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**FINANCIAL LITERACY AND
POVERTY REDUCTION:
THE CASE OF INDONESIA**

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Abstract

Given its role in affecting financial behavior, financial literacy has received considerable attention from researchers and policy makers alike. This paper employs data from a nationally representative survey in Indonesia to investigate the impact of financial literacy on poverty, which is a downstream welfare indicator. Consequently, we have constructed a composite financial literacy index. Our results reveal that financial literacy plays an important role in reducing poverty. This finding is robust, irrespective of the measure of financial literacy and regardless of the instrumentalization strategy adopted.

Contents

1. INTRODUCTION

It has been widely recognized that financial development matters for economic growth and poverty reduction (Levine 2005; Beck et al. 2007; Claessens and Perotti 2007). There has recently been a surge of international interest in advancing financial inclusion, which has a big role to play in reaching the Sustainable Development Goals. Many national governments have introduced enabling regulatory and policy environments, and efforts are being made by service providers to innovate in new products and/or make their services more accessible and affordable. However, according to the latest World Bank statistics on financial inclusion, 2 billion adults remain unbanked and only 54% of those in developing countries have a bank account or access to a financial institution. While there is a need to further reduce regulatory and supply-side barriers, it has become increasingly clear that reducing the barriers to financial services faced by those currently excluded is still a considerable challenge. Low financial literacy is one of the most important demand-side barriers.

Financial literacy can generally be defined as a person's ability to understand financial concepts and the skills to manage his/her financial resources, and has recently emerged as an important component of financial reform efforts. There is a growing body of literature providing evidence that financial literacy affects many people's financial decisions and behavior. Cohen and Nelson (2011) and Wachira and Kihiu (2012) document the positive effect of financial literacy on people's awareness of available financial services and they find that more financially literate households are more likely to seek out information about the financial services that are suitable for their needs. Hogarth et al. (2005) probe the impact of financial knowledge on bank account ownership, while Banerjee (1992) and Hastings et al. (2013) show a high correlation between financial illiteracy and low savings.

Lusardi and Mitchell (2011b), Lusardi and Mitchelli (2007), Lusardi and Mitchell (2011a), and Bucher-Koenen and Lusardi (2011) provide evidence that more financially literate people have a higher propensity to plan ahead for their retirement. Similarly, Clark et al. (2011), and Fornero and Monticone (2011) show that financial literacy can help to explain pension market participation. Van Rooij et al. (2011a), Yoong (2011), and Almenberg and Dreber (2015) conclude that there is a significant relationship between people's financial knowledge and their stock market participation. There is also evidence suggesting that financial literacy affects individual's motivation to seek out professional financial advice, and whether and how they follow the recommendations received (Calcagno and Monticone 2015; Hackethal et al. 2012; Stolper 2018).

There are, however, at least two gaps in the existing literature. First, the majority of studies on financial literacy have been confined to developed countries. There are considerably fewer studies on less developed countries, with rare exceptions such as Cole et al. (2011), Despard and Chowa (2014), Doi et al. (2014), Klapper et al. (2013), Murendo and Mutsonziwa (2017), Sayinzoga et al. (2016), and Sevim et al. (2012). This is partly due to the lack of reliable data on developing countries, which hinders researchers from constructing appropriate measurements of financial literacy. In addition, unlike developed countries where financial systems are mature and sophisticated, many developing countries have less developed financial markets and institutions. Only in recent decades have some less developed countries started reforming their financial systems and introducing ever-more multifaceted financial services and products. Consequently, the issue of (low) financial literacy has increasingly attracted the attention of both policy makers and scholars in developing countries, which has led to the call for more empirical studies.

Second, most of existing studies stop far short of welfare analysis. They tend to attempt to examine only (relatively) short-run effects or whether and to what extent financial literacy affects people's financial behavior related to account ownership, investment, savings, insurance, retirement planning, financial market participation, and so on. Even if some studies do dwell a bit further on the impact on economic outcomes, they usually look at what happens to the wealth cumulated from the related financial instruments (Cole et al. 2011). As noted in Karlan et al. (2014) in the case of savings, while improving financial knowledge has the potential to increase the use of savings products, it cannot be taken for granted that their net savings will increase (due to the possibility of crowd-out and crowd-in) and/or their overall wealth will improve (due to the possibility that putting more money in savings may have an adverse impact on other decisions, such as borrowing, investment, health, consumptions, etc.). Therefore, more empirical evidence is needed to reveal the impact of financial literacy on downstream welfare indicators.

This paper is motivated to join the discourse by addressing these gaps. It attempts to make a contribution to the scanty literature on financial literacy in developing countries. Furthermore, instead of focusing on the impact on financial behavior, like most of the extant studies, this paper explores the effects of financial literacy on poverty, which is a welfare indicator that is far down the impact chain. Developing countries are quite different from developed countries in that financial markets in the former are inherently incomplete and informationally deficient, and people there are more financially illiterate (Cole et al. 2011). If attention from policy makers and researchers to financial literacy comes down to not just its role in influencing financial behavior but, ultimately, also its impact on people's financial and economic well-being, then linking it with poverty in contexts where poverty is stark and prevalent has the potential to provide more useful and relevant empirical evidence.

This paper bases its empirical inquiry on Indonesia because financial literacy may be one of the most important barriers to access banking in this country (Cole et al. 2011). It is also one of the seven developing economies where the unbanked concentrate (Demirguc-Kunt et al. 2018), despite the fact that the Indonesian banking system has a relatively wide geographical reach. Although some previous research attempts have been made to examine financial literacy in Indonesia, they either use a non-representative sample of households, they aggregate data or they simply provide descriptive information (e.g., Hidajat 2015; Astuti and Trinugroho 2016; Amidjono et al. 2016). The most influential study conducted on the basis of a nationally representative household survey was Cole et al. (2011); however, the authors do not provide evidence of the impact of financial literacy on downstream welfare indicators. In this current paper, we aim to shed empirical light on the nexus of financial literacy and poverty by employing nationally representative household-level data from Indonesia, obtained from Financial Inclusion Insight.

