

FINANCIAL LITERACY IN  
UKRAINE: DETERMINANTS AND  
IMPLICATIONS FOR SAVING  
BEHAVIOR

by

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Kyiv School of Economics

Abstract

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This paper explores the determinants of financial literacy and its implications for the saving behavior in Ukraine. In this study we use data from the national survey Financial Literacy and Awareness in Ukraine, conducted by Financial Sector Development Project (FINREP) and USAID in 2010. The empirical results on determinants reveal that the major factors influencing financial literacy in Ukraine are gender, level of education, occupation, region and wealth. Age and area of residence have not been found significant in explaining financial literacy. With regard to the implications of financial literacy for saving behavior our results suggest that literacy does not have a direct impact on savings when controlling for wealth. However, given the fact that financial literacy and wealth are mutually determined and are correlated over the life of consumer, we argue that financial literacy may have an indirect impact on saving by influencing wealth.

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## *Chapter 1*

### INTRODUCTION

There has been a rising interest in the financial literacy from academic community, international organizations and governments recently.

Numerous academic studies have discovered the importance of financial literacy for various aspects of household's wellbeing and economic stability. It has been shown by Banks et al. (2009), McArdle et al. (2009), Guiso and Jappelli (2008) and Alessie et al. (2008) that financial literacy has serious implications for wealth accumulation and portfolio choice. Moreover, several researchers stress that financial literacy has an effect on the level of participation in the formal financial market and stock market (Hogarth et al. (1999), Christelis et al. (2010), Cole et al. (2008)). Concerning the debt side, empirical studies reveal that lack of financial literacy may result in costly borrowing and high debt load (Lusardi and Tufano (2009), Moore (2003), Stango and Zinman (2009), Campbell (2006)). Finally, financial literacy has implications for overall economic and financial development and stability. Beck et al. (2009) demonstrates that financial sophistication is correlated with economic development and affects it through three channels: it increases stock market participation, results in more efficient savings behavior and as a result raises returns and attracts more investments into the economy. Conjointly, Bernanke (2006) points out that financial literacy helps to develop confidence in the economy and thus induces growth.

The interest from academic community goes along with the initiatives of global international organizations with respect to assessment and improvement of financial and economic knowledge.

The prime global initiative was started by the OECD in March 2008, when the International Gateway for Financial Education was established. The Gateway serves as a clearinghouse for various initiatives, programs and research on financial education globally. Another major global initiative was the World Bank's Consumer Protection and Financial Literacy project, aimed at assessing and improving financial literacy all over the world.

Along with programs of global international organizations governments from various developed countries have been trying to foster financial literacy among their population. Agencies responsible for financial education were created in the United Kingdom (Financial Service Authority, 2000), Canada (Financial Consumer Agency, 2001), the United States (Financial Literacy and Education Commission, 2003), and Australia (Financial Literacy Foundation, 2005).

Developing countries also undertake actions aimed at enhancing financial literacy. The largest developing countries program is The Partnership for Making Finance Work for Africa, which brings together African governments, donor partners and private sector with the aim to build financial capability in Africa. Other government or civil society programs on financial education have been launched in over 40 developing countries globally<sup>1</sup>.

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<sup>1</sup> Albania, Armenia, Brazil, Bulgaria, Cape Verde, Chile, China, Colombia, Czech Republic, Egypt, Estonia, Ghana, India, Israel, Jamaica, Kenya, Lebanon, Lithuania, Malaysia, Malta, Mexico, Namibia, Pakistan, New Zealand, Peru, Philippines, Poland, Puerto Rico, Qatar, Romania, Russia, El Salvador, Serbia, Slovakia, South Africa, Tanzania, Trinidad and Tobago, Turkey, Uganda, Uzbekistan and Zambia. Those countries are listed on the web-site of the International Gateway for Financial Education: <http://www.financial-education.org>



At the same time large scale private projects accompany initiatives of governments and international organizations. In 2004 Citibank instituted an Office of Financial Education and launched a 10-year \$200 mln project on improvement of financial literacy worldwide. So far \$167 mln have been invested in 73 countries globally. Likewise, the member banks of the World Savings Bank (WSBI), which is the largest global banking association, started a number of projects aimed at promoting financial education in 16 countries<sup>2</sup>.

A substantial interest in enhancing financial knowledge among population gave rise to a number of papers, which explore what factors drive financial literacy in different countries. This issue is of particular importance for policymakers and international organizations since it tells which population groups are the most likely to be financially illiterate and indicates the direction for educational activity. Empirical findings suggest that the level of financial knowledge should be determined by age, gender, level of education, major of studies, occupation, region, area of residence, race and ethnical background and wealth. The detailed overview of the empirical evidence is provided in the next chapter.

Taking previous findings into account we investigate the determinants of financial literacy in Ukraine using data from the national survey Financial Literacy and Awareness in Ukraine conducted by Financial Sector Development Project (FINREP) and USAID in 2010. We contribute to the scarce literature on the determinants of financial literacy in developing countries, which were only investigated for India and Indonesia by Cole et al. (2008). Moreover, our study is the first one to explore this issue for a transition country. Our findings are of a particular interest for policymakers who aim to improve financial knowledge

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<sup>2</sup> Thailand, Malaysia, Senegal, Uganda, Spain, Hungary, Austria, Portugal, Sweden, Germany, Lithuania, France, Germany, The United Kingdom and Kenya. Those countries are listed on the web-site of the International Gateway for Financial Education: <http://www.financial-education.org>

among Ukrainians since we provide the overview of the population groups which are most vulnerable to being financially illiterate.

Along with the determinants we focus on the implications of financial literacy for saving decisions of Ukrainians.

Saving behavior is an urgent issue for Ukraine since it currently undergoes changes in the pension arrangements and moves toward a pension reform. Those changes are a major challenge for Ukrainians since they may shift substantial part of responsibility to ensure the retirement income from state to individual. If this will be the case, Ukrainians will need at least basic financial skills required for educated saving and borrowing decisions.

The current pension system in Ukraine is mainly based on the pension benefit financed by pay-as-you-go system with current workers supporting current retirees. The ability of current system to ensure a decent retirement income for the future generations is highly doubtful. Ukrainian population is aging, which puts a pressure on the pay-as-you-go system. The working population is unlikely be able to support the growing number of retirees in the future.

The proposed changes to the pension arrangements mainly concern the introduction of the mandatory accumulation system and development of private or voluntary pension system. The mandatory accumulation system assumes obligatory contribution of younger workers into state pension account. Those contributions are to be invested in capital markets by the asset management companies chosen by competitive tender. The launch of this amendment is conditional upon reaching certain economic indicators and is scheduled by the end of 2012. At the same time, the private pension system in Ukraine has been

slow to develop. In 2009 only 109 non-state pension funds operated in Ukraine with 487,100 investors and UAH 858 bln under management.

Therefore, proposed amendments to pension reform in Ukraine assume that Ukrainians should save more on a voluntary basis above the compulsory contributions. The responsibility to ensure respectful living standards upon retirement is being partially shifted to individuals from state. However, the results of the 2010 survey Financial Literacy and Awareness in Ukraine indicate that only 13% of Ukrainian population set money aside for later use rather than spend on consumption. The depleted level of savings in Ukraine can be explained by two major reasons: low income (76% of survey respondents) and low trust in financial institutions (14% of respondents).

There is considerable evidence that financial literacy is the other channel to have an impact on savings, apart from low income and trust in financial institutions. Lusardi and Mitchel (2006, 2007, 2008, 2009), Alessie et al. (2008), Banks and Oldfield (2007) and Banks et al. (2009) show that lack of financial knowledge translates in lack of retirement planning and saving. Jappelli and Padula (2011) have analyzed a cross-section data on 39 countries and discovered that financial literacy is a strong predictor of national savings.

