tolerance and the irrational perception of reality, confirms that the lending sector is exposed to unreasonably high risks, which justifies the need for its macroprudential regulation.

Overestimated financial literacy is negatively correlated with optimism and confidence, but positively correlated with attention to financial information.

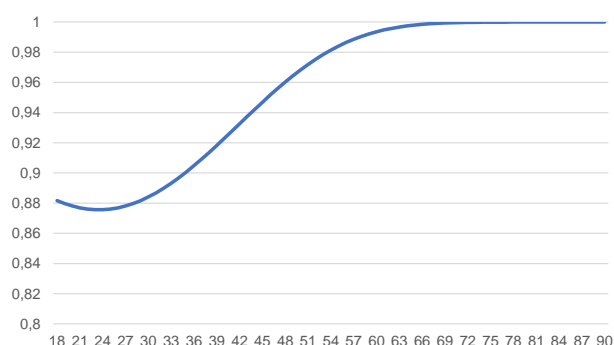
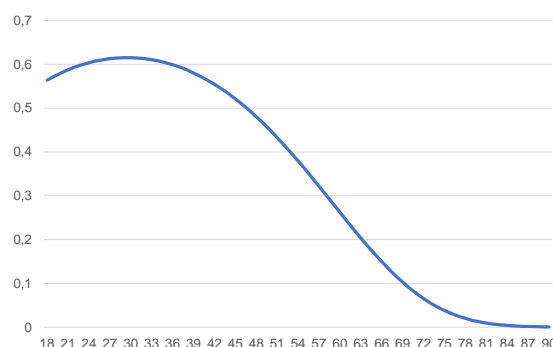
A high future discount rate expectedly shows a negative correlation with saving activity, portfolio diversification and retirement planning. A strong propensity to discount the future is also negatively correlated with overborrowing.

A long planning horizon is positively correlated with saving activity and portfolio diversification, but also with financial naivety.

Based on the results for the control variables, women are more inclined to save and diversify their assets.

Saving activity, lending activity and retirement planning are non-linearly linked to age. However, the form of this relationship varies. As for retirement planning, the elderly show lower activity, with its peak falling on 30–35 year olds. For those older than 50–55 years, the likelihood of retirement planning drops sharply to zero. As regards saving, the minimum value is registered for those younger than 25 years of age, subsequently increasing (the strongest increase continues up until 50 years).

Retirement planning is more common to family people. The growing number of adult family members pushes optimism and confidence higher and saving activity lower, together with the propensity for retirement planning.

Figures 46. Probability of saving activity variable being different from zero**Figures 47.** Probability of retirement planning variable being different from zero

City residents are more optimistic and confident about the future; they take interest in financial information and their portfolios are more diversified. They are less active borrowers but tend to have a higher propensity to overborrow (which, however, may come as a result of supply-side constraints for rural residents).

Self-assessed financial standing is positively correlated with confidence and an optimistic outlook, interest in financial information, but also with the irrational perception of reality and financial naivety. Those that are more affluent and thrifty diversify their portfolio and make efforts at retirement planning. As savings become adequate, credit activity declines; however, credit activity grows as incomes increase. Growing incomes are pushing up the propensity for overborrowing (which may also reflect the role of supply-side factors).

Home ownership is (positively) statistically significant only for retirement planning.

Financial inclusion is important for optimism and confidence as well as for activity in the lending market.

5.3 Results for individual indicators of responsible financial behaviour

For a more detailed insight into these results, in particular those for financial naivety, irrational perception of reality, and overborrowing, this section presents regression estimates for individual dependent variables (53 dependent variables from Table 2).

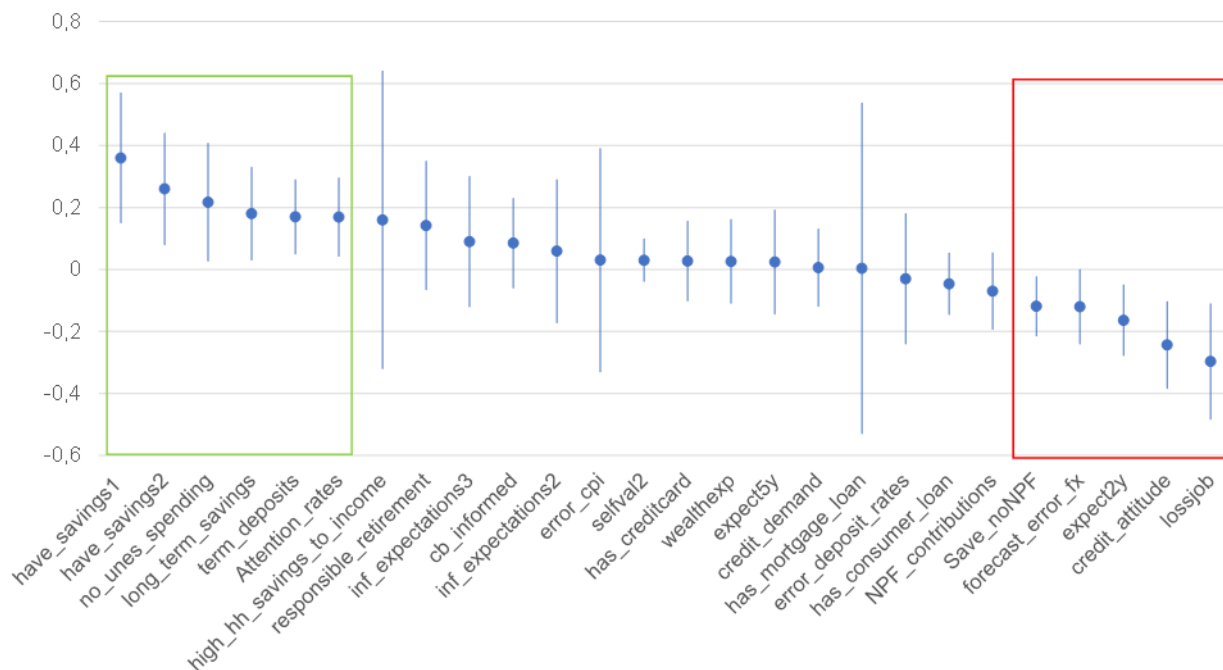
All the individual indicators used to calculate group indicators are either binary or ordered discrete indicators.²⁹ Therefore, to assess their relationship with the financial literacy index and other independent variables, we use either binary dependable variable models or models for multiple (groups) discrete (ordered) dependent variables (ordered Probit).

²⁹ All the dependent variables are arranged by intensity of manifestation of an aspect of financial behaviour or sentiment.

A total of 53 dependent variables are used to calculate the aggregate financial behaviour index (see Appendix 1). The results of estimating the regressions for these indicators (marginal effects, their standard errors and p-values) are presented in the tables in Appendices 8–14.

The small number of observations or the low variation of the indicator, given there are enough observations, makes it impossible to estimate Probit models for some dependent variables. The marginal effects of financial literacy in the resulting models (with confidence intervals equalling to three standard deviations) are shown in Figure 48.