This paper also makes an empirical contribution. Most previous studies have either measured financial literacy based on the total number of questions correctly answered by respondents or they have constructed a composite index based on the principal component (PCA) approach. While this paper follows the latter approach, we adopt a Polychoric Principal Component Approach (PPCA) because it is more suitable when the underlying variables are binary (Kolenikov and Angeles 2009), as is the case with the variables used to capture the respondents' financial literacy. One issue that needs to be addressed in empirical analysis is the potential endogeneity arising from omitted variables, which correlate with both financial literacy and the error term and/or reverse causality. This paper adopts an instrumental variables (IVs) approach to deal with the problem.

The remainder of the paper is organized as follows. The next section reviews the related literature, where the links between financial literacy and poverty are discussed. Section 3 details the methodology. Section 4 presents and discusses the results. The last section concludes.

2. FINANCIAL LITERACY AND POVERTY: RELATED LITERATURE

Financial literacy refers to people's understanding of financial concepts, as well as their skills and ability to manage money and make informed financial decisions. As noted by Calvet et al. (2007) and Van Rooij et al. (2011b), financially illiterate households and those with lower cognitive abilities are found to have difficulties in managing their daily expenditures, economic transactions, and financial resources. This is particularly true of and troubling for the poor, who, on the one hand, are more likely to be financial illiterate and, on the other hand, face constant and cumulative financial tightness. Therefore, their lack of skills and ability to manage their already limited resources to meet various basic living needs adds to the material hardship of their low and unstable incomes (Collins et al. 2010). Cohen and Nelson (2011) argue that financial literacy helps the poor by making them aware of financial issues and choices that they face, and develop strategies to deal with their financial state.

Both economics and consumer behavior literature agree that financial literacy affects people's financial behavior and economic decision-making. Financial literacy influences financial behavior because it constitutes an intrinsic factor that motivates an individual to seek out information and act on what they know (Hira 2010). However, the poor are more likely to be financially excluded and poor financial literacy is one of the demand-side barriers for financial inclusion. Braunstein and Welch (2002) argue that financial literacy has a positive impact on people's awareness and understanding of available financial services, which is particularly important to encourage the unbanked to become financially included. For those who are currently included, financial literacy also matters because it has an impact on a range of financial behaviors, which are deemed to be crucial for asset building and wealth accumulation, such as savings, retirement planning, financial market participation, investment and debt management (Bucher-Koenen and Lusardi 2011; Carpena et al. 2011; Clark et al. 2011; Fornero and Monticone 2011; Hilgert et al. 2003; Lusardi and Mitchell 2009; Van Rooij et al. 2011a; Van Rooij et al. 2011b; Van Rooij et al. 2012; Xu and Zia 2012). Not only is engaging in a particular financial behavior/practice important but the soundness of the decisions made when using financial services and products is also crucial. Agarwal et al. (2007) and Calvet et al. (2007) reveal that there is a negative association between financial literacy and financial mistakes. A lack of financial knowledge and capability leads to poor financial choices and investment mistakes, which could result in undesired economic consequences.

Low financial literacy is often cited as a potential cause of under-saving. Banerjee (1992) develops a theoretical argument to support this view based on the concept of the low-knowledge trap, which refers to a situation where the uninformed rely on social learning and end up herding on sub-optimal choices. Hastings et al. (2013) empirically document a strong correlation between low knowledge and under-saving, which is derived from household surveys in developed countries. For the poor, in particular those in developing countries, accumulating savings can help to smooth consumption, make financially productive investments in human and business capital, and guard against shocks (Karlan et al. 2014). However, given their low and uncertain incomes, saving money itself is not easy for the poor (although they do save), and transforming small amounts of money into

more substantial savings is more difficult. This is where having a savings account with a financial institution may help. The main concern for the poor who try to use savings product is to find safety and a reasonable return. Calvet et al. (2007) find that when savings returns are risky (including the risk of fraud), low financially literate people may opt-out of the market. Cole et al. (2011) also find that financial literacy is a strong predictor of demand for savings services and providing financial training to those with initially low financial knowledge can make them more likely to open and use a savings account. Although more research is needed to provide empirical evidence of the impact on people's financial condition and economic well-being, some studies have found positive effects of access to subsidized or specialized savings products on downstream income, expenditures, and/or wealth (Brune et al. 2011; Dupas and Robinson 2013; Prina 2015; Schaner 2018).

In terms of borrowing, financial literacy affects the sources from which people get loans. People with higher financial literacy are likely to rely less on informal borrowing sources, which is common in developing countries but tend to incur higher fees and charge higher interest rates (Lusardi and Tufano 2009; Stango and Zinman 2009; Klapper et al. 2013). In addition, there is an assumption that the lack of financial literacy makes people susceptible to fraud and abuse, and is correlated with default, delinquency and other borrower behavior that increases financial fragility (Campbell 2006; Disney and Gathergood 2013; Duca and Kumar 2014; Gerardi et al. 2010).

A more serious issue which has a great negative impact on the economic welfare of low-income households is over-indebtedness. French and McKillop (2016) show that poor money management skills are associated with high debt burdens. In addition, Sevim et al. (2012) find that individuals with higher financial literacy are less likely to exhibit excessive borrowing, which results from the informed use of selected beneficial financial services and consumer finance schemes emerging in most developing countries. In some less developed countries that have recently witnessed a microfinance crisis, a big lesson to learn is that the most financially vulnerable (who are also the least financially literate) can easily fall into debt traps that can leave them in even greater financial hardship (Young 2010).

Investment is another important way to increase household wealth. A body of research has found a strong correlation between financial literacy and investment efficiency. The more financially savvy are more likely to choose a low fee investment portfolio (Choi et al. 2009) and/or show better portfolio diversification (Calvet et al. 2007; Graham et al. 2009). Around the world, a substantial fraction of the poor act as entrepreneurs to raise capital and make investments (Banerjee and Duflo 2007).