Based on the empirical research it may be argued that by improving financial literacy it is possible to trigger the increase in savings. Therefore, the relationship between financial literacy of Ukrainians and their saving behavior is the focus of the current research. Our hypothesis is that those who are more financially knowledgeable are more likely to save, which is in line with previous findings on other countries of Banks and Oldfield (2007), Lusardi and Mitchel (2006, 2007, 2008, and 2009), van Alessie et al. (2008) and Jappelli and Padula (2011).

The issue of the implications of financial literacy on savings behavior in developing and transition countries has yet been unexplored besides the only work of Klapper and Panos (2001) for Russia. Therefore it becomes of a particular use to investigate this question further since the saving behavior with respect to financial knowledge in developing and transition countries is likely to be different from one in the developed world.

The structure of this paper is the following. Chapter 1 presents main idea and motivation of the study. Then a review of the existing literature is provided in Chapter 2. It is followed by the description of empirical implementation in Chapter 3 and the data used in the study in Chapter 4. Next empirical results are presented in Chapter 5. And finally, Chapter 6 sums up this paper.

## *Chapter 2*

### LITERATURE REVIEW

A lot of research has been devoted to the study of the determinants and implications of financial literacy in different countries. In this study we focus on two major issues of financial literacy: its determinants and consequences for saving behavior. We begin this literature review with reviewing various definitions of financial literacy used in different studies. Then we proceed by studying the approaches to assess financial literacy used by different researchers. After that we cover the studies focusing on factors that explain financial literacy. Finally, we describe the theoretical and empirical work on the relationship between financial knowledge and savings.

To begin with, we review definitions of financial literacy that exist in the literature and formulate the meaning that we use in this study.

#### *Definition of financial literacy*

Different meanings of financial literacy have been employed by researchers. However, no consistent definition has been developed. Houston (2010) reviewed 71 papers on financial literacy and discovered eight prevailing definitions. Those definitions could be found in Appendix 1.

Our meaning of financial literacy can be summarized as necessary numerical skills and understanding of basic economic concepts required for educated saving and borrowing decisions. Our choice of definition is motivated by the data we use in

this research. As a proxy for financial literacy we choose the performance of Ukrainians on the numerical literacy test, which is a part of 2010 survey Financial Literacy and Awareness in Ukraine. The test contains seven questions on basic financial concepts such as simple and compound interest, inflation, purchase power, sales discount, loan with prepaid interest and a bond yield.

#### *Assessment of financial literacy*

There are two major approaches to measure financial literacy: self-assessments and objective measures like test scores.

Under the first approach respondents are asked to evaluate their literacy skills as well as to provide information about their attitudes toward financial decisions, knowledge and information. This approach has been used by Jappelli (2010), who performed an international comparison of literacy levels among 55 countries based on the indicator of financial literacy provided by IMD World Competitive Yearbook (WCY). The indicator is computed based on the survey of middle and top managers and business leaders, who are requested to evaluate on 0-10 scale the argument 'Economic literacy among the population is generally high'. Jappelli (2010) shows that this indicator is an acceptable proxy for financial sophistication since it is strongly correlated with the objective measures provided by the Survey of Health, Age and Retirement in Europe (SHARE).

The second approach of measuring financial literacy relies on the objective test which assesses the respondents' knowledge of financial terms, understanding of various financial concepts and ability to apply numerical skills in particular situations related to finance. The objective test has been found to better assess the respondents financial knowledge than self-assessment (OECD, 2005).

The objective tests used by various researchers differ in the way they measure financial literacy.

The most popular test is based on three questions developed by Lusardi and Mitchell (2006), which they designed for 2004 Health and Retirement Survey (HRS) in the United States. Those three questions tested the respondents' understanding of compound interest, inflation and risk diversification, concepts vital for educated saving decisions and investment activity. The methodology of Lusardi and Mitchell (2006) has become widely used by researchers globally. Almenberg and Säve-Söderbergh (2011) use similar questions to assess financial literacy in Sweden. Cole et al. (2008) follow this methodology in measuring literacy in India and Indonesia. Klapper and Panos (2011) assess financial literacy in Russia by using similar questions.

The extended methodology of Lusardi and Mitchell (2006) is applied by Alessie et al. (2008) who use Dutch DNB Household Survey, which includes two more questions on time discounting and money illusion.

Besides this most popular type of objective measures, other studies use other tests to assess financial literacy. Christelis et al. (2010) and Dewey and Prince (2005) study financial literacy based on The Survey of Health, Age and Retirement in Europe (SHARE) held for eleven European countries. In SHARE financial literacy is measured by testing respondents' ability to perform basic numerical operations and understand basic economic concepts. Guiso and Jappelli (2009) measure financial literacy related to portfolio choice based on the 2007 Unicredit Customers' Survey, which test respondents' understanding of interest rate and inflation, portfolio diversification and concept of risk.

Other researchers use tests that focus on measuring financial skills among students. Mandell (1998, 2004, and 2008) and Mandell and Klein (2007) use the questions of the Jump\$tart Coalition for Personal Financial Literacy Survey conducted in the United States twice a year. This survey is a test for high-school students, which contains multiple-choice questions on income, saving and investing, money management and spending and credit. Chen and Volpe (1998, 2002) and Volpe et al. (1996) measure financial literacy among the US college students based on their responses to questions on general financial knowledge, insurance, investing, saving and borrowing.

As the next step of this literature review we present the overview of the empirical studies focusing on the factors that explain financial literacy.

#### *Determinants of financial literacy*

A vast majority of studies on the determinants of financial literacy have been done for developed countries such as the United States, Italy, Australia and Sweden. Only one paper of Cole et al. (2008) focuses on the determinants of financial literacy in developing countries, particularly in India and Indonesia.

Among factors that were found significant in various studies are age, gender, level of education, major of studies, occupation, region, area of residence, race and ethnical background and wealth. Let's focus on each of these determinants and the empirical evidence behind it.

Most of the studies have found age to be significant factor in explaining financial literacy. In his study of financial sophistication in Australia Worthinton (2004) discovers that people aged 50-60 are less likely to be financially literate. While studying financial literacy in Sweden Almenberg and Säve-Söderbergh (2011)



observe that the highest levels of literacy are demonstrated by those of 35-50 and those older than 65 were found to perform the worst. Lusardi and Mitchell (2006) discover that among the US retirees Baby-Boomers (those aged 51-56 in 2004) are the least financially literate. Cole et al. (2008) find that age is significant factor to explain literacy in India and Indonesia. Age is found to have a non-linear effect and peaks at 40 years in India and 45 in Indonesia.

There is also rich empirical evidence that gender predicts financial literacy. Numerous studies argue that men are more likely to perform better on various literacy tests (Mandell (2008), Cole et al. (2008), Worthington (2004), Chen and Volpe (1998), Lusardi and Mitchell (2006, 2008), Almenberg and Säve-Söderbergh (2011), Monticone (2009), Volpe et. al. (1996), Goldsmith and Goldsmith (1997)). Almenberg and Säve-Söderbergh (2011) explain large gender differences among Swedish individuals by the fact that women in Sweden seldom make economic decisions in the household. Goldsmith and Goldsmith (1997) suggest that women score worse than men because in general they are less interested in the topics of investment and personal finance and, consequently, use financial services more seldom.

Some researchers find that those who completed university or college degree are more likely to be financially knowledgeable than those with low education level (Cole et al. (2008), Worthington (2004), Lusardi and Mitchell (2006, 2008), Almenberg and Säve-Söderbergh (2011), Guiso and Jappelli (2005), Alexander et al. (1998)). In addition to that Mandell (2004, 2008) has shown that the correlation between literacy and education is present at the early stages of life-cycle. He has discovered that children of college graduates perform better on numerical test.

Several studies go even further and show that there is a correlation between financial literacy and study major. There is considerable evidence that people who studied economics or business are more likely to be financially knowledgeable. This argument was supported by research of Lusardi and Mitchell (2007), Almenberg and Säve-Söderbergh (2011), Beal and Delpachitra (2003), Chen and Volpe (2002) and Alessie et al. (2008).