Figure 48. Marginal effects of financial literacy and their confidence intervals (± 3 standard errors) of regressions for initial dependent variables (26 out of 53), unit fractions



A positive statistically important marginal effect is observed for the savings indicators (a portion of the CS variable is saving activity), the absence of impulse purchases (a portion of the OC variable is optimism and confidence), deposits (a portion of the DP is portfolio diversification), and attention to deposit rates (a portion of AI is acquisition of information in decision-making).

The strongest negative effect is registered for confidence about finding a new job in the event of job loss (but the result is not robust to alternative specifications) and for attitude to loans, as well as for optimism about the economy and errors in the forecast of the ruble exchange rate (after the 2022 survey). Financially competent households make better forecasts of the ruble exchange rate and have a less optimistic economic outlook for two years ahead (in general, the correlation between financial literacy and the aggregate optimism and confidence indicator is insignificant).

These effects help explain the results obtained in the previous section for the ten abstract indicators by linking financial literacy to specific indicators from the survey.

6. Robustness check

To test the robustness of the results to changes in the financial literacy index, two other financial literacy indicators are calculated.

First, to test the robustness of the results to changes in the financial literacy index, calculations were made for the other two financial literacy indicators.

The financial literacy index `fin_litr_indx_2` is calculated only for those individuals who gave meaningful answers to all the eight financial literacy questions (excluding 'refuse to answer' / 'no answer'). As can be seen from Table 6, the sample size becomes less than half as large.

The financial literacy index `fin_litr_indx_3` is calculated for all respondents, but only for meaningful answers (excluding 'refuse to answer' / 'no answer' – which were assigned the value 'NA' rather than zero, as in the calculation of the first indicator). Accordingly, the denominator of the financial literacy index equals the number of meaningful answers (not 8 as in the calculation of the main financial literacy index `fin_litr_indx_1`). As can be seen in Table 6, the sample size in this case declines only slightly – by the number of respondents who did not give any meaningful answers. Figures 49–50 show how these two indicators are correlated with the main index. The correlation between the main index and `fin_litr_indx_2` is perfect in construction: `fin_litr_indx_2` is calculated only for those who gave meaningful answers to all questions (i.e. the denominator is 8, as in the main index).

Figure 49. Binscatter plot for main financial literacy index (X-axis) and auxiliary index (Y-axis, `fin_litr_indx_2`)

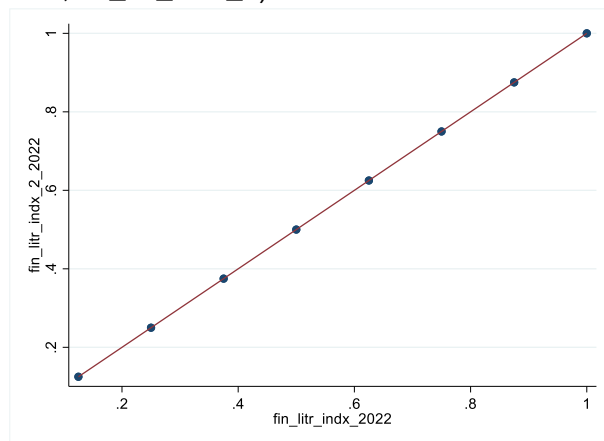


Figure 50. Binscatter plot for main financial literacy index (X-axis) and auxiliary index (Y-axis, `fin_litr_indx_3`)

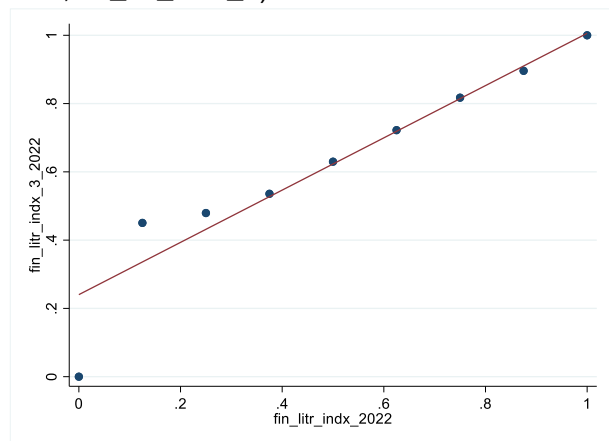


Table 16 shows the regression estimates for the responsible financial behaviour indicators given the indicator of financial literacy is `fin_litr_indx_2`. The small number of observations limits us to one instrument – the lagged value of the literacy rate according to the 2020 survey. Table 17 presents the results under `fin_litr_indx_3`.

Table 16. Estimates of regressions for responsible financial behaviour index given fin_litr_indx_2 as financial literacy index

		FinBeh	
		Responsible Financial Behaviour	
Type of dependent variable		Sum of discrete	Sum of discrete
Model		OLS	IV OLS
Financial literacy (second variable)		0.417*** (0.101)	0.661** (0.272)
Education		0.174*** (0.034)	0.164*** (0.043)
Financial experience	Relevant job	0.231** (0.108)	0.287*** (0.109)
	Relevant industry of employment	0.300*** (0.092)	0.236** (0.104)
	Financial crises	-0.185 (0.136)	-0.111 (0.146)
	Entrepreneur's experience	0.115*** (0.042)	0.140*** (0.054)
Personal preferences	Risk tolerance	0.091 (0.076)	0.111 (0.090)
	FL bias up	-0.152 (0.483)	-0.612** (0.241)
	High time discounting	-0.197*** (0.038)	-0.256*** (0.045)
	Long planning horizon1	0.146** (0.069)	0.158** (0.080)
	Long planning horizon2	0.039 (0.030)	0.024 (0.038)
	Optimism	0.099 (0.068)	0.068 (0.096)
Controls	Gender (F=1)	-0.011 (0.031)	-0.013 (0.038)
	Age	-0.001 (0.009)	0.003 (0.012)
	Age^2	-0.000 (0.000)	-0.000 (0.000)
	Marital status (M=1)	0.050 (0.033)	0.099** (0.041)
	Family size	-0.013 (0.012)	-0.028* (0.014)
	Number of children	-0.023 (0.018)	-0.009 (0.023)
	Employment_2020	-0.065 (0.073)	-0.004 (0.093)
		0.097**	0.159***

	Type of residence (town=1)	(0.047)	(0.060)
	Well-being_2020	0.370*** (0.033)	0.380*** (0.040)
	Ln_income_2020	0.026*** (0.010)	0.030** (0.013)
	Home ownership_2020	-0.029 (0.035)	-0.006 (0.042)
	Financial access	0.132** (0.052)	0.155** (0.064)
	Month	0.020 (0.016)	0.007 (0.021)
Statistics	N	1880	1195
	Wald chi2*	16.662	372.933
	p-value	0	0
	R2	0.1896	0.2377
Instruments	FL (second variable) in 2020		+

Note: * - p<.1; ** - p<.05; *** - p<.01

Robust standard errors are calculated in each case.

First lag of Financial literacy is used as an Instrument.