Another important channel to mitigate poverty is insurance. The poor are particularly vulnerable to external shocks, such as illness, job losses, crop failure, the death of wage earners, and so on. Insurance plays a crucial role in society and an individual's financial well-being by offering protection against adverse events. The poor are particularly vulnerable to external shocks and this vulnerability, and when combined with unstable income and low savings, this translates into much greater levels of material hardship because adverse events jeopardize the poor's ability to meet basic living needs. Despite the high threat of adverse events, poor individuals are less likely to buy insurance and they instead rely mainly on informal mechanisms through social networks, which only have a limited ability to protect the households against risks (Banerjee and Duflo 2007). In addition to supply-side barriers, such as the unsuitability of insurance products for the risks faced by low-income households, demand-side issues such as low awareness and poor insurance literacy also contribute to low coverage of insurance among the poor (Dalkilic and Kirkbesoglu 2015). Even when innovation is made to reduce some supply-side barriers, which has made micro-insurance products more accessible for the poor,

Yeboah and Obeng (2016) show that more financially literate micro-entrepreneurs are more likely to pay for such products.

In summary, it is clear from the existing literature that financial literacy can impact on poverty by affecting an individual's ability to manage their financial resources, and by influencing financial behavior and decision-making in those areas that are particularly crucial for the poor to improve their economic well-being. However, there is a void of empirical evidence regarding the nexus of financial literacy and poverty—this paper attempts to fill that gap.

3. METHODOLOGY

3.1 Data

This study uses data from the Financial Inclusion Insights (FII) database. This database is compiled by Intermedia and is based on national representative surveys that focus on the adult population (15 years and older). This survey was undertaken in eight African and Asian countries, including Indonesia, which is the focus of the current study. These surveys used questionnaires to assess an individual's financial and digital literacy. Additionally, this survey collected the respondent's demographic and socioeconomic attributes. In the context of Indonesia, it is worth noting that although data was collected for the years 2014, 2015, and 2016, the current study is based on the 2014 dataset. This choice is based on the following reasons. First, the 2014 dataset allows us to estimate a poverty measure based on consumption expenditures; however, this variable is not available for the data from 2015 and 2016. This research holds that it is essential to calculate an individual's consumption to capture the poverty level because people develop their living standards from the real consumption of goods and services, instead of from income per se. Therefore, consumption is predicted to be a more suitable measure relative to measurement errors because there are many missing values for the income data in the survey. Second, the 2014 dataset provides financial literacy indicators that are in line with commonly used financial literacy measurements, which makes it easy to compare our findings with those of existing studies.

Our dataset included 6,000 respondents surveyed from 24 out of the 34 provinces in Indonesia. These 24 provinces account for approximately 94% of the national population, and thus the sample can be considered as nationally representative.[1]

3.2 Measuring Financial Literacy

In the existing literature, financial literacy is measured by asking a series of questions covering a range of financial concepts. The questions asked by the FII survey are similar to those first used by Lusardi and Mitchelli (2007), and later widely adopted in other studies (Cole et al. 2011; Dick and Jaroszek; 2013; Fort et al. 2016; Gathergood 2012; Grohmann et al. 2014; Lusardi and Mitchell 2011b; Lusardi and Mitchell 2011a; Mahdzan and Tabiani 2013; Millimet et al. 2015). The questions include capturing: (i) numeracy and capacity to do calculations related to interest rates (such as compound interest); (ii) understanding of inflation; and (iii) understanding of risk diversification. Each correct answer is given a score of one. Several approaches have been adopted in the existing literature to compute the relevant financial literacy index. For example, Lusardi

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[1] Ten provinces were excluded from the survey due to cost and logistical considerations.

and Mitchelli (2007), Cole et al. (2011), Klapper et al. (2013), among others derived a financial literacy index by adding each score obtained by the respondents. Meanwhile, Brown and Graf (2012) rely on a binary financial literacy score that gives one point for the respondents answering all questions correctly and zero to those who failed to answer one or more questions correctly.

While these approaches of measuring financial literacy are sensible, they tend to give the questions (asked) the same weight. In other words, they overlook the fact that the questions are different in both difficulties and concepts involved. To address this shortcoming, other studies have derived a composite index based on the PCA (e.g., Behrman et al. 2012; Klapper et al. 2015; Lusardi and Mitchell 2011b; Müller and Theuvsen 2015). The current paper follows the latter studies in the construction of the financial literacy index. Nonetheless, it is worth stressing that we depart from these studies in terms of the PCA method that we have adopted. The standard PCA adopted by these studies is based on the well-known Pearson correlation, which is suited for continuous variables. However, in the context of discrete variables, the normality assumption no longer holds and any attempt to implement the standard PCA will lead to inconsistent and biased weights (Kolenikov and Angeles 2004). PPCA, which was proposed by Kolenikov and Angeles (2009), is a better approach to handle discrete data. Similar to the concept of probit regression, the PPCA computes a polychoric correlation based on maximum likelihood to allow for the analysis of discrete data. Using the PPCA, this study constructs a composite index of financial literacy. The computed index is normalized between 0 and 1, with a higher value indicating a higher financial literacy level.

3.3 Measuring Poverty

A higher financial literacy level may improve the individual's investment behavior, increase their savings and investment income, and correspondingly lead to a higher total income and higher consumption. In fact, while financial services are becoming ever more accessible, people with higher financial literacy might better recognize the need and the benefits of financial markets, and thus they may also spend more by increasing their leverage or borrowing. Correspondingly, the use of financial services, especially credit markets, is predicted to generate higher levels of consumption (Prinsloo 2002). Hence, following studies such as Ravallion (1992), Ravallion and Lokshin (2005), Cutler and Katz (1992), Ravallion (1992), Slesnick (1993), Grootaert (1999), Balisacan et al. (2003), Pradhan et al. (2000) and Meyer and Sullivan (2003), consumption expenditures are used as proxies for poverty. This measure is in line with the World Bank's definition of poverty; that is, the inability to fulfill a minimum of living standards based on consumption (World Bank 1990). Consumption expenditures are also used by the Indonesian government to determine the country's poverty levels.