Occupation is another determinant of financial literacy that was found to be significant by many researchers. Worthington (2004) discovers that among Australians professionals, executives, business or farm owners display the highest level of financial literacy, while unemployed and non-working perform the worst, which is in line with findings of Almenberg and Säve-Söderbergh (2011) for Sweden. Monticone (2010) observes that in Italy white-collars, managers and self-employed are the most literate population groups. Cole et al. (2008) show that people in Indonesia who own a non-farm enterprise are more likely to be financially literate.

Two papers investigate whether area of residence impacts the level of financial literacy. Cole et al. (2008) find that people who live in rural area demonstrate the lowest level of financial knowledge. Guiso and Jappelli (2003) argue that the stock market awareness is correlated with the intensity of social communication in the area of investors' residence.

Region is found to be the other determinant of financial literacy in the work of Monticone (2010) who shows that people living in Southern Italy possess worse financial literacy skills.

Some researchers look whether nationality and ethnic background impact the financial knowledge among population. Lusardi and Mitchell (2006) find that

minorities in the United States, mainly Black and Hispanic, have the worst financial preparation. Worthington (2004) observes that people from non-English speaking background in Australia are less likely to be financially literate.

Numerous studies suggest that wealth has a positive impact on financial literacy since the acquisition of financial knowledge may be motivated by the need to manage own wealth. This idea was induced by theoretical frameworks of Delavande et al. (2008) and Peress (2004).

Delavande et al. (2008) study financial literacy in production function with human capital. They postulate that the stock of financial literacy determines the expected return household receives on his/her investment into the risky assets. Moreover, the amount of wealth held in risky assets matters for the return on investment in financial literacy.

Peress (2004) models theoretically the investment of individuals in financial information. He argues that investment in financial education allows investors to improve portfolio allocation and receive higher risk-adjusted returns. Individuals make their decisions to invest into obtaining new information upon the condition that marginal cost of information acquisition will be equal to marginal benefit from investing, which is expressed as a function of wealth, risk tolerance and expected Sharpe ratio. Peress (2004) suggests that below certain wealth threshold marginal costs outweigh marginal benefits so that investors have no incentive to invest in financial knowledge.

Theoretical models were supported by various empirical findings that financial literacy increases with wealth (Bernheim (1998), Guiso and Jappelli (2008), Worthington (2004), Lusardi and Mitchell (2008). In the above papers wealth has been taken as an exogenous determinant of literacy. However, there is some

evidence that financial literacy is a critical factor of wealth accumulation (Guiso and Jappelli (2008), Lusardi and Mitchell (2007), Lusardi and Tufano (2009), Alessie et al. (2007, 2008)). This leads to endogeneity issue. Jappelli and Padula (2011) have developed a theoretical model of the consumer's investment in financial literacy. They show that literacy and wealth are mutually determined and are correlated over the life of consumer. Monticone (2009) approaches the reverse causality problem empirically by using instrumental variables such as interest rates on deposits, dummies whether a household has a self-employed parent and if household lives in a house received as an inheritance or a gift. She finds that wealth predicts financial literacy, however, the effect of wealth is minor and only households with considerable amount of wealth are motivated to learn more.

Next the review of the studies focused on some aspects of the relationship between financial literacy and saving is given.

#### *Implication of financial literacy for saving behavior*

There is considerable evidence that financial literacy predicts savings both at cross-country and individual levels.

Jappelli and Padula (2011) analyze data for 39 countries and find that financial literacy is a determinant for the level of national savings and that the impact of literacy is potentially large: one standard deviation increase in overall financial literacy score drives 3.6% increase in national savings.

On the individual level most empirical studies are done for developed countries such as the United States, The United Kingdom, Italy and Netherlands. The only

study conducted for developing countries is work by Klapper and Panos (2001) on retirement planning in Russia.

While analyzing households' behavior in developed countries numerous studies demonstrate that financial literacy may have acute implications for retirement planning and saving decisions. It has been shown by Lusardi and Mitchell (2006, 2007, and 2008) that less literate people are less likely to save for retirement. This argument was supported by Lusardi and Mitchell (2009) and Banks et al. (2009) who observe that more financially sophisticated individuals are more likely to be retirement ready and have higher retirement income. Moreover, several studies reveal that low financial literacy translates into lack of retirement planning (Lusardi and Mitchell (2009), Alessie et al. (2008)). This fact may be explained by several factors. First of all, it has been demonstrated that lack of numerical skills impacts perceived financial security (Banks and Oldfield (2007)) and retirement expectations (Banks et al. (2009)). Secondly, low financial literacy raises planning costs, meaning economic and psychological barriers to obtain information required for saving and investing (Alessie et al. (2008)).

Concerning the developing countries, Klapper and Panos (2011) investigate the impact of financial literacy on the retirement saving in Russia. They find that higher literacy is positively related to retirement planning and investing in private pension funds.

However, while studying the impact of financial literacy on saving behavior one should be careful because of reverse causality issue since one can acquire financial knowledge in the process of developing and implementing a savings plan.

Several researchers recognize endogeneity of financial literacy with respect to saving decisions (Lusardi and Mitchell (2008), Willis (2009), Delevande et al.

(2008)). However, only two studies of Jappelli and Padula (2011) and Lusardi and Mitchell (2009) explicitly address this issue with instrumental variable method. They argue that the stock of financial literacy before entering a labor market is an applicable instrument for financial literacy in the saving regression. Their choice of instrument has been supported by Herd and Holden (2010) who find that early-life education is a strong predictor of late-life financial knowledge and by Behrman et al. (2010) who suggest that enrollment rate at school is a significant instrument in first stage regression of savings on financial literacy stock.

To sum up, the literature on factors explaining financial literacy and the effects it has for households' saving decisions is vast, however focusing mostly on developed countries. Only two papers of Cole et al. (2008) and Klapper and Panos (2011) address the above issues for the developing countries of Russia, India and Indonesia.

To the best of our knowledge this is the first research aimed to study financial literacy in Ukraine. It will contribute to the scarce literature on the determinants of financial literacy and its implications to savings behavior in developing countries.

## *Chapter 3*

### METHODOLOGY

In this paper we aim to investigate two issues. First of all, we look at the determinants of financial literacy in Ukraine. Secondly, we examine its effect on the saving behavior of Ukrainian households. Our methodology is grounded on previous theoretical and empirical findings. We begin by explaining the methodology we use to examine the determinants of financial literacy. Then we proceed by describing methodology for the second part of our research on the implications of financial literacy for savings decisions.

#### *Determinants of financial literacy*

Our discussion in Section 2 suggests that the level of financial knowledge may be determined by age, gender, level of education, major of studies, occupation, region, area of residence, race and ethnical background and wealth.

The choice of explanatory variables used in this research is motivated by the previous empirical findings and the availability of data. 2010 survey of Financial Literacy and Awareness in Ukraine provides information about the following demographic and economic characteristics of respondents: age, gender, level of education, occupation, region, area of residence and wealth, which are in line with the literature. Those factors serve as independent variables in this study.

Following our discussion in Section 2 on the endogeneity of wealth with respect to financial literacy we recognize that our results will be potentially biased if we

include wealth variable into the regression. However, rich empirical evidence and our intuition suggest that wealth is an important determinant of financial literacy in Ukraine. Since the data used in this research does not provide any instrument to solve the reverse causality problem we face the trade-off between endogeneity and omitted variable bias.

Therefore, we choose to estimate two specifications. Our baseline specification will include variables that are less endogenous such as age, gender, level of education, occupation and region. Then we will extend our specification by including wealth. The results of two regressions will allow us to explore if our results are robust to the inclusion of wealth variable.

Our baseline specification will be the following:

$$\Phi = \gamma_0 + X'\gamma_1 + \nu, \quad (1)$$

where  $\Phi$  is a measure of current stock of financial literacy;  
 $X'$  is a set of demographic variables (age, gender, level of education, occupation and region);  
 $\nu$  is an error term.