(*) - F-statistics for OLS (const is included in regression)

Table 17. Estimates of regressions for responsible financial behaviour index given fin_litr_indx_3 as financial literacy index

		FinBeh				
		Responsible Financial Behaviour				
Type of dependent variable		Sum of discrete	Sum of discrete	Sum of discrete	Discrete ordered	Discrete ordered
Model		OLS	IV OLS	IV OLS	Ordered Probit	Ordered Probit
Financial literacy (third variable)		0.408*** (0.057)	0.826*** (0.155)	0.958*** (0.203)	0.681*** (0.071)	0.695*** (0.101)
Education		0.182*** (0.025)	0.158*** (0.026)	0.140*** (0.029)	0.301*** (0.032)	0.315*** (0.042)
Financial experience	Relevant job	0.108 (0.083)	0.119 (0.083)	0.145 (0.098)	(-) (-)	0.047 (0.135)
	Relevant industry of employment	0.219*** (0.079)	0.205*** (0.079)	0.172** (0.084)	(-) (-)	0.296** (0.140)
	Financial crises	-0.093 (0.093)	-0.079 (0.094)	-0.076 (0.099)	-0.247** (0.121)	-0.194 (0.164)
	Entrepreneur's experience	0.120*** (0.034)	0.118*** (0.035)	0.118*** (0.039)	(-) (-)	0.142** (0.057)
Personal preferences	Risk tolerance	-0.006 (0.054)	-0.001 (0.055)	0.006 (0.059)	-0.252*** (0.059)	-0.074 (0.085)
	FL bias up	-0.002 (0.057)	0.179** (0.085)	0.252** (0.101)	0.098 (0.069)	-0.024 (0.109)

	High time discounting	-0.215*** (0.028)	-0.206*** (0.028)	-0.185*** (0.032)	-0.408*** (0.035)	-0.313*** (0.048)
	Long planning horizon1	0.165*** (0.059)	0.167*** (0.060)	0.112* (0.067)	0.231*** (0.083)	0.287*** (0.105)
	Long planning horizon2	0.049** (0.022)	0.030 (0.023)	0.013 (0.025)	0.150*** (0.030)	0.057 (0.039)
	Optimism	0.166*** (0.040)	0.149*** (0.041)	0.156*** (0.047)	0.206*** (0.043)	0.308*** (0.071)
Controls	Gender (F=1)	0.019 (0.022)	0.015 (0.022)	0.025 (0.024)	0.091*** (0.028)	0.045 (0.038)
	Age	-0.007 (0.006)	-0.008 (0.007)	-0.009 (0.008)	-0.033*** (0.005)	-0.026** (0.011)
	Age^2	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000*** (0.000)	0.000* (0.000)
	Marital status (M=1)	0.061*** (0.024)	0.059** (0.024)	0.066** (0.027)	0.116*** (0.030)	0.143*** (0.041)
	Family size	-0.012 (0.008)	-0.015* (0.008)	-0.017** (0.009)	-0.024** (0.010)	-0.023* (0.014)
	Number of children	-0.018 (0.013)	-0.016 (0.013)	-0.027* (0.014)	-0.019 (0.017)	-0.031 (0.024)
	Employment_2020	-0.019 (0.045)	-0.032 (0.046)	-0.023 (0.054)	0.117*** (0.037)	-0.044 (0.081)
	Type of residence (town=1)	0.081*** (0.030)	0.071** (0.031)	0.078** (0.034)	0.235*** (0.036)	0.187*** (0.052)
	Well-being_2020	0.305*** (0.024)	0.305*** (0.024)	0.279*** (0.027)	0.419*** (0.030)	0.480*** (0.042)
	Ln_income_2020	0.016*** (0.006)	0.013** (0.006)	0.012* (0.007)	0.022*** (0.007)	0.027** (0.012)
	Home ownership_2020	-0.026 (0.024)	-0.015 (0.025)	-0.002 (0.028)	-0.011 (0.031)	-0.036 (0.042)
	Financial access	0.101*** (0.036)	0.079** (0.037)	0.063 (0.042)	0.036 (0.042)	0.132** (0.063)
	Month	0.028** (0.012)	0.027** (0.012)	0.023* (0.013)	0.035** (0.015)	0.045** (0.020)
Statistics	N	3549	3541	2920	6804	3549
	Wald chi2 (*)	30.904	745.876	567.454	1,236.371	606.293
	p-value	0	0	0	0.000	0.000
	Pseudo R2 (**)	0.1822	0.1702	0.1423	0.071	0.064
Instruments	FL (third variable) in 2020	+				
	Av. FL (third variable) of other HH's members in 2020	+				

Note: * - $p < .1$; ** - $p < .05$; *** - $p < .01$

Robust standard errors are calculated in each case.

First lag of Financial literacy is used as an Instrument.

(*) - F-statistics for OLS (const is included in regression)

(**) - R2 for OLS

All the results are essentially the same as those for the main index.

Appendix 15 presents the regression results for ten aggregates with `fin_litr_indx_2`, and Appendix 16 shows the results for the same aggregates with the regressor `fin_litr_indx_3`.

When the more 'rigid' financial literacy index `fin_litr_indx_2` is used and all the questions must be meaningfully answered, a significant positive correlation between financial literacy and speculative investments is found. We confirm a positive correlation with saving activity and a negative correlation with demand for loans.

Second, the robustness check was related to the adjustment of the sample for possible outliers associated with respondents who experienced a significant decrease in financial literacy according to the 2022 survey (relative to 2020, same questions). To check robustness, we excluded 10% of such respondents. The results for the responsible financial behaviour index are shown in Table 18.

Table 18. Regression estimates for responsible financial behaviour index with 10% of observations with the largest decrease in financial literacy excluded from the sample between the 2020 and 2022 surveys

		FinBeh					
		Responsible financial behaviour					
Type of dependable variable		Sum of discretets				Discrete ordered value	
Model		OLS	IV OLS		Ordered Probit		
Financial literacy index		0,400*** (0,057)	0,615*** (0,121)	0,794*** (0,168)	0,495** (0,220)	0,690*** (0,071)	0,642*** (0,100)
Level of education		0,181*** (0,026)	0,163*** (0,027)	0,133*** (0,031)	0,173*** (0,032)	0,295*** (0,033)	0,304*** (0,044)
Financial experience	Relevant job	0,172** (0,086)	0,168** (0,086)	0,187* (0,100)	0,170** (0,086)	(-) (-)	0,116 (0,142)
	Relevant industry of employment	0,269*** (0,078)	0,258*** (0,078)	0,214** (0,086)	0,264*** (0,078)	(-) (-)	0,397*** (0,144)
	Financial crises	-0,124 (0,096)	-0,120 (0,096)	-0,125 (0,100)	-0,122 (0,096)	-0,258** (0,125)	-0,240 (0,171)
	Entrepreneur's experience	0,111*** (0,035)	0,108*** (0,035)	0,101** (0,039)	0,110*** (0,036)	(-) (-)	0,130** (0,058)
Personal preferences	Risk tolerance	-0,029 (0,057)	-0,031 (0,057)	-0,019 (0,062)	-0,030 (0,057)	-0,282*** (0,061)	-0,105 (0,088)
	FL bias up	0,052 (0,072)	0,158* (0,088)	0,262** (0,112)	0,099 (0,125)	0,185** (0,082)	0,053 (0,135)
		High time discounting	- 0,205*** (0,029)	- 0,198*** (0,029)	- 0,173*** (0,033)	- 0,202*** (0,030)	-0,396*** (0,036)
		0,151**	0,142**	0,070	0,147**	0,211**	0,276***