3.4 Empirical Strategy

To examine the impact of financial literacy on poverty, the following model is estimated:

$$Y_i = \alpha_0 + \alpha_1 FL_i + \alpha_2 X_i + \eta_i + \varepsilon_i \tag{1}$$

where *Y* denotes poverty, *FL* is the financial literacy index, and *X* is a vector of the control variables. Following the literature, the control variables include gender, marital status, age, occupation and education level of the respondent, household size, a dummy for individuals who have more than one family member earn money to take care of the household, a dummy capturing urban locations, a dummy for experiencing financial shocks over the last three months, and a dummy of bank account ownership. In the model, the regional fixed effects, η_i, are included to control for other regional unobservables and accommodate regional heterogeneity. The parameter of interest is α_1, which captures the effect of financial literacy on poverty.

4. THE RESULTS

4.1 Descriptive Statistics

Table 1 breaks down the individual's financial literacy index along with their socioeconomic characteristics, including poverty level. The distribution of index shows that among the poor, there is a greater fraction of individuals with low financial literacy level than the non-poor, which corroborates the expectations and observations of previous studies. There are also no significant differences in term of financial literacy index between males and females in Indonesia, which is consistent with Morgan and Trinh (2017). In line with Brown and Graf (2013), the data indicate that married people have higher levels of financial literacy. In contrast to earlier findings such as Potrich et al. (2015), Table 1 shows that the average score of financial literacy index among young respondents is higher compared to other age levels, whereas the 55–64 age group shows a significantly lower level of financial literacy. There are several possible explanations for this. First, this could be related to education level—because Indonesia is a developing country, the older group has lower levels of education than the younger generations. Second, there is a possibility that younger generations have been more exposed to the massive spread of financial institutions over the last decade, and they are likely to receive more information about financial concepts. Third, this could also be due to the impact of financial education initiatives targeted at younger generations.

Table 1 suggests that individuals with higher levels of education have higher financial literacy. For example, individuals with no education have, on average, lower financial literacy than those of high school by 24 percentage points. This is in line with observations from existing studies, such as Santoso et al. (2016) and Bucher-Koenen and Lusardi (2011). Similar to ANZ (2008); However, there seems to be evidence that there are marked differences in the level of financial literacy among different occupations. In Indonesia, individuals with professional occupations have substantially higher financial literacy than those who have non-professional occupations (including students and unemployed groups). The urban populace in Indonesia also tends to have higher levels of financial literacy than their rural counterparts.

Figure 1 reports the values of the scores of financial literacy in Indonesia. Generally, about 23% of respondents are unable to answer all three questions, while only 33% of respondents answered all of the questions correctly.

Table 1: The Average Financial Literacy Index Across Demographics

Characteristics	Observation	The Average Financial Literacy Index
Whole sample	6,000	0.56
Poverty		
Poor	2,425	0.49
Non-poor	3,574	0.60
Gender		
Male	3,493	0.58
Female	2,367	0.55
Marital status		
Single	1,001	0.36
Non-single	4,999	0.54
Age		
Age 15–24 years	919	0.62
Age 25–34 years	1,290	0.61
Age 35–44 years	1,408	0.59
Age 45–54 years	1,103	0.53
Age 55–64 years	1,280	0.44
Education		
No school	259	0.24
Primary school	2,584	0.48
Junior high school	2,776	0.64
Senior high school	372	0.70
University	9	0.77
Location		
Urban	3,160	0.62
Rural	2,840	0.49
Occupation		
Professional occupation	1,081	0.64
Non-professional occupation	4,919	0.54

Figure 1: Percentage of Correct Answers for Indonesia
(%)
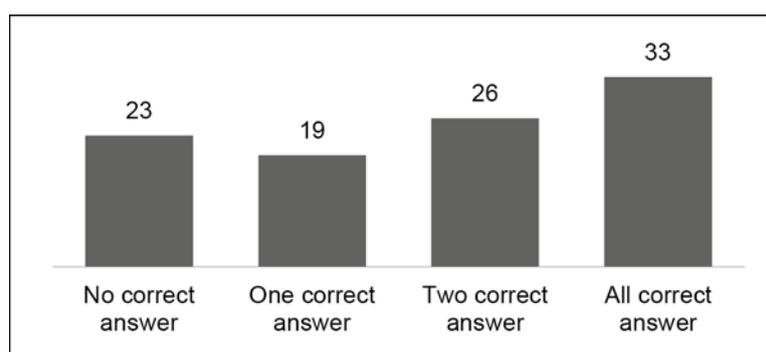
Source: Financial Inclusion Insight (2014).

Table 2 describes the poverty levels of Indonesia in our sample. The percentages of poor individuals are high among female respondents, those without no education, people living in rural areas, and individuals without a professional occupation. Table C1 in Appendix C summarizes the variables included in the model specification and it reports the summary statistics. It can be seen that about 39% of the respondents were male, 17% were single, and the majority (about 52%) lived in urban areas. Most respondents had a small family (less than four members) and most lived in a household where there was only one member earning an income. Of the sample, only 18% of the respondents had a managerial or professional occupation. The education level of the sample was relatively low, with an average of 4.85 years of schooling. The ownership of bank accounts was low in the sample—only 21% of the respondents claimed to have an account.

Table 2: The Distribution of the Poor Across Demographics

Characteristics	Observation	The Percentage of Poor Individuals
Whole sample	6,000	
Gender		
Male	3,493	31
Female	2,367	39
Marital status		
Single	1,001	36
Non-single	4,999	35
Age		
Age 15–24 years	919	38
Age 25–34 years	1,290	30
Age 35–44 years	1,408	29
Age 45–54 years	1,103	36
Age 55–64 years	1,280	45
Education		
No school	259	62
Primary school	2,584	45
Junior high school	2,776	28
Senior high school	372	12
University	9	33
Location		
Urban	3,160	29
Rural	2,840	43
Occupation		
Professional occupation	1,081	23
Non-professional occupation	4,919	38

4.2 Econometric Results

Table 3 presents the regression results using the OLS, where the dependent variable is measured by a continuous indicator based on consumption expenditures. The financial literacy variable is the composite index based on the PPCA with the 'do not know' option

is treated as an incorrect answer. Furthermore, the table reports the analysis results as hierarchical regression by adding control variables (as groups). This approach is adopted to ensure that the results regarding the financial literacy variable remain robust to specification changes. In total, seven model specifications are reported. It can be seen from the table that the coefficient of the financial literacy variable is positive and statistically significant across all of the regressions, which indicates the positive impact of financial literature on the levels of consumption expenditures. It should be noted that the magnitude of the coefficient registers a substantial decrease when respondents' age and education are controlled (see Models 2 and 3), which implies that part of the impact of financial literacy as shown in Models 1 and 2 is confounded by the impact of education on the level of poverty. Nonetheless, the coefficient of financial literacy remains positive and significant, even after controlling for education. This corroborates Behrman et al. (2010), who also document financial literacy's positive impact after education variables are included in their estimations. The financial literacy coefficient becomes only slightly smaller when other variables that potentially confound the association between financial literacy and poverty are included, such as financial shocks and bank account ownership.