The extended specification is as follows:

$$\Phi = \psi_0 + X'\psi_1 + \psi_2 Z + \varepsilon, \quad (2)$$

where  $\Phi$  is a measure of current stock of financial literacy;  
 $X'$  is a set of demographic variables (age, gender, level of education, occupation and region);  
 $Z$  is an economic variable (wealth);



$\varepsilon$  is an error term.

Given the ordered categorical nature of dependent variable, which is a financial literacy score ranging from 1 to 4, we apply ordered probit estimation and compute the marginal effects of explanatory variables on the underlying latent variable.

For each demographic and economic variable we will estimate the following marginal effects:

$$\frac{\partial P(\Phi_i = 1 | X_i)}{\partial X_j}; \frac{\partial P(\Phi_i = 2 | X_i)}{\partial X_j}; \frac{\partial P(\Phi_i = 3 | X_i)}{\partial X_j}; \frac{\partial P(\Phi_i = 4 | X_i)}{\partial X_j}. \quad (3)$$

Those marginal effects will be interpreted as an effect of a particular explanatory variable on the probability of dependent variable to fall in a given category.

Next we proceed by uncovering our methodology for the second part, which focuses on the implications of financial literacy for the savings behavior.

#### *Implications of financial literacy for the savings behavior*

The methodology of this section is grounded on the theoretical and empirical model of van Jappelli and Padula (2011) who incorporate financial literacy into the model of intertemporal consumer's choice. Below we present the detailed overview of the model.

The model set-up is as follows.

Consumers live two periods: they earn income in period zero and retire in the period one. At the start of their lives consumers have no assets, however possess initial stock of financial literacy,  $\Phi_0$ , which depreciates over the life of the consumer at the rate  $\delta$ . In period one consumers receive the return on savings made in period zero, which is an interest rate,  $R$ .

In their analytical framework Jappelli and Padula (2011) assume that interest rate is a function of the stock of financial literacy in period one since investment in literacy provide consumers with better investment opportunities and raises returns:

$$R = f(\Phi_1) = \Phi_1^a, \quad (4)$$

where  $a$  is the elasticity of the interest rate with regard to the stock of financial literacy in period one.

Consumers may increase their stock of financial literacy in period one by making investment in their education,  $\varphi$  in period zero. They can buy literacy for  $p$ , which is a relative cost with respect to consumption and corresponds to the economic and time cost:

$$\Phi_1 = (1 - \delta)\Phi_0 + \varphi \quad (5)$$

Consumers choose savings,  $S$  and investment in literacy,  $\varphi$  to maximize their life-time utility subject to intertemporal budget constraints:

$$\text{Max } \ln C_0 + \beta \ln C_1 \quad (6)$$

subject to:

$$Y = C_0 + S + p\varphi$$

$$C_1 = \Phi_1^\alpha \cdot S$$

Where  $0 < \beta < 1$  is a discount factor and  $S$  is a first period saving.

The solution to the maximization problem yields the following results:

$$\Phi_1^* = \frac{\alpha\beta}{1 + \beta + \alpha\beta} \cdot \left[ \Phi_0(1 - \delta) + \frac{Y}{p} \right] \quad (7)$$

$$S^* = \frac{\beta}{1 + \beta + \alpha\beta} \cdot [Y + p\Phi_0(1 - \delta)] \quad (8)$$

The solution reveals that income, discount factor and return to literacy have a positive impact on the stock of financial literacy in period one and depreciation rate and elasticity of the interest rate with regard to the stock of financial literacy have a negative effect. The saving rate is positively affected by the discount factor, income and the initial stock of financial literacy and negatively affected by depreciation rate and elasticity of the interest rate.

Results suggest that the stock of financial literacy in period one has no direct effect on the saving since  $\Phi_1$  does not enter the second equation. However, solving (1) for  $\Phi_0$  and substituting it into (2) implies that  $S^*$  is a linear function of  $\Phi_1$ :

$$S^* = \bar{a}' \cdot p \cdot \Phi_1^* \quad (9)$$

The model of Jappelli and Padula (2011) suggests that financial literacy impacts savings indirectly through the initial stock of financial knowledge, which is a relevant instrument for financial literacy in the saving regression. Their findings imply that although  $\Phi_1$  is itself a choice variable, empirically higher literacy should be associated with higher savings.

The data we use in this research is cross-sectional and thus does not provide us with the information about the previous knowledge of respondents, which could be used as an instrument. Therefore, we have to acknowledge endogeneity and recognize that our results will be potentially biased.

To estimate the impact of literacy on savings we run a regression of the following form:

$$\frac{S}{Y} = \pi_0 + \pi_1 \Phi + X' \pi_2 + \pi_3 Z + \nu, \quad (10)$$

where  $\frac{S}{Y}$  is a saving rate;

$X'$  is a set of demographic variables (age, gender, level of education, occupation and region);  $Z$  is wealth;  $\nu$  is an error term.

The choice of control variables is in line with Jappelli and Padula (2011).

Since we have a censored dependent variable with many individuals having zero savings it is reasonable to apply tobit estimation. As in our previous specification on the determinants of financial literacy, we are interested in the marginal effect, which is the effect of change in the financial literacy on the unconditional

expectation of savings rate:  $\frac{\partial E\left(\frac{S}{Y}\right)}{\partial \Phi_j}$

The expected sign of marginal effect is positive since we hypothesize that increase in financial literacy will induce Ukrainians to save more.

## *Chapter 4*

### DATA

For our empirical analysis we use data of the national survey of Financial Literacy and Awareness in Ukraine conducted by USAID/ FINREP in September 2010. The survey covers 2014 respondents aged 20-60 throughout Ukraine. It is mentioned in the survey that it is representative and that the distribution of demographic characteristics of the respondents corresponds to the actual allocation of population groups in Ukraine. The survey contains sections on self-assessment of financial literacy, financial behavior, numerical test of financial literacy and test on the knowledge of consumer rights and financial terms. Beyond questions on financial literacy and behavior, survey contains a section on the demographic characteristics such as age, gender, level of education, occupation, income, wealth, availability of savings and debt.

For our analysis of financial literacy we use answers to numerical test, data on respondents' demographic and economical characteristics and savings. Let's look more closely at the data used in each part of our research, namely the determinants of financial literacy and its implications for saving behavior.

#### *Determinants of financial literacy*

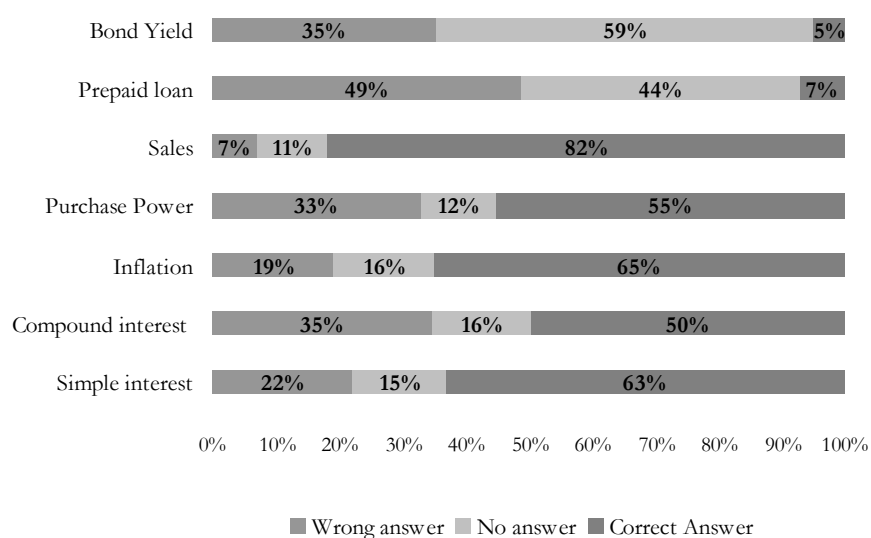
To study the determinants of financial knowledge among Ukrainian population we construct a financial literacy score, which we use as a dependent variable, based on the respondents' answers to numerical literacy test. The test contains seven questions on basic financial concepts such as simple and compound

interest, inflation, purchase power, sales discount and bond yield. The survey questions can be found in Appendix 2. The questions of the test measure respondents' ability to perform basic numerical operations required for educated saving and borrowing decisions. Therefore, we argue that this test is a reasonable proxy for financial literacy in Ukraine.