	Long planning horizon_1	(0,061)	(0,061)	(0,067)	(0,061)	(0,083)	(0,107)
	Long planning horizon_2	0,042* (0,023)	0,032 (0,023)	0,010 (0,026)	0,038 (0,025)	0,133*** (0,031)	0,050 (0,040)
	Optimism	0,145*** (0,044)	0,128*** (0,044)	0,134*** (0,051)	0,137*** (0,046)	0,172*** (0,046)	0,277*** (0,076)
Controls	Gender (w = 1)	0,023 (0,023)	0,024 (0,023)	0,025 (0,025)	0,023 (0,023)	0,086*** (0,029)	0,052 (0,039)
	Age	-0,006 (0,007)	-0,006 (0,007)	-0,008 (0,008)	-0,006 (0,007)	-0,033*** (0,006)	-0,024** (0,011)
	Age 'squared'	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000*** (0,000)	0,000* (0,000)
	Marital status (marries = 1)	0,055** (0,024)	0,053** (0,024)	0,063** (0,028)	0,054** (0,024)	0,112*** (0,031)	0,138*** (0,043)
	Family size	-0,014* (0,008)	-0,014* (0,008)	-0,015* (0,009)	-0,014* (0,008)	-0,024** (0,010)	-0,025* (0,014)
	Number of children	-0,018 (0,013)	-0,018 (0,013)	-0,030** (0,015)	-0,018 (0,013)	-0,022 (0,018)	-0,028 (0,024)
	Employment_2020	-0,037 (0,048)	-0,047 (0,048)	-0,031 (0,056)	-0,041 (0,048)	0,113*** (0,039)	-0,081 (0,084)
	Type of residence (town = 1)	0,075** (0,032)	0,064** (0,033)	0,066* (0,036)	0,070** (0,034)	0,243*** (0,037)	0,181*** (0,055)
	Well-being_2020	0,292*** (0,025)	0,289*** (0,025)	0,264*** (0,027)	0,291*** (0,025)	0,393*** (0,031)	0,458*** (0,043)
	Ln_income_2020	0,017*** (0,006)	0,016*** (0,006)	0,015** (0,007)	0,016*** (0,006)	0,024*** (0,007)	0,028** (0,012)
	Home ownership_2020	-0,034 (0,025)	-0,032 (0,025)	-0,017 (0,028)	-0,033 (0,025)	-0,010 (0,032)	-0,050 (0,043)
	Financial access	0,111*** (0,038)	0,103*** (0,038)	0,096** (0,042)	0,108*** (0,039)	0,025 (0,044)	0,145** (0,066)
	Month of survey	0,028** (0,012)	0,029** (0,012)	0,027** (0,013)	0,028** (0,012)	0,040*** (0,015)	0,044** (0,021)
Statistics	N	3320	3320	2735	3320	6340	3320
	Wald chi2 (*)	27,798	676,890	520,659	663,449	1,160,732	544,555
	p-value Wald	0	0	0	0	0,000	0,000
	Pseudo R2 (**)	0,179	0,176	0,149	0,179	0,072	0,062
Instruments	Financial literacy in 2020			+			
	Average financial literacy of other household members 2020				+		
	Average financial literacy at regional level in 2020					+	
Instrument types	GMM C-statistic of financial literacy endogeneity., Chi2(1)		3,989	7,821	0,191		
	p-value of C-statistics		0,046	0,005	0,661		
	F-statistic on step one		796,14	340,98	240,11		

p-value of F-statistics	0	0	0
Hansen J	-	-	-

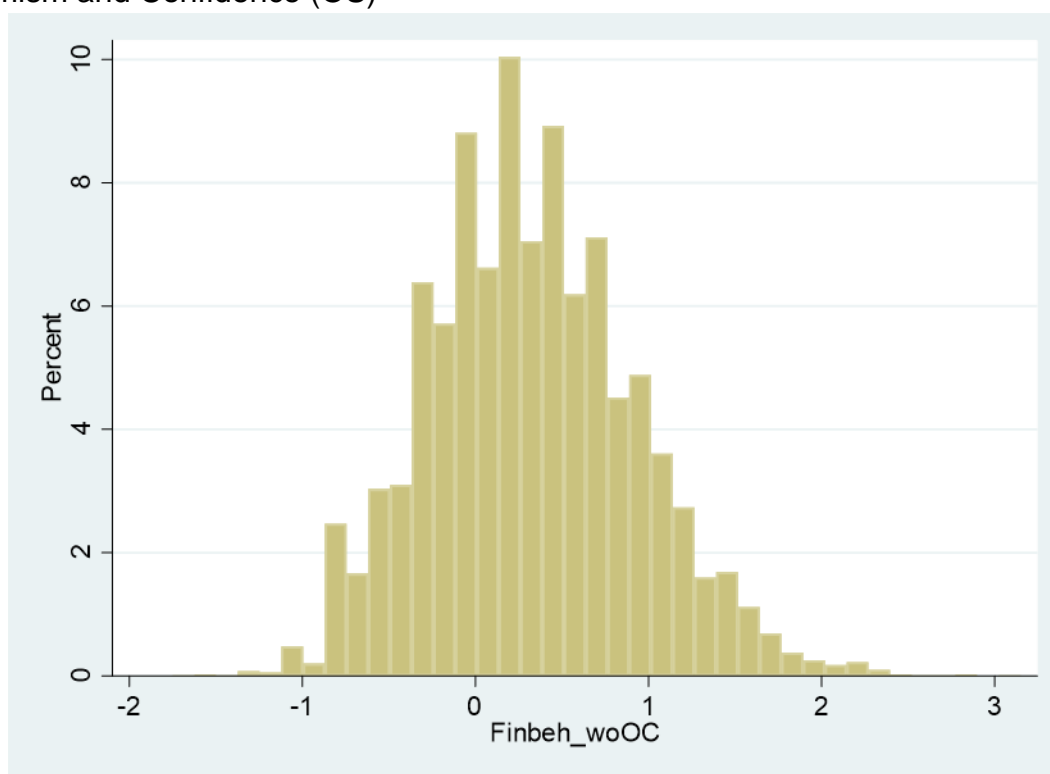
Note: * – $p < 0.1$; ** – $p < 0.05$; *** – $p < 0.01$.

Robust standard errors are shown in parenthesis.
 (*) – F- statistics for OLS (constant included in number of regressors).
 (**) – R2 for OLS.

In terms of quality and quantity, the results remained very similar. That is, if we assume that 10% of respondents showing the strongest deterioration in the literacy indicator are ‘outliers’, the results are unaffected by their exclusion.