Generally speaking, the results of the controls are in line with the findings of most existing studies. Males tend to have higher consumption levels, while people who are single and those who have experienced financial shocks tend to have lower consumptions. People aged 35–54 seem to be better off than the other age groups. Urban residents tend to have higher consumption levels than rural people, which is in line with the observation in most less developed countries that poverty is more prevalent and severe in rural areas. Consistent with the intuition and the existing literature, education appears as a strong predictor of consumption levels. So is the variable of income-earning members, indicating that consumption expenditures are higher in families with more members contributing to family incomes. People with a managerial or professional occupation appear to have higher consumption levels, although the coefficient of the variable becomes statistically insignificant when bank account ownership is controlled for.

In addition to measuring the poverty variable with the continuous indicator, we also experiment with employing probit regression models in which poverty is treated as a binary variable by adopting the World Bank's poverty line (i.e., people with consumption expenditures below \$1.25 per day are categorized as living in poverty). The results reported as hierarchical repression are presented in Table 4, which are qualitatively similar to the OLS results.[2] Based on the coefficient of Model 7, where all of the control variables are included, the probability of living in poverty decreases by around 18 percentage points when the financial literacy index increases by one standard deviation. This confirms the finding of the OLS results, it also corroborates the conclusions of Van Rooij et al. (2012), Fort et al. (2016), and Behrman et al. (2012), who all document a negative association between financial literacy and the likelihood of being poor.

It should also be noted that unobservable factors such as parents' education, the level of confidence in financial skills and time preference may potentially affect the results but the analysis in this paper is unable to capture such variables due to data unavailability. However, Behrman et al. (2010) find that there is no substantial effect of parents' education in the link between financial literacy and household wealth. In addition, Van Rooij et al. (2011b), who examine the relationship between financial literacy and household wealth in the Netherlands, maintain that an individual's confidence in finance and time preference does not affect the level of wealth and

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[2] As for probit regression analysis, a positive coefficient indicates that an increase in the predictor brings an increase in the predicted probability of being poor and a negative coefficient suggests that an increase in the predictor brings a reduction in the predicted probability of being poor.

controlling for these variables only slightly changes the coefficient estimate of financial literacy.

Table 3: Regression Results: OLS Estimation

Variables	Dependent Variable: Log of Expenditure						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Financial literacy	0.266***	0.258***	0.119***	0.101***	0.100***	0.098***	0.087***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Gender		0.127***	0.120***	0.125***	0.111***	0.112***	0.105***
		(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Single		−0.096***	−0.141***	−0.142***	−0.149***	−0.149***	−0.133***
		(0.023)	(0.031)	(0.030)	(0.030)	(0.030)	(0.030)
Family members		0.031***	0.014**	0.013**	0.008	0.009	0.011*
		(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Age 25–34 years			0.015	0.025	0.032	0.032	0.060
			(0.038)	(0.038)	(0.038)	(0.038)	(0.037)
Age 35–44 years			0.129***	0.133***	0.130***	0.130***	0.137***
			(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Age 45–54 years			0.152***	0.160***	0.158***	0.158***	0.166***
			(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Age 55–64 years			0.109***	0.111***	0.103***	0.104***	0.109***
			(0.026)	(0.026)	(0.026)	(0.026)	(0.025)
Education			0.071***	0.062***	0.059***	0.058***	0.044***
			(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Urban				0.163***	0.163***	0.159***	0.142***
				(0.017)	(0.017)	(0.017)	(0.017)
Occupation					0.081***	0.079***	0.038*
					(0.022)	(0.022)	(0.022)
Inc-earning members					0.022**	0.022**	0.019*
					(0.011)	(0.011)	(0.011)
Financial shock						−0.063**	−0.065**
						(0.029)	(0.029)
Bank account							0.237***
							(0.022)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.03	0.04	0.14	0.15	0.16	0.16	0.17
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: A constant is included in all regressions but is not reported. Figures in parentheses are robust standard errors; *, ** and *** represent statistical significance at 10%, 5%, and 1%, respectively.

Table 4: Regression Results: Probit Models

Variables	Dependent Variable: Binary Poverty						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial literacy	−0.438***	−0.429***	−0.236***	−0.207***	−0.204***	−0.203***	−0.188***
	(0.044)	(0.044)	(0.046)	(0.047)	(0.047)	(0.047)	(0.047)
Gender		−0.222***	−0.220***	−0.231***	−0.202***	−0.203***	−0.196***
		(0.035)	(0.036)	(0.036)	(0.037)	(0.037)	(0.037)
Single		0.146***	0.229***	0.232***	0.248***	0.248***	0.221***
		(0.046)	(0.063)	(0.063)	(0.064)	(0.064)	(0.064)
Family members		−0.049***	−0.023**	−0.022*	−0.013	−0.014	−0.017
		(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
Age 25–34 years			0.008	−0.011	−0.024	−0.023	−0.066
			(0.075)	(0.075)	(0.075)	(0.075)	(0.076)
Age 35–44 years			−0.166***	−0.174***	−0.169***	−0.170***	−0.180***
			(0.056)	(0.057)	(0.057)	(0.057)	(0.057)
Age 45–54 years			−0.199***	−0.214***	−0.211***	−0.212***	−0.225***
			(0.054)	(0.054)	(0.055)	(0.055)	(0.055)
Age 55–64 years			−0.103*	−0.108**	−0.094*	−0.094*	−0.103*
			(0.054)	(0.054)	(0.055)	(0.055)	(0.055)
Education			−0.115***	−0.099***	−0.093***	−0.093***	−0.068***
			(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Urban				−0.271***	−0.270***	−0.267***	−0.243***
				(0.037)	(0.037)	(0.037)	(0.037)
Occupation					−0.168***	−0.167***	−0.099*
					(0.052)	(0.052)	(0.053)
Inc-earning members					−0.043*	−0.042*	−0.038
					(0.024)	(0.024)	(0.024)
Financial shock						0.052	0.055
						(0.063)	(0.063)
Bank account							−0.416***
							(0.052)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.02	0.02	0.06	0.07	0.07	0.07	0.08
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: A constant is included in all regressions but is not reported. Figures in parentheses are robust standard errors; *, ** and *** represent statistical significance at 10%, 5%, and 1%, respectively.