The performance of Ukrainians on the numerical test unveils the low literacy level among the population. Less than 1% of all respondents were able to solve all the problems correctly. Those who have given right answers to 6-7 questions accounted for 22% of all respondents. Likewise, 27% of Ukrainians solved 4-5 problems. Significant share of population, 38% could answer only 2-3 questions. 13% of respondents showed the worst financial preparation showed and were able to give only one or no correct answers.

The distribution of correct answers by question type reveals that the easiest problem for Ukrainians has been question on sales discount. The vast majority of respondents, 82% managed answer it correctly. Problems on simple interest and inflation were solved by 63% and 65% respectively. Half of the respondents gave right answer to compound interest. Questions on the loan with prepaid interest and bond yield were the most difficult. Only 7% and 5% managed to perform correct calculation.

The distribution of right answers per question type could be found in Figure 1 below.



**Figure 1. Answers to numerical test, % of all respondents**

*Source: 2010 survey Financial Literacy and Awareness in Ukraine*

Based on answers to the numerical test we construct a financial literacy score, which ranges from 1 to 4 and corresponds to different literacy levels.

Table 1. Financial literacy score

Value	Meaning	Number of correct answers	% of correct answers
4	Excellent	5-6	22%
3	Good	4-5	27%
2	Fair	2-3	38%
1	Poor	0-1	13%



As independent variables we choose age, gender, level of education, occupation, area of residence, region and wealth. The survey provides detailed information on respondents' personal information. Most explanatory variable we use are categorical, except for gender variable, which is a dummy. The mean values of background variables are given in Table 1 in Appendix 3.

For *Age* variable we have 4 categories (20-25, 25-35, 35-45 and 45-60).

*Gender* variable is a dummy which has a value one for males and zero for females.

Variable on *Educational level* contains three categories. Category Higher education corresponds to those who have completed at least three years of education in higher educational institution. Category Special/Technical relates to respondents who have special vocational education or have completed technical college. Category Secondary education captures those who have complete or incomplete secondary or primary education.

*Occupation* variable includes nine categories corresponding to how respondents describe themselves based upon their main job. The categories are Entrepreneur, Specialist with higher education, Qualified worker (including those employed in agricultural industry), Unqualified worker (which includes people without higher education employed as a secretary, office worker, shop assistant etc.), Employed in service industry, Pensioner, Student, Public worker (which includes civil servants, public authority officers, enlisted personnel in the army, interior forces, police and security) and Non-working (which includes household workers and registered unemployed).

The *Area of residence* variable contains three categories related to the amount of population in the city, where respondents live. Those three categories include City

with population up to 100,000, City with population from 100,000 to one million and City with a population over one million.

*Region* variable includes five categories corresponding to main regions of Ukraine: Central, Southern, Western, Eastern and Northern.

For *Wealth* variable we have four categories. The first category contains Ukrainians who have responded that they do not have money even for food. The second one captures those who have enough money to buy food but have financial troubles to buy clothes. The third category relates to respondents who can afford food and clothes, but not durable goods like a TV-set or refrigerator. The last category refers to Ukrainians who face no financial problems in purchasing durable goods or expensive things like car or real estate.

When looking at the distribution of literacy scores among various population groups one may observe that financial knowledge differs across demographics (see Table C2 in Appendix C).

With regard to age, one may learn that people aged 25-35 seem to possess the highest financial skills. This age group has the highest share of those who scored Good or Excellent and the lowest share of those who performed poorly among all the age categories. The oldest respondents (45-60) have the worst results. The percentage of those who answered at most one question is much higher than in any other age group. At the same time, much less of older Ukrainians succeeded in answering 6-7 questions. Results of other two age categories (people aged 20-25 and 35-45) are very similar. The distribution of grades is almost the same with younger respondents performing slightly better.

Score breakdown by gender demonstrates that Ukrainian women are less financially literate than men. A notably higher share of female respondents received grade Poor on the test. Likewise, fewer women than men were able to give 4-5 correct answers and score Good on the test.

The test results of population groups by educational level reveal that people with higher education stand out among all other groups. Percentage of those who scored Poor and Fair is considerably lower than in any other category. At the same time, share of respondents who delivered excellent results is much higher compared to people with secondary or special/technical education. Respondents with at most secondary education are more likely to demonstrate weak performance. The share of those who answered all or almost all the questions is the lowest among the categories. Meanwhile, percentage of people who scored poorly is the highest. The distribution of test results among people with special or technical education is more moderate. Their performance on the test fell in the middle between two other groups by educational level.

While looking at the performance of different regions one may conclude that people from Western region possess the best financial preparation. Results of other regions do not display a clear trend. However, some inferences could be made. While performance of Eastern region gravitates to Fair and Good, the percentage of those who failed to answer almost all questions is the highest on the South.

The occupation category that performed the best is specialists with higher education. This category has the lowest share of illiterate people and the highest share of those who received superior scores among other groups. Performance of students and non-working people mainly falls in the middle of grade distribution mostly scoring Fair and Good on the literacy test. Unqualified workers exhibit

large discrepancies in the literacy scores. Almost half of respondents in this category received grade Fair on the test.

#### *Implications of financial literacy for saving behavior*

For our analysis of the effects of financial literacy on saving we construct a variable *Saving rate*, which corresponds to the percentage of income saved by Ukrainian individuals each month. We use this variable as a dependent variable in the tobit regression. It is constructed based on respondent's answers to the following questions:

- *How much do you save each month?*
- *What was the level of your personal monthly earnings, wages/ salary in your main job, including bonuses, vacation benefits, and other payments.*

The *Saving rate* variable is continuous ranging from zero to 100%. It is constructed by dividing savings amount in UAH by income amount in UAH. Both savings amount and income amount are continuous variables, containing 1391 and 1043 observations respectively. Some respondents have answered only one of two questions on income and saving which results in a number of missed observations for Saving Rate. Moreover, we have excluded 11 observations where Saving Rate is above 100% to avoid using faulty and mistaken answers. Consequently, our constructed variable consists of 854 observations. The average amount saved by household is 9.5% of their income per month. Standard deviation of monthly saving rate is 17.1%.

Table 2. Saving rate summary statistics

Variable	# of obs.	Mean	St. dev.	Min	Max
Savings amount, UAH	1391	161.8	435.6	0	8000
Income amount, UAH	1043	1826.3	1304.1	100	15000
Saving Rate, %	854	9.5%	17.1%	0%	100%

The explanatory variables we use are financial literacy score and a set of demographic and economic variables such as age, gender, education, occupation, area of residence, region and wealth. Mean values of the independent variables are presented in Table C1 in Appendix C.

## EMPIRICAL RESULTS

In this section we present the empirical results on the determinants and implications of financial literacy.

### *Determinants of financial literacy*

Given the fact that most of our explanatory variables are categorical one of the categories has to be omitted to avoid multicollinearity. In this case, the interpretation of other categories is done in terms of comparing them to the omitted (base) category.

Following our discussion on wealth endogeneity in Section 2 we estimate two specifications to see if the results are robust to the presence of wealth variable in the regression. Both specifications yield similar results in terms of coefficient signs for the majority of variables. However, the magnitude of the coefficients and their significance level differ in two regressions. Explanatory variables have higher effects in the baseline specification. In the extended specification the significance level decreases for most dependent variables.

Age does not seem to matter in explaining the level of financial preparation meaning that people of age 20-25, 25-35 or 45-60 have the same probability of being financially literate as those of age 35-45. Our conclusion contradicts findings of Worthington (2004), Almenberg and Säve-Söderbergh (2011), Lusardi and Mitchell (2006), Cole et al. (2008), and Monticone (2009), who find that age is

a significant determinant of financial literacy in the United States, Sweden and Italy.