Third, we estimate regressions for the aggregate indicator of responsible behaviour Fin_Beh without considering such a subjective component as Optimism and Confidence (code OC). The histogram of its distribution is shown in Figure 51.

Figure 51. Distribution histogram of responsible financial behaviour index excluding Optimism and Confidence (OS)



The correlation between the indicator finbeh_woOC index (excluding Optimism and Confidence) with the initial one is very high at 0.92. The formal analysis of regressions for this responsible behaviour indicator confirms that the results are unchanged in terms of quality, as well as the proximity of numerical assessments (Table 19, similar to Table 11 for the initial indicator) with two small exceptions: the indicator excluding Optimism and Confidence does not show any correlation with the months of survey or with the type of

residence. In other words, the Optimism and Confidence indicator is responsible for the sensitivity of the aggregate index to the shock of February–March 2022.³⁰

Table 19. Regression estimates for responsible financial behaviour index excluding Optimism and Confidence

Type of dependable variable		FinBeh_woOC					
		Responsible financial behaviour without Optimism and Confidence component					
Model		Sum of discretets				Discrete ordered	
		OLS	IV OLS			Ordered Probit	
Financial literacy index		0,365*** (0,045)	0,714*** (0,108)	0,791*** (0,146)	0,453*** (0,173)	0,684*** (0,067)	0,670*** (0,094)
Level of education		0,174*** (0,022)	0,146*** (0,023)	0,133*** (0,026)	0,167*** (0,026)	0,288*** (0,032)	0,322*** (0,043)
Financial experience	Relevant job	0,086 (0,072)	0,086 (0,072)	0,113 (0,084)	0,086 (0,072)	(-) (-)	0,020 (0,134)
	Relevant industry of employment	0,214*** (0,067)	0,196*** (0,067)	0,169** (0,070)	0,210*** (0,067)	(-) (-)	0,359** (0,142)
	Financial crises	-0,105 (0,080)	-0,100 (0,080)	-0,095 (0,082)	-0,104 (0,080)	-0,262** (0,125)	-0,170 (0,166)
	Entrepreneur's experience	0,089*** (0,031)	0,084*** (0,031)	0,087** (0,034)	0,088*** (0,031)	(-) (-)	0,170*** (0,060)
Personal preferences	Risk tolerance	-0,019 (0,046)	-0,020 (0,046)	-0,010 (0,049)	-0,019 (0,046)	-0,441*** (0,061)	-0,134 (0,084)
	FL bias up	0,030 (0,049)	0,204*** (0,070)	0,260*** (0,087)	0,074 (0,096)	0,105 (0,067)	-0,018 (0,103)
	High time discounting	-0,160*** (0,025)	-0,149*** (0,025)	-0,133*** (0,028)	-0,158*** (0,025)	-0,319*** (0,035)	-0,245*** (0,047)
	Long planning horizon_1	0,150*** (0,054)	0,140** (0,055)	0,094 (0,062)	0,147*** (0,054)	0,223** (0,088)	0,217* (0,111)
	Long planning horizon_2	0,058*** (0,019)	0,041** (0,020)	0,028 (0,022)	0,053*** (0,021)	0,179*** (0,030)	0,107*** (0,039)
	Optimism	0,124*** (0,036)	0,098*** (0,037)	0,119*** (0,041)	0,117*** (0,038)	0,135*** (0,044)	0,230*** (0,075)
Controls	Gender (w = 1)	0,034* (0,019)	0,034* (0,019)	0,036* (0,021)	0,034* (0,019)	0,123*** (0,028)	0,089** (0,038)
	Age	-0,003 (0,005)	-0,004 (0,005)	-0,005 (0,006)	-0,003 (0,005)	-0,029*** (0,005)	-0,017 (0,011)
	Age 'squared'	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)	0,000*** (0,000)	0,000 (0,000)
	Marital status (married = 1)	0,067*** (0,020)	0,064*** (0,020)	0,070*** (0,023)	0,067*** (0,020)	0,134*** (0,030)	0,165*** (0,041)

³⁰ The correlation with the type of residence may be the result of city residents feeling the consequences of the 2022 shock more strongly (following the exit of foreign brands, unavailable tourism, etc.).

	Family size	-0,016** (0,006)	-0,017*** (0,006)	-0,020*** (0,007)	-0,016** (0,006)	-0,027*** (0,009)	-0,029** (0,013)
	Number of children	-0,009 (0,011)	-0,010 (0,011)	-0,018 (0,013)	-0,009 (0,011)	-0,014 (0,017)	-0,016 (0,024)
	Employment_2020	0,014 (0,040)	-0,001 (0,041)	0,012 (0,048)	0,010 (0,040)	0,131*** (0,037)	-0,027 (0,078)
	Type of residence (town = 1)	0,025 (0,026)	0,010 (0,027)	0,013 (0,030)	0,022 (0,027)	0,141*** (0,036)	0,032 (0,054)
	Well-being_2020	0,255*** (0,021)	0,248*** (0,021)	0,224*** (0,023)	0,253*** (0,021)	0,407*** (0,030)	0,478*** (0,042)
	Ln_income_2020	0,014*** (0,005)	0,012** (0,005)	0,010* (0,006)	0,013** (0,005)	0,026*** (0,006)	0,028*** (0,010)
	Home ownership_2020	-0,012 (0,021)	-0,008 (0,021)	0,001 (0,024)	-0,011 (0,021)	-0,002 (0,031)	-0,043 (0,042)
	Financial access	0,074** (0,032)	0,057* (0,032)	0,051 (0,035)	0,070** (0,032)	0,005 (0,042)	0,135** (0,063)
	Month of survey	0,007 (0,010)	0,008 (0,010)	0,011 (0,011)	0,007 (0,010)	0,026* (0,015)	0,027 (0,020)
Statistics	N	3554	3554	2930	3554	6819	3554
	Wald chi2 (*)	30,044	733,479	580,433	710,495	1,150,263	571,553
	p-value Wald	0	0	0	0	0,000	0,000
	Pseudo R2 (**)	0,180	0,167	0,143	0,179	0,066	0,060
Instruments	Financial literacy in 2020		+				
	Average financial literacy of other household members in 2020			+			
	Average financial literacy at regional level in 2020				+		
Instrument tests	GMM C-statistic of financial literacy endogeneity, Chi2(1)		12,794	11,6956	0,272		
	p-value of C-statistics		0,003	0,000	0,602		
	F-statistic in step one		656,624	321,46	277,32		
	p-value of F-statistics		0	0	0		
	Hansen J		-	-	-		

Note: * – p<0,1; ** – p<0,05; *** – p<0,01.

Robust standard errors are shown in parenthesis. Robust standard errors are shown in parenthesis.