4.3 Robustness Check

4.3.1 Dealing with Endogeneity

The baseline OLS estimation results indicate that financial literacy has a strong impact on poverty. However, the related findings should be interpreted with caution. Indeed, when estimating a model such as (1), it is possible that our variable of interest, financial literacy, is endogenous. It is likely that those who are poor are also those who have low financial literacy. This reverse causality may bias the results obtained from estimating model (1). In addition, there may be unobservables that correlate with both the financial literacy variable and the error term. Therefore, the Hansen test is performed, which confirms the endogeneity of the variable.

A number of different approaches have been adopted in the literature to circumvent these issues. For example, some studies use field experiments to parse out the effects of financial literacy on economic outcomes (Cole et al. 2011; Sayinzoga et al. 2016). Another strategy that has been widely used in the literature is the use of IVs (based on the 2SLS). This paper adopts the latter approach. In practical terms, however, choosing the appropriate instruments remains one of the main challenges faced by researchers. In this paper, we use three potential instruments. The first instrument is the distance between the household and the nearest bank branch. This is inspired by studies that employ distance-related variables to instrument the independent variable in concern. For instance, Ky et al. (2016) use the instrument of the distance between a household and the nearest mobile money provider when estimating the impact of mobile money on savings behavior. Redding and Venables (2004) adopt the distance to the central areas as an instrument for market access. Similarly, Alcaraz et al. (2012) instrument remittance by the distance to a railroad route.

It is arguable that people living nearer a bank (or a financial institution) may have better exposure to financial information, which makes them more aware of financial products and more familiar with financial matters. The distance is thus correlated with a person's financial literacy but is largely beyond the respondent's control and thereby largely exogenous to her or his actions and economic outcomes. However, we understand the limitations of using this instrument because banks are often located in the central of the town/city or near a market, and thus the distance to the bank may, to some extent, correlate with consumption. Meanwhile, the inclusion of the urban vs. rural dummy and the dummy of bank account ownership as regressors in the estimation may to some extent mitigate the problem.

The second and third instruments are the ratio of the number of university students to the total number of households in the region and the ratio of financial workers to the total number of households at the regional level, respectively. The use of the two regional-level factors as instruments is motivated by various studies based on the idea that people can improve financial literacy by social interaction and learning from peers. For instance, Lachance (2014) instruments financial literacy by the neighborhood education level and the number of financial workers in the region. Christiansen et al. (2007), Sekita (2011), and Klapper et al. (2015) include a variable in their instruments that captures the education level of the region in concern. Exogenous to the respondent, these regional-level factors fulfill the requirement for instruments in that they affect an individual's financial awareness and knowledge through mechanisms such as peer learning but do not directly affect the individual's welfare.

The data on household-bank distance is drawn from the FII. The data on financial workers and university students are both drawn from the Indonesia Database for Policy and Economic Research, World Bank Group. The 2SLS is used to do the estimation, in which the first stage regression regresses financial literacy upon the three instruments and the exogenous regressors in Equation (1). Therefore, IVs are adopted and the estimation is conducted using 2SLS. In the first stage regression, the financial literacy index is regressed on the three instruments (namely household-bank distance, regional education level and the regional ratio of financial workers) and the exogenous regressors in Equation (1). The F test statistics reject weak instruments and the Hansen J statistics indicate no over-identification.

The results from the second-stage regression are reported in Table 5, which are again arranged in hierarchical regression. The results for the control variables are qualitatively similar to those obtained from OLS, except that now the financial shock variable becomes insignificant. For the coefficient of financial literacy, the estimated parameter is positive and statistically significant across the different specifications, which

indicates that this variable has a positive impact on individual consumption. It should be noted that the coefficients of the financial literacy variable obtained from 2SLS are larger in magnitude than those from OLS. This is in line with the observation made by Lusardi and Mitchell (2014) based on a review of many influential studies on the topic. There are several explanations for this. First, IV estimates tend to assess the local average treatment effect, while OLS estimates measure the average treatment effect over the whole population. Second, if individuals affected by the instruments have large responses, then the IV estimates become larger than the OLS ones. Finally, there may be unobservable factors that have a negative impact on financial literacy but a positive effect on poverty, or vice versa (Fort et al. 2016).