Contrariwise, gender seems to explain financial literacy level, which is in line with the literature, however, only in the baseline specification. Men are found to perform better than women at all literacy levels. They are 3.3% more likely to receive grade Excellent and 1.2% more likely to score good on the numerical test. At the same time, the probability that they will demonstrate fair or poor performance is 2.1% and 2.4% lower than females.

Results for education suggest that financial literacy of those who did not receive higher education significantly differ from the base category (those who have finished at least three years of study in higher educational institution). People with special/technical education are much more likely to perform weaker on literacy test and notably less likely to demonstrate sound knowledge of finance. Respondents with at most secondary education are even less likely to be financially literate than people with higher education. These results are true for both specifications. However, extended specification displays lower discrepancies between secondary and special/technical education and the base category. Our findings support the results of Worthington (2004), Lusardi and Mitchell (2006, 2008), Almenberg and Säve-Söderbergh (2011), Guiso and Jappelli (2005) and Alexander et al. (1998), who find that level of education matters for the level of financial knowledge.

Examination of Occupation variable reveals that only pensioners and unqualified workers (people without higher education, employed on jobs which do not require professional skills) significantly differ from qualified workers in their literacy levels: they are less likely to possess sound knowledge of finance. Other occupations such as public workers, entrepreneurs, specialists with higher

education, students, people employed in the service industry and non-working have the same probability of being financially literate as the base category. One may argue that qualified workers possess sufficient literacy skills. This statement can also be verified by data analysis performed in Section 3. Therefore, the categories that do not differ from the base can be said to have an adequate level of financial knowledge as well. Our findings support results of Cole et al. (2008), Worthington (2004), Almenberg and Säve-Söderbergh (2011) and Monticone (2010), who have found that professionals, executives and entrepreneurs are more likely to be financially literate. However, our finding that non-working people do not differ significantly from qualified workers does not seem to be in line with the existing literature. Results for unqualified workers differ across two specifications: while baseline specification suggests that unqualified differ significantly from qualified workers at all literacy levels, the extended specification shows that results do not differ much for levels Good and Poor.

Area of residence has not been found significant in both specifications meaning that residents of cities with population over 100,000 do not differ much in their financial knowledge from inhabitants of smaller cities (up to 100,000 of population). Our results do not support findings of Cole et al. (2008) who find that people from rural areas in India and Indonesia are less likely to be financially literate. Our results may be different from Cole et al. (2008) since the category which corresponds to the smallest settlement type is larger than in the research on India and Indonesia and includes small cities beyond the rural areas.

Analysis of regions yields interesting results. Both specifications suggest that Eastern, Central and Southern regions differ significantly from Western Ukraine (base category) in their literacy level. People from Eastern, Southern and Central Ukraine are less likely to be financially knowledgeable than those on the West. Northern region displays a performance similar to that of a base category.



Looking at the magnitude of the coefficients we can clearly see that Central region is the most different from West among all categories. Southern region falls in the middle. And Eastern region is the least different among those three groups. Our results are in line with Monticone (2010), who has found that regions matter in explaining financial literacy in Italy.

Results for wealth indicate that all categories differ significantly from the base one, which corresponds to people who have enough money to buy food and clothes, however have troubles buying durable goods like a TV-set or refrigerator. While this category is related to average wealth, the other three represent either poor population groups or rather wealthy. Although the variable we use as an indicator for wealth is not perfect in explaining resources, it is still a reasonable proxy for wealth in relation to the literacy level. It may be argued that when consumers are not able to satisfy their basic needs in food or clothes they are less likely to invest in financial literacy. Alternatively, when people have wealth in excess of their basic consumption needs, they may consider improving their literacy level. The two poorest categories seem to be far less literate than people with an average prosperity. The wealthiest population group, those who can afford buying durable goods and expensive things like car or real estate, are more likely to be financially literate than respondents with the average resources. The results indicate that financial literacy increases with wealth which is in line with theoretical findings of Delavande et al. (2008) and Peress (2004) and empirical findings of Bernheim (1998), Guiso and Jappelli (2008), Worthington (2004), Lusardi and Mitchell (2008), who did not account for wealth endogeneity in their research. At the same time, our results somewhat contradict Monticone (2010) who has used IV approach to solve the reverse causality problem and found that although wealth predicts financial literacy in Italy, the magnitude of effect is minor.

### *Implication of financial literacy for saving behavior*

The results of regression that tests whether financial literacy affects savings decisions unveils that higher financial knowledge does not directly induce individuals to set money aside for later use. The coefficient in the tobit regression of saving rate on financial literacy score has been found insignificant at 10% level. However, if one excludes wealth from this regression results become significant at 5%. In this case one standard deviation increase in financial literacy has been found to rise saving rate by 4.5%.

At the same time, wealth is found to be an important determinant of saving behavior of Ukrainians. It is significant in explaining saving rate at 1% level. This inference is also supported by results of 2010 survey of Financial Literacy and Awareness in Ukraine, which reveal that 76% of Ukrainians do not save because of low income.

Our discussion in Chapter 2 suggests that financial literacy and wealth are mutually determined and are positively correlated along the consumer's life cycle (Jappelli and Padula (2011)). Numerous studies have observed that financial literacy is an important factor of wealth accumulation (Guiso and Jappelli (2008), Lusardi and Mitchell (2007), Lusardi and Tufano (2008), and Alessie et al. (2007, 2008)). Therefore, it may be argued that although financial literacy does not impact saving directly, it should have an indirect effect through influencing wealth.

We acknowledge that inclusion of two correlated variables into regression for saving gives rise to multicollinearity problem. However, our data does not provide any instrument to account for this issue.

To conclude, financial literacy has not been found significant to explain the consumer's saving rate when controlling for wealth. This result may be due to joint correlation of financial literacy and wealth, which are both included into regression. However, their correlation suggests that albeit financial literacy does not determine saving directly, it should have an impact by influencing wealth.

## *Chapter 6*

### CONCLUSION

In this study we have investigated the determinants of financial literacy and its implications for saving behavior in Ukraine. Our research is important for several reasons. First of all, we are the first to investigate the determinants of financial literacy in transition country and one of a few to explore this issue in developing countries. Our findings about factors that explain financial literacy is of a particular use for policymakers who aim to improve the financial knowledge among Ukrainians since we provide an overview of the population groups which are the most likely to be financially illiterate. Secondly, our study on the implications of financial literacy for the saving behavior is motivated by the upcoming changes in pension arrangements and a move toward a fully funded tier of pension system. It is likely that amendments to the pension system will shift part of responsibility in ensuring retirement income from state to individual, who will have to save above the compulsory contribution. In this case Ukrainians will need sufficient financial knowledge for sound saving decisions. Therefore, it becomes valuable to examine what kind of impact has the level of financial literacy on saving decisions of Ukrainian population.

To explore the determinants of financial literacy and its impact on savings we have performed empirical analysis by applying ordered probit and tobit techniques. The analysis has been performed based on the data from the national survey Financial Literacy and Awareness in Ukraine, conducted in 2010 by FINREP and USAID.

Our empirical results on determinants reveal that the major factors influencing financial literacy in Ukraine are gender, level of education, occupation, region and wealth. Age and area of residence have not been found significant in explaining financial literacy. We have observed that males perform better than females. People with special/technical or at most secondary education are less likely to demonstrate sufficient knowledge of finance compared to those with higher education. Unqualified workers and pensioners are less likely to possess high financial literacy compared to qualified workers. At the same time, entrepreneurs, non-working, specialists with higher education, students and people employed in service industry do not seem to differ much from qualified workers in their financial preparation. Residents of Central, Southern and Eastern regions are less likely to be financially literate than those from Western Ukraine. Our results for wealth indicate that it is an important determinant of financial knowledge and that financial literacy increases with wealth. Although we acknowledge the possible endogeneity of wealth with respect to financial literacy our data does not provide any instrument to solve the reverse causality problem.