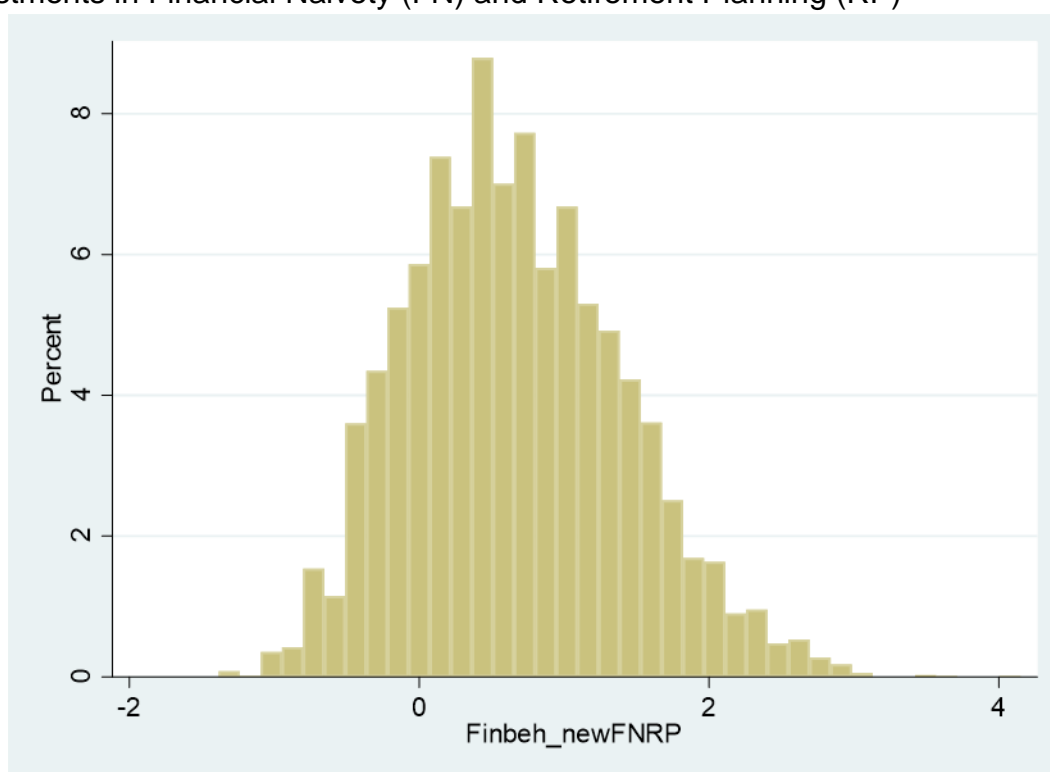
(*) – F-statistic for OLS (constant included in number of regressors).

(**) – R2 for OLS.

Fourth, we calculate a responsible behaviour index encompassing two adjusted indicators: financial naivety and retirement planning. The adjusted financial naivety indicator leaves out the question about the share of foreign cash in savings (indicator 17 in Table 2) and the question about the share of all foreign currency (indicator 18 in Table 2). Therefore, the calculation of the indicator was adjusted for the year 2022, marked by increased demand for foreign cash. As regards retirement planning, questions related to

savings in non-governmental pension funds, including voluntary ones, are stripped out (part of indicator 37 and 38 in Table 2). This is meant to take into account the current mode of operation of the pension system in Russia: how citizens are active without taking into account voluntary and mandatory contributions of the employer under the state pension programme. The distribution histogram of the adjusted aggregate index is shown in Figure 52.

Figure 52. Distribution histogram of responsible financial behaviour index with adjustments in Financial Naivety (FN) and Retirement Planning (RP)



The correlation of the indicator with the initial one is 0.89. Table 20 shows the calculation results for the aggregate responsible behaviour index with these two adjusted indicators.

Table 20. Regression estimates for responsible financial behaviour index with adjusted Financial Naivety (FN) and Retirement Planning (RP)

Type of dependable variable	FinBeh_newFNRP					
	Responsible financial behaviour with adjusted Financial Naivety and Retirement Planning					
Model	Non-discrete				Discrete ordered	
	OLS	IV OLS		Ordered Probit		
Financial literacy index	0,337*** (0,058)	0,502*** (0,137)	0,651*** (0,186)	0,404* (0,213)	0,522*** (0,075)	0,501*** (0,098)
Level of education	0,149*** (0,028)	0,135*** (0,029)	0,111*** (0,033)	0,144*** (0,033)	0,243*** (0,034)	0,244*** (0,044)

Financial experience	Relevant job	0,101 (0,085)	0,103 (0,085)	0,137 (0,100)	0,102 (0,085)	(-) (-)	0,097 (0,139)
	Relevant industry of employment	0,158* (0,084)	0,150* (0,083)	0,108 (0,089)	0,155* (0,084)	(-) (-)	0,181 (0,139)
	Financial crises	-0,063 (0,099)	-0,060 (0,098)	-0,055 (0,103)	-0,062 (0,098)	-0,196 (0,128)	-0,126 (0,156)
	Entrepreneur's experience	0,101*** (0,038)	0,098*** (0,038)	0,098** (0,040)	0,100*** (0,038)	(-) (-)	0,156** (0,063)
Personal preferences	Risk tolerance	0,001 (0,056)	-0,001 (0,056)	0,003 (0,061)	0,000 (0,056)	- 0,304*** (0,062)	-0,057 (0,088)
	FL bias up	-0,030 (0,063)	0,051 (0,088)	0,126 (0,110)	0,002 (0,120)	-0,004 (0,076)	-0,123 (0,115)
	High time discounting	-0,211*** (0,031)	- 0,205*** (0,031)	- 0,179*** (0,035)	- 0,209*** (0,031)	- 0,327*** (0,039)	-0,308*** (0,050)
	Long planning horizon_1	0,176*** (0,068)	0,172** (0,068)	0,092 (0,077)	0,175** (0,068)	0,126 (0,091)	0,210* (0,111)
	Long planning horizon_2	0,040* (0,024)	0,032 (0,025)	0,015 (0,028)	0,037 (0,026)	0,111*** (0,032)	0,047 (0,040)
	Optimism	0,165*** (0,045)	0,154*** (0,046)	0,141*** (0,051)	0,161*** (0,047)	0,165*** (0,052)	0,250*** (0,076)
Controls	Gender (w = 1)Gender (w = 1)	0,039* (0,024)	0,039 (0,024)	0,040 (0,026)	0,039* (0,024)	0,065** (0,030)	0,057 (0,039)
	Age	-0,021*** (0,007)	- 0,021*** (0,007)	- 0,024*** (0,009)	- 0,021*** (0,007)	- 0,022*** (0,006)	-0,036*** (0,012)
	Age 'squared'	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)
	Marital status (marries = 1)	0,033 (0,026)	0,032 (0,026)	0,044 (0,030)	0,033 (0,026)	0,081** (0,033)	0,098** (0,043)
	Family size	-0,008 (0,008)	-0,009 (0,008)	-0,007 (0,009)	-0,009 (0,008)	-0,020* (0,011)	-0,012 (0,014)
	Number of children	-0,021 (0,014)	-0,021 (0,014)	-0,037** (0,016)	-0,021 (0,014)	-0,040** (0,019)	-0,033 (0,024)
	EmploymentEmployment_20 20	-0,057 (0,051)	-0,065 (0,051)	-0,063 (0,059)	-0,060 (0,052)	0,010 (0,043)	-0,105 (0,083)
	Type of residence (town = 1)	0,090*** (0,033)	0,083** (0,034)	0,072* (0,038)	0,087** (0,035)	0,254*** (0,040)	0,171*** (0,055)
	Well-being_2020	0,286*** (0,027)	0,284*** (0,026)	0,261*** (0,029)	0,285*** (0,027)	0,375*** (0,033)	0,443*** (0,043)
	Ln_income_2020	0,017*** (0,007)	0,016** (0,007)	0,016** (0,007)	0,017** (0,007)	0,024*** (0,007)	0,034*** (0,011)
	Home ownership_2020	-0,048* (0,027)	-0,046* (0,027)	-0,038 (0,029)	-0,048* (0,027)	-0,070** (0,034)	-0,082* (0,043)
	Financial access	0,084** (0,040)	0,076* (0,040)	0,079* (0,044)	0,081** (0,041)	0,022 (0,048)	0,126* (0,067)
	Month of survey	0,034***	0,035***	0,029**	0,034***	0,047***	0,048**