Table 5: Regression Results: IVs

Variables	Dependent Variable: Log of Expenditure						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial literacy	2.241***	2.354***	2.356***	2.345***	2.390***	2.339***	2.326***
	(0.232)	(0.250)	(0.287)	(0.316)	(0.314)	(0.296)	(0.296)
Gender		0.100***	0.081***	0.082***	0.073**	0.073**	0.069**
		(0.028)	(0.028)	(0.028)	(0.029)	(0.029)	(0.029)
Single		−0.272***	−0.149***	−0.149***	−0.155***	−0.155***	−0.147***
		(0.042)	(0.049)	(0.049)	(0.050)	(0.049)	(0.049)
Family members		−0.004	0.003	0.003	−0.001	−0.001	0.000
		(0.009)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
Age 25–34 years			−0.232***	−0.230***	−0.230***	−0.224***	−0.208***
			(0.068)	(0.070)	(0.070)	(0.069)	(0.070)
Age 35–44 years			−0.122**	−0.121**	−0.126**	−0.120**	−0.116**
			(0.055)	(0.057)	(0.057)	(0.055)	(0.055)
Age 45–54 years			−0.067	−0.066	−0.070	−0.065	−0.060
			(0.051)	(0.053)	(0.054)	(0.052)	(0.052)
Age 55–64 years			−0.016	−0.016	−0.022	−0.020	−0.016
			(0.046)	(0.046)	(0.047)	(0.046)	(0.046)
Education			0.004	0.004	0.000	0.002	−0.006
			(0.010)	(0.010)	(0.010)	(0.009)	(0.009)
Urban				0.009	0.006	0.013	0.005
				(0.036)	(0.036)	(0.035)	(0.034)
Occupation					0.044	0.047	0.025
					(0.039)	(0.039)	(0.039)
Inc-earning members					0.019	0.019	0.017
					(0.018)	(0.018)	(0.018)
Financial shock						0.066	0.065
						(0.055)	(0.055)
Bank account							0.126***
							(0.040)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F statistics	46	41	32	26	27	30	30
Hansen J p-value	0.44	0.44	0.59	0.58	0.71	0.67	0.64
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: A constant is included in regressions but is not reported. Figures in parentheses are robust standard errors; *, ** and *** represent statistical significance at 10%, 5%, and 1%, respectively.

In addition to using the three instruments together, we also experiment with the instrumentation strategies by using alternative combinations and we obtain largely similar results.[3]

4.3.2 Alternative Measure of Financial Literacy

As previously mentioned, the financial literacy index that we have used in the main analysis is constructed based on the PPCA. An alternative financial literacy index is tried by adding up the total number of questions that a respondent has got right. This strategy is similar to that employed in Cole et al. (2011) and Klapper et al. (2013). Using this alternative financial literacy index, estimations are made using both OLS and probit models, and the results reported in Tables 6 and 7, respectively. It can be seen that the findings from the main analysis hold when the composite financial literacy index is constructed in a different way.

Table 6: Regression Results: OLS Estimation with Alternative Financial Literacy Index

Variables	Dependent Variable: Log of Expenditure						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial literacy	0.089***	0.086***	0.040***	0.034***	0.033***	0.033***	0.029***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Gender		0.127***	0.120***	0.125***	0.111***	0.112***	0.105***
		(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Single		−0.096***	−0.141***	−0.142***	−0.149***	−0.149***	−0.133***
		(0.023)	(0.031)	(0.030)	(0.030)	(0.030)	(0.030)
Family members		0.031***	0.014**	0.013**	0.008	0.009	0.011*
		(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)
Age 25–34 years			0.015	0.025	0.032	0.032	0.060
			(0.038)	(0.038)	(0.038)	(0.038)	(0.037)
Age 35–44 years			0.129***	0.133***	0.130***	0.130***	0.137***
			(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Age 45–54 years			0.152***	0.159***	0.158***	0.158***	0.166***
			(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Age 55–64 years			0.109***	0.111***	0.103***	0.104***	0.109***
			(0.026)	(0.026)	(0.026)	(0.026)	(0.025)
Education			0.071***	0.062***	0.059***	0.058***	0.044***
			(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
Urban				0.163***	0.163***	0.159***	0.142***
				(0.017)	(0.017)	(0.017)	(0.017)
Occupation					0.081***	0.079***	0.038*
					(0.022)	(0.022)	(0.022)
Inc-earning members					0.022**	0.022**	0.019*
					(0.011)	(0.011)	(0.011)
Financial shock						−0.063**	−0.065**
						(0.029)	(0.029)
Bank account							0.237***
							(0.022)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.03	0.05	0.14	0.15	0.16	0.16	0.17
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: A constant is included in regressions but is not reported. Figures in parentheses are robust standard errors; *, ** and *** represent statistical significance at 10%, 5%, and 1%, respectively.

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[3] The results are available from the authors upon request.

Table 7: Regression Results: Probit Models with Alternative Financial Literacy Index

Variables	Dependent Variable: Binary Poverty						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Financial literacy	−0.146***	−0.143***	−0.079***	−0.069***	−0.068***	−0.068***	−0.063***
	(0.015)	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.016)
Gender		−0.222***	−0.220***	−0.231***	−0.202***	−0.203***	−0.196***
		(0.035)	(0.036)	(0.036)	(0.037)	(0.037)	(0.037)
Single		0.146***	0.229***	0.232***	0.248***	0.248***	0.221***
		(0.046)	(0.063)	(0.063)	(0.064)	(0.064)	(0.064)
Family members		−0.049***	−0.023**	−0.022*	−0.013	−0.013	−0.017
		(0.011)	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)
Age 25–34 years			0.008	−0.011	−0.024	−0.023	−0.066
			(0.075)	(0.075)	(0.075)	(0.075)	(0.076)
Age 35–44 years			−0.166***	−0.174***	−0.169***	−0.170***	−0.180***
			(0.056)	(0.057)	(0.057)	(0.057)	(0.057)
Age 45–54 years			−0.199***	−0.214***	−0.211***	−0.212***	−0.225***
			(0.054)	(0.054)	(0.055)	(0.055)	(0.055)
Age 55–64 years			−0.103*	−0.108**	−0.094*	−0.094*	−0.103*
			(0.054)	(0.054)	(0.055)	(0.055)	(0.055)
Education			−0.115***	−0.099***	−0.093***	−0.093***	−0.068***
			(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Urban				−0.271***	−0.270***	−0.267***	−0.243***
				(0.037)	(0.037)	(0.037)	(0.037)
Occupation					−0.168***	−0.167***	−0.099*
					(0.052)	(0.052)	(0.053)
Inc–earning members					−0.043*	−0.042*	−0.038
					(0.024)	(0.024)	(0.024)
Financial shock						0.052	0.055
						(0.063)	(0.063)
Bank account							−0.416***
							(0.052)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.02	0.03	0.06	0.07	0.07	0.07	0.08
Observations	6,000	6,000	6,000	6,000	6,000	6,000	6,000

Notes: a constant is included in regressions but is not reported. Figures in parentheses are robust standard errors; *, ** and *** represent statistical significance at 10%, 5%, and 1%, respectively.