With regard to the implications of financial literacy for saving behavior our results suggest that literacy does not have a direct impact on savings when controlling for wealth. However, given the fact that financial literacy and wealth are mutually determined and are correlated over the life of consumer, we argue that financial literacy may have an indirect impact on saving by influencing wealth.

Our findings are of a particular use for policymakers. First of all, they reveal that females, people without higher education, unqualified workers, pensioners, residents of Eastern, Central and Southern regions and people with insufficient wealth are the most vulnerable to being financially illiterate and should be targeted at the outset in order to improve financial literacy among the population. Secondly, we argue that enhancing financial literacy may have an indirect impact

on savings through improving wealth. Therefore, if policymakers decide to encourage saving decisions among the population financial literacy is the possible channel to realize this aim.

Future research on financial literacy in Ukraine could be performed in the direction of assessing debt literacy and studying the impact of financial literacy on the households' borrowing behavior. Also, in the case of data availability one could explore the implications of financial literacy for savings and wealth accumulation by using instrumental variable approach.

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## APPENDIX A

### Definitions of financial literacy

- ‘Financial literacy is the ability to make informed judgments and to take effective decisions regarding the use and management of money’ (Noctor et al. (1992));
- ‘Personal financial literacy is the ability to read, analyze, manage and communicate about the personal financial conditions that affect material wellbeing. It includes the ability to discern financial choices, discuss money and financial issues without (or despite) discomfort, plan for the future and respond competently to life events that affect everyday financial decisions, including events in the general economy’ (Vitt et al. (2000));
- ‘Financial literacy is a basic knowledge that people need in order to survive in a modern society’ (Kim (2001));
- ‘Financial knowledge is defined as understanding of key financial terms and concepts needed to function daily in the society’ (Bowen (2003));
- ‘Consumer literacy is defined as self-assessed financial knowledge or objective knowledge’ (Courchane et al. (2008));
- ‘Financial literacy refers to a person’s ability to understand and make use of financial concepts’ (Servon and Kaestner (2008)).

## APPENDIX B

### Numerical section on financial literacy in 2010 survey Financial Literacy and Awareness in Ukraine

#### *Simple Interest*

Let's assume that you deposited 100,000 UAH in a bank account for 2 years at 8% annual interest rate. How much money will you have in your account in 2 years if you do not withdraw from or add to this account any money?

- More than 108,000 UAH
- Exactly 108,000 UAH
- Less than 108,000 UAH
- I cannot estimate it even roughly

#### *Compound Interest*

Let's assume that you deposited 100,000 UAH in a bank account for 5 years at 10% annual interest rate. The interest will be earned at the end of each year and will be added to the principal. How much money will you have in your account in 5 years if you do not withdraw either the principal or the interest?

- More than 150,000 UAH
- Exactly 150,000 UAH
- Less than 150,000 UAH
- I cannot estimate it even roughly

#### *Inflation*

Imagine that you deposited the money in a bank account at 8% annual interest rate, while the annual inflation rate was 10%. Do you think the money from your account can buy more or less, or the same amount of goods and services on average now as a year ago?

- More than a year ago
- The same
- Less than a year ago
- I cannot estimate it even roughly

### *Purchase Power*

Let's assume that in 2011 your income is twice as now, and the consumer prices also grow twofold. Do you think that in 2011 you will be able to buy more, less, or the same amount of goods and services as today?

- More than today
- Exactly the same
- Less than today
- I cannot estimate it even roughly

### *Sales Discount*

Let's assume that you saw a TV-set of the same model on sale in two different shops. The initial retail price of it was 10,000 UAH. One shop offered a discount of 1,500 UAH, while the other one offered a 10% discount. Which one is a better bargain: a discount of 1,500 UAH or 10%?

- A discount of 1,500 UAH
- A 10% discount
- I cannot estimate it even roughly

### *Loan with Prepaid Interest*

Let's assume that you took a bank credit of 10,000 UAH to be paid back during a year in equal monthly payments. The credit charge is 600 UAH. Give a rough estimate of the annual interest rate on your credit.

- 3%
- 6%
- 9%
- 12%
- I cannot estimate it even roughly

### *Bond Yield*

Let's assume you have purchased a bond with face value of 1,000 UAH for 900 UAH. The bond would expire in a year and bring you a coupon of 150 UAH. If you would hold the bond till maturity, can you estimate what return you would enjoy on your investment?

- Below 15%
- Exactly 15%
- Above 15%
- Above 20%
- I cannot estimate it even roughly



## APPENDIX C

### Data statistics

Table C1. Mean values of background variables

		Count	Percent
Age	20- 25	225	12%
	25-35	545	28%
	35-45	438	23%
	45-60	717	37%
Gender	Male	916	48%
	Female	1009	52%
Education	Secondary	552	29%
	Special/Technical	566	29%
	Higher	807	42%
Occupation	Public worker	105	5%
	Unqualified	233	12%
	Entrepreneur	116	6%
	Non-working	259	13%
	Pensioner	259	13%
	Qualified	474	25%
	Specialist with higher education	349	18%
	Student	59	3%
	Employed in service industry	71	4%
Area of residence	City up to 100,000	416	22%
	City 100,000 - 1 mln	879	46%
	City over 1 mln	630	33%
Region	Western	329	17%
	Eastern	775	40%
	Central	177	9%
	Northern	365	19%
	Southern	279	14%
Wealth	Not enough for food	209	11%
	Enough only for food	726	38%
	Enough for food and clothes	768	40%
	Can buy durable and expensive goods	222	12%

Table C2. The distribution of financial literacy across demographics

	<b>Variable</b>	<b>Poor</b>	<b>Fair</b>	<b>Good</b>	<b>Excellent</b>
Age	Up to 25	12%	38%	28%	22%
	25-35	9%	37%	29%	25%
	35-45	12%	39%	28%	20%
	45-60	17%	38%	25%	20%
Gender	Male	11%	38%	29%	22%
	Female	15%	38%	26%	21%
Education	Secondary	19%	41%	27%	13%
	Special/Technical	13%	41%	26%	20%
	Higher	9%	34%	28%	29%
Occupation	Public worker	10%	39%	25%	27%
	Unqualified	15%	49%	19%	17%
	Entrepreneur	9%	31%	34%	26%
	Non-working	16%	36%	32%	16%
	Pensioner	22%	38%	23%	17%
	Qualified	12%	41%	26%	21%
	Specialist with higher education	7%	31%	32%	30%
	Student	15%	32%	29%	24%
	Employed in service industry	7%	38%	31%	24%
Area of residence	City up to 100,000	14%	36%	23%	26%
	City 100,000 - 1 mln	11%	41%	27%	20%
	City over 1 mln	15%	34%	31%	20%
Region	Western	10%	35%	22%	32%
	Eastern	11%	40%	34%	14%
	Central	15%	46%	16%	23%
	Northern	14%	32%	26%	28%
	Southern	18%	37%	23%	22%
Wealth	Not enough for food	17%	45%	25%	12%
	Enough only for food	16%	42%	27%	15%
	Enough for food and clothes	11%	35%	25%	29%
	Can buy durable and expensive goods	7%	28%	24%	41%

## APPENDIX D

### Empirical results for ordered probit and Tobit estimation

Table D1. Determinants of financial literacy (baseline specification)