		(0,013)	(0,013)	(0,014)	(0,013)	(0,017)	(0,022)
Statistics	N	3236	3236	2687	3236	5507	3236
	Wald chi2 (*)	22,215	528,965	404,195	529,719	796,939	461,205
	p-value Wald	0	0	0	0	0,000	0,000
	Pseudo R2 (**)	0,147	0,145	0,120	0,147	0,055	0,052
Instruments	Financial literacy in 2020		+				
	Average financial literacy of other household members in2020			+			
	Average financial literacy at regional level in2020				+		
Instrument types	GMM C-statistic of financial literacy endogeneity, Chi2(1)		1,74397	4,669	,099		
	p-value of C-Statistics		0,186	0,031	0,752		
	F-statistic in step one		602,854	297,297	263,994		
	p-value of F-statistics		0	0	0		
	Hansen J		-	-	-		

Note: * – $p < 0,1$; ** – $p < 0,05$; *** – $p < 0,01$.

Robust standard errors are calculated in each case.

(*) – F-statistics for OLS (constant is included in regression).

(**) – R2 for OLS.

In terms of quality, the results for the responsible financial behaviour index are unchanged; the quantitative assessments prove to be very close.

The regressions, separately for the adjusted Financial Naivety and Retirement Planning measures (similar to those in Table 14 and 15), are presented in Table 21.

Table 21. Regressions for adjusted Financial Naivety and Retirement Planning

		FN_2	RP_2
		Financial naivety adjusted	Retirement planning adjusted
Type of dependable variable		Discrete ordered	
Model		IV Ordered Probit	IV Ordered Probit
Financial literacy index		0.706*** (0.258)	-0.701*** (0.243)
Level of education		0.128** (0.055)	0.122** (0.053)
Financial experience	Relevant job	-0.063 (0.160)	-0.022 (0.152)
	Relevant industry	-0.023 (0.169)	-0.037 (0.159)
	Loss in financial crises	0.290 (0.207)	-0.099 (0.185)
	Entrepreneur's experience	0.121*	0.027

		(0.071)	(0.069)
Personal preferences	Risk tolerance	-0.138 (0.112)	0.179* (0.094)
	FL bias up	-0.098 (0.157)	-0.156 (0.129)
	High time discounting	0.031 (0.063)	-0.060 (0.061)
	Long planning horizon_1	0.501*** (0.119)	0.173 (0.124)
	Long planning horizon_2	0.085* (0.051)	0.025 (0.048)
	Optimism	0.278** (0.116)	0.287*** (0.104)
Controls	Gender (w = 1)	0.090* (0.051)	0.029 (0.047)
	Age	-0.021 (0.013)	-0.066*** (0.015)
	Age 'squared'	0.000** (0.000)	0.001*** (0.000)
	Marital status (married = 1)	-0.084 (0.055)	-0.030 (0.053)
	Family size	-0.026 (0.019)	-0.023 (0.018)
	Number of children	-0.002 (0.032)	-0.041 (0.031)
	Employment_2020	-0.009 (0.107)	-0.277*** (0.098)
	Type of residence (town = 1)	0.031 (0.072)	0.028 (0.066)
	Well-being_2020	0.309*** (0.053)	0.159*** (0.051)
	Ln_income_2020	0.028* (0.014)	0.022* (0.012)
	Home ownership_2020	-0.091 (0.056)	0.058 (0.054)
	Financial access	0.075 (0.083)	0.005 (0.077)
	Month of survey	-0.004 (0.028)	-0.017 (0.027)
Statistics	N	2949	2711
	Wald chi2	151.198	88.178
	p-value	0.000	0.000
Endogeneity test	P-value of corr(e_main;e_auxiliary)	0.049	0.253

Note: * – $p < .1$; ** – $p < .05$; *** – $p < .01$

Robust standard errors are calculated in each case.

Instrument: average financial literacy of other household members in 2020.

Based on comparison of the results from Table 21 with similar regressions for the initial indicators (Table 14 and 15), we note that the adjusted retirement planning indicator (excluding voluntary contributions in non-government pension funds) is negatively correlated with financial literacy, while the initial indicator is statistically insignificantly correlated. All else being equal, the more financially literate are less active in retirement planning unrelated to contributions to NPFs, while the less literate respond more often that they plan to live on their own savings or rent out housing, and that they save for old age in other ways. Those who are financially literate are likely more realistic in their assessments of the adequacy of their savings and the increased risks of losing purchasing power given a large number of macroeconomic shocks in Russia, and they less often give such responses. Risk tolerance maintains its positive statistical significance in the regression for the adjusted indicator. Thus, the results are unchanged: retirement planning in Russia is the behaviour of people with increased risk tolerance.

Conclusion

We rely on data from the All-Russian Survey of Consumer Finances to analyse the relationship between the financial literacy and regulatory financial behaviour indices.

Below are the key findings of this study.

- The calculated financial literacy index is statistically significantly and positively correlated with the responsible financial behaviour index. At the same time, the overall level of education is also significantly and positively correlated with responsible financial behaviour.
- Of the ten components of responsible financial behaviour, financial literacy is expectedly positively correlated with saving activity and asset portfolio diversification, and negatively correlated with the misperception of macroeconomic trends.
- An unexpected negative correlation (steady in various specifications) is found for the lending activity indicator (in which the main role is played by a decline in confidence in loans as literacy improves).
- Neither speculative investments nor excessive debt burdens are statistically significant for financial literacy. A positive correlation with financial literacy is found only for the financial naivety indicator, in which a major role is played by a large share of dollar cash (more than 50%) in total savings. However, this result may account for the characteristics of the period under study given the foreign exchange controls targeting cashless transactions and declining confidence in the banking system (roaring demand for ruble cash in February 2022). Regardless of foreign currency transactions, the adjusted financial naivety indicator remains positively and significantly correlated with financial literacy. Thus, the Russian data only partially confirm the findings of Kawamura et al. (2020).
- The financial experience and personal characteristic variables are also statistically significantly correlated with responsible financial behaviour, and this correlation is intuitively expected. For example, impatient people are characterised by less responsible behaviour. Conversely, a long planning horizon is positively correlated with responsible financial behaviour. Overestimated one's financial literacy (self-confidence) lifts the aggregate gauge; this is also true of respondents' optimism indicator. People with loss experience in past crises are characterised by less responsible financial behaviour.
- More correct financial behaviour is common to people who are married, city residents, and those who live in areas with good financial inclusion, earn high incomes and have a high self-assessment of their savings. Behind this correlation may lie the causal relationship in either or both directions (when the third variable, such as motivation or personal values, affects both financial behaviour and incomes or the decision to live in a large city). These results do not suggest that should all people relocate to large cities, their financial behaviour would become more responsible.