5. CONCLUSIONS

Financial literacy has received considerable attention from researchers, practitioners, and policy makers around the world. In the growing body of related literature, most studies have focused on developed countries and the majority have examined the relationship between financial literacy and various financial behaviors. In comparison, fewer efforts have been made to unravel its impact on welfare indicators further down the impact chain, particularly individual consumption levels and poverty. This paper attempts to fill these gaps by conducting an empirical analysis of the nexus of financial literacy and poverty in the context of Indonesia. Based on the data obtained from the FII database, our analysis constructs a composite financial literacy index using the PPCA to accommodate the binary nature of the underlying variables.

Estimations are made using both OLS, in which poverty is measured as a continuous indicator, and probit models, in which poverty is treated as a binary variable. To ensure the robustness of the findings, this paper employs IVs to address the issue of endogeneity and it experiments with an alternative strategy of constructing the financial literacy index.

The results of the analysis reveal that financial literacy has a positive and statistically significant impact on individual's consumption. This paper provides empirical evidence of the importance of financial literacy in poverty reduction, which the literature has theoretically implied but rarely empirically tested. Among existing studies that have related financial literacy to downstream welfare indicators, Sayinzoga et al. (2016) document that financial education training does not have a significant impact on monthly expenditures. However, they note that the absence of evidence in their study may be due to the relatively short period involved in their field experiment (i.e., the period between the education intervention and the measurement is too short for the effect to manifest). Thus, the finding of this current paper does not necessarily contradict that of Sayinzoga et al. (2016), but it instead offers empirical insights into the role of financial literacy in helping poor people improve their economic well-being and reduce poverty in the context of a developing country.

Given the important role of financial literacy in improving people's economic welfare, a key policy lesson from this study is that it is advisable for national and international efforts in poverty reduction to pay more attention to improving and enhancing an individual's financial knowledge and skills. This could be done by incorporating financial literacy into the educational curriculum, as well as through the provision of targeted and specially tailored training programs. The latter is particularly crucial in Indonesia and other less developed countries because, as indicated by the data used in this paper, financially illiterate people concentrate among women, people living in rural areas, and those with the least education. These are the same groups that formal education may find difficult to reach. This points to the importance of targeting such programs to the economically and socially disadvantaged to have the greatest impact on poverty reduction.

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APPENDIX

A.   Financial Inclusion Insight Database: Sampling and Questions About Financial Literacy

The initial step of the sampling process is to distribute the sample in the 24 provinces proportionately with the target respondents aged 15 and over. This survey uses a proportionate-to-population size (PPS) technique to randomly select rural and urban areas in each district in every province. Small administrative units, namely census blocks from that primary sampling units, are randomly nominated using a PPS technique and are registered to choose the districts. The data from the Indonesian Bureau of Statistics is then used as a direction in choosing a household. Furthermore, 10 households are randomly selected within each selected census block.

Using the Kish and Grid technique, one respondent is chosen for every household and has to fulfill the survey requirement. Variables used for choosing eligible respondent are sex and age, starting from the oldest male to the youngest, followed by the oldest female to the youngest. Given the sequence number, the eligible respondent is selected as the sample based on the intersection between the household serial number sequence column with the number of eligible household members in the household.

B.   Constructing the Financial Literacy Index

Table B1: Correlation Between Financial Literacy Questions

Variable	Interest Rate	Inflation	Risk Diversification
Interest rate	1		
Inflation	0.374	1	
Risk diversification	0.473	0.485	1

Table B2: PPCA

Component	Eigenvalues	Proportion Explained	Cum. Explained
1	2.358	0.786	0.786
2	0.381	0.127	0.913
3	0.259	0.086	1

Table B3: Scoring Coefficient for PPCA

Variable	Coeff. 1	Coeff. 2	Coeff. 3
Interest rate	0.285	0.373	0.183
Inflation	0.537	−0.630	0.445
Risk diversification	0.405	−0.041	−0.547

**Figure B1: Scree Plot Graphs of the Amount of Variation Explained
by Each Component**
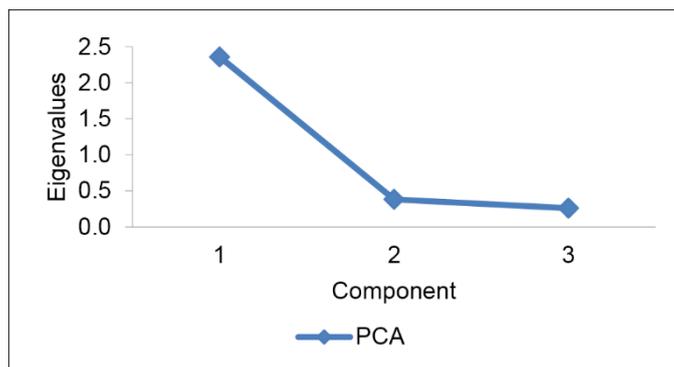
C.   Descriptive Statistics

Table C1: Variable Description and Summary Statistics

Variable	Variable Description	Mean	Min	Max
Consumption expenditure	Log of monthly per capita expenditure on basic needs	13.43	11.7	16.31
Financial literacy index	Composite financial index based on PCA	0.56	0	1
Gender	Dummy (1 if male)	0.39	0	1
Marital status	Dummy (1 if single)	0.17	0	1
Family size	Dummy (1 if more than 4 family members)	0.28	0	1
Income-earning members	Dummy (1 if more than 1 income-earning member in the family members)	0.35	0	1
Age 25–34	Dummy (1 if aged 25–34)	0.22	0	1
Age 35–44	Dummy (1 if aged 35–44)	0.23	0	1
Age 45–54	Dummy (1 if aged 45–54)	0.21	0	1
Age 55+	Dummy (1 if aged 55 and over)	0.18	0	1
Education	Years of schooling of the respondent	4.85	0	13
Urban	Dummy (1 for respondents living in urban areas)	0.52	0	1
Occupation	Dummy (1 if holding job by qualification level)	0.18	0	1
Financial shock	Dummy (1 if the household experienced financial shocks over the last 3 months)	0.08	0	1
Bank account ownership	Dummy (1 if the respondent holds a bank account)	0.21	0	1