Given the role of individual preferences, these findings confirm that correct financial behaviour is most likely determined by some underlying individual factors that extend beyond financial literacy.

Of the personal characteristics, risk tolerance is positively correlated with irrational perception of reality and speculative investments. Notable is the positive correlation with retirement planning; this is probably a sign of retirement planning in Russia being a risky business.

A number of conclusions are possible.

First, higher financial literacy at the individual level can help smooth out consumption (through diversification of savings). Consequently, at the macroeconomic level, improved financial literacy may help in economic and financial market development through stable funding for banks and higher demand for investment instruments.

Second, to the degree the results are specific to 2022, in times of crisis financial literacy does not guarantee greater optimism and confidence in the financial system (this aggregate variable is statistically insignificant).

Third, financial literacy does not guarantee active retirement planning.

Fourth, higher financial literacy does not necessarily lead to lower acceptance of personal risks from high-risk investments or systemic risks from high debt burdens. The results do not refute a 'Woe from Wit' effect: for more financially literate people, risk awareness may be their informed risk-taking. Financial culture in these aspects of financial behaviour may be shaped through targeted action rather than through a broad financial literacy programme.

Bibliography

Cattaneo, Crump, Farrell, and Feng (2024): Binscatter Regressions. Working paper, prepared for the Stata Journal. <https://nppackages.github.io/binsreg/>

Fedorova, E. A. E., Nekhaenko, V. V., and Dovzhenko, S. E. E. (2015). Impact of financial literacy of the population of the Russian Federation on behavior on financial market: Empirical evaluation. *Studies on Russian Economic Development*, 26, 394–402.

Fernandes, D., Lynch Jr, J. G., and Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management science*, 60(8), 1861–1883.

Gilenko, E. and Chernova, A. (2021). Saving behavior and financial literacy of Russian high school students: An application of a copula-based bivariate probit-regression approach. *Children and Youth Services Review*, 127, 106122.

Hall, R. E. 1978. Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence. *The Journal of Political Economy*, 86(6), 971–987.

Kaiser, T., Lusardi, A., Menkhoff, L., and Urban, C. (2022). Financial education affects financial knowledge and downstream behaviors. *Journal of Financial Economics*, 145(2), 255–272.

Kawamura, T., Mori, T., Motonishi, T., and Ogawa, K. (2021). Is financial literacy dangerous? Financial literacy, behavioral factors, and financial choices of households. *Journal of the Japanese and International Economies*, 60, 101131.

Klapper, L., Lusardi, A., and Panos, G. A. (2013). Financial literacy and its consequences: Evidence from Russia during the financial crisis. *Journal of Banking and Finance*, 37(10), 3904–3923.

Kuzina, O. E. and Moiseeva, D. V. Strategies of financial behavior of Russians: Concept, dynamics, factors. *Voprosy Ekonomiki*. 2021; (10):71–88. [In Russian] <https://doi.org/10.32609/0042-8736-2021-10-71-88>

Modigliani, Franco and Richard H. Brumberg, 1954. Utility analysis and the consumption function: an interpretation of cross-section data. In: Kenneth K. Kurihara, ed. *PostKeynesian Economics*, New Brunswick, NJ. Rutgers University Press. Pp.388–436.

Modigliani, Franco, and Richard H. Brumberg, 1990. Utility analysis and aggregate consumption functions: an attempt at integration. In: Andrew Abel, ed. *The Collected Papers of Franco Modigliani: Volume 2, The Life Cycle Hypothesis of Saving*, Cambridge, MA. The MIT Press. Pp. 128–197.

Pikulina, E., Renneboog, L. and Tobler, P. N. (2017). Overconfidence and investment: An experimental approach. *Journal of Corporate Finance*, 43, 175–192.

Ramsey, F. P. 1928. A Mathematical Theory of Saving. *The Economic Journal*. 38(152), 543–559.

Smirnov, V. A. The phenomena of financial behavior of Russians (on the example of clients of Sberbank of Russia). *Moscow State University Bulletin. Series*

18. Sociology and Political Science. 2020; 26(1): 97–121. [In Russian] <https://doi.org/10.24290/1029-3736-2020-26-1-97-121>

Tintner, G. 1937. Monopoly Over Time. *Econometrica*. 5(2), 160–170.

Artemova, M., Mamedli, M., and Sinyakov, A. Regional heterogeneity of household lending based on the findings of the household finance survey: regional features and potential risks. Analytical Note of the Department of Research and Forecasting, Bank of Russia, 2018.

Bank of Russia (2023). [All-Russian Survey of Consumer Finances, 2022. Presentation](http://cbr.ru/Content/Document/File/145947/presentation_31-03-2023.pdf)http://cbr.ru/Content/Document/File/145947/presentation_31-03-2023.pdf.

Bessonova, E. V. and Tsvetkova, A. N. (2023B). Financial behaviour of households during the pandemic period [in Russian]. *Voprosy Ekonomiki*. 2023; (8):123–146.

Bessonova, E. V. and Tsvetkova, A. N. (2022). Financial behaviour of households during the pandemic. Analytical Note of the Department of Research and Forecasting, Bank of Russia, 2022 [in Russian].

Bessonova, E. V. and Tsvetkova, A. N. (2023A). Russian households' finances in 2022. Analytical Note of the Department of Research and Forecasting, Bank of Russia, 2023. [In Russian].

Mamedli, M. and Sinyakov, A. (2018). Household Finance in Russia: income shocks and consumption smoothing. *Voprosy Ekonomiki* No. 5, 2018 [in Russian].

Mamedli, M. and Sinyakov, A. (2017). Household lending in Russia: future and risks, based on household finance surveys. Analytical Note of the Department of Research and Forecasting, Bank of Russia, 2017 [in Russian].

Bank of Russia website (2022), The All-Russian Survey of Consumer Finances, available at: https://cbr.ru/ec_research/vserossiyskoe-obsledovanie-domokhozyaystv-po-potrebitel-skim-finansam/

Sinyakov, A. and Ushakova, Yu. Two Russian credit booms and current expansion of mortgage lending: lessons for policymaking. Analytical Note of the Department of Research and Forecasting, Bank of Russia, 2018.

Tishin, A. The impact of demography on the development of the financial sector in the Russian Federation. Analytical Note of the Department of Research and Forecasting, Bank of Russia, 2020 [in Russian].