	<b>Poor</b>	<b>Fair</b>	<b>Good</b>	<b>Excellent</b>
Male	-0.024*	-0.021*	0.012*	0.033*
<i>vs. Female</i>	(0.010)	(0.010)	(0.005)	(0.016)
Age 20-25	0.015	0.013	-0.008	-0.020
<i>vs. Age 25-30</i>	(0.021)	(0.016)	(0.011)	(0.026)
Age 35-45	0.021	0.017	-0.011	-0.028
<i>vs. Age 25-30</i>	(0.015)	(0.011)	(0.008)	(0.019)
Age 45-60	0.018	0.015	-0.009	-0.024
<i>vs. Age 25-30</i>	(0.015)	(0.011)	(0.008)	(0.019)
Secondary Education	0.096***	0.069***	-0.052***	-0.114***
<i>vs. Higher Education</i>	(0.020)	(0.008)	(0.012)	(0.016)
Special/Technical education	0.044**	0.035***	-0.022*	-0.057**
<i>vs. Higher Education</i>	(0.016)	(0.010)	(0.009)	(0.017)
Public Occupation	0.008	0.007	-0.004	-0.011
<i>vs. Qualified</i>	(0.025)	(0.020)	(0.013)	(0.033)
Unqualified	0.045*	0.033**	-0.024*	-0.054*
<i>vs. Qualified</i>	(0.021)	(0.012)	(0.012)	(0.021)
Entrepreneur	-0.010	-0.009	0.005	0.014
<i>vs. Qualified</i>	(0.022)	(0.022)	(0.010)	(0.034)
Non-working	0.031	0.024	-0.016	-0.039
<i>vs. Qualified</i>	(0.021)	(0.013)	(0.011)	(0.023)
Pensioner	0.057*	0.040***	-0.030*	-0.067**
<i>vs. Qualified</i>	(0.023)	(0.012)	(0.013)	(0.022)
Specialist with higher education	-0.014	-0.013	0.007	0.021
<i>vs. Qualified</i>	(0.017)	(0.017)	(0.008)	(0.027)
Student	0.041	0.029	-0.022	-0.049
<i>vs. Qualified</i>	(0.042)	(0.023)	(0.023)	(0.042)
Employed in service industry	-0.017	-0.017	0.008	0.026
<i>vs. Qualified</i>	(0.026)	(0.027)	(0.011)	(0.042)
City up to 1 mln	0.012	0.010	-0.006	-0.016
<i>vs. City up to 100,000</i>	(0.014)	(0.011)	(0.007)	(0.018)
City over 1 mln	0.016	0.014	-0.008	-0.022
<i>vs. City up to 100,000</i>	(0.015)	(0.012)	(0.008)	(0.019)

Numbers in the table are marginal effects after ordered probit regression. Standard errors are reported in parentheses.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%

Table D1. Determinants of financial literacy (baseline specification) – cont.

Eastern	0.045**	0.038***	-0.022*	-0.060**
<i>vs. Western</i>	(0.017)	(0.011)	(0.009)	(0.019)
Central	0.079**	0.048***	-0.042**	-0.085***
<i>vs. Western</i>	(0.028)	(0.010)	(0.016)	(0.022)
Northern	0.013	0.011	-0.007	-0.018
<i>vs. Western</i>	(0.018)	(0.014)	(0.009)	(0.023)
Southern	0.061**	0.042***	-0.032*	-0.072***
<i>vs. Western</i>	(0.023)	(0.011)	(0.013)	(0.021)
Pseudo R Squared	0.0257			
Number of observations	1925			

Numbers in the table are marginal effects after ordered probit regression.

Standard errors are reported in parentheses.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%

Table D2. Determinants of financial literacy (extended specification)

	Poor	Fair	Good	Excellent
Male	-0.016	-0.014	0.008	0.023
<i>vs. Female</i>	(0.010)	(0.010)	(0.005)	(0.015)
Age 20-25	0.016	0.013	-0.008	-0.021
<i>vs. Age 25-30</i>	(0.021)	(0.015)	(0.011)	(0.025)
Age 35-45	0.018	0.015	-0.009	-0.023
<i>vs. Age 25-30</i>	(0.015)	(0.011)	(0.008)	(0.019)
Age 45-60	0.013	0.011	-0.006	-0.018
<i>vs. Age 25-30</i>	(0.014)	(0.012)	(0.007)	(0.019)
Secondary Education	0.079***	0.059***	-0.042***	-0.095***
<i>vs. Higher Education</i>	(0.019)	(0.009)	(0.011)	(0.016)
Special/Technical education	0.033*	0.027*	-0.017*	-0.043*
<i>vs. Higher Education</i>	(0.016)	(0.010)	(0.008)	(0.018)
PublicOccupation	0.007	0.006	-0.004	-0.010
<i>vs. Qualified</i>	(0.025)	(0.020)	(0.013)	(0.033)
Unqualified	0.039	0.029*	-0.020	-0.048*
<i>vs. Qualified</i>	(0.021)	(0.012)	(0.011)	(0.022)
Entrepreneur	0.000	0.000	-0.000	-0.001
<i>vs. Qualified</i>	(0.023)	(0.021)	(0.012)	(0.032)
Non-working	0.021	0.017	-0.011	-0.027
<i>vs. Qualified</i>	(0.020)	(0.014)	(0.010)	(0.024)
Pensioner	0.049*	0.035**	-0.026*	-0.058**
<i>vs. Qualified</i>	(0.023)	(0.012)	(0.013)	(0.022)
Specialist with higher education	-0.007	-0.007	0.004	0.010
<i>vs. Qualified</i>	(0.018)	(0.017)	(0.008)	(0.026)
Student	0.038	0.027	-0.020	-0.045
<i>vs. Qualified</i>	(0.041)	(0.023)	(0.022)	(0.042)
Employed in service industry	-0.017	-0.016	0.008	0.025
<i>vs. Qualified</i>	(0.026)	(0.027)	(0.011)	(0.041)
City up to 1 mln	0.013	0.011	-0.006	-0.018
<i>vs. City up to 100,000</i>	(0.014)	(0.011)	(0.007)	(0.018)
City over 1 mln	0.021	0.017	-0.010	-0.028
<i>vs. City up to 100,000</i>	(0.015)	(0.011)	(0.008)	(0.019)
Eastern	0.028	0.024*	-0.014	-0.038*
<i>vs. Western</i>	(0.016)	(0.012)	(0.009)	(0.019)
Central	0.071**	0.045***	-0.037*	-0.078***
<i>vs. Western</i>	(0.027)	(0.011)	(0.015)	(0.023)
Northern	0.014	0.012	-0.007	-0.019
<i>vs. Western</i>	(0.018)	(0.014)	(0.009)	(0.023)
Southern	0.056*	0.039***	-0.029*	-0.066**
<i>vs. Western</i>	(0.022)	(0.011)	(0.012)	(0.021)

Numbers in the table are marginal effects after ordered probit regression.

Standard errors are reported in parentheses.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%

Table D2. Determinants of financial literacy (extended specification) – cont.

Not enough for food <i>vs. Enough for food and clothes</i>	0.062** (0.022)	0.042*** (0.010)	-0.033** (0.013)	-0.071*** (0.020)
Enough only for food <i>vs. Enough for food and clothes</i>	0.044** (0.014)	0.037*** (0.009)	-0.023** (0.008)	-0.059*** (0.015)
Can buy durable and expensive goods <i>vs. Enough for food and clothes</i>	-0.045*** (0.013)	-0.051** (0.019)	0.020*** (0.005)	0.076** (0.028)
Pseudo R Squared	0.0324			
Number of observations	1925			

Numbers in the table are marginal effects after ordered probit regression.

Standard errors are reported in parentheses.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%

Table D3. Implications of financial literacy for saving behavior

	<b>Wealth included</b>	<b>Wealth excluded</b>
Financial Literacy	0.023 (0.014)	0.045** (0.015)
Male <i>vs. Female</i>	-0.025 (0.028)	-0.006 (0.029)
Age 20-25 <i>vs. Age 25-30</i>	-0.055 (0.051)	-0.049 (0.054)
Age 35-45 <i>vs. Age 25-30</i>	-0.045 (0.038)	-0.063 (0.039)
Age 45-60 <i>vs. Age 25-30</i>	-0.102** (0.036)	-0.114** (0.037)
Secondary Education <i>vs. Higher Education</i>	-0.049 (0.040)	-0.093* (0.041)
Special/Technical education <i>vs. Higher Education</i>	-0.023 (0.037)	-0.043 (0.039)
Public Occupation <i>vs. Qualified</i>	-0.055 (0.063)	-0.081 (0.065)
Unqualified <i>vs. Qualified</i>	-0.020 (0.042)	-0.030 (0.044)
Entrepreneur <i>vs. Qualified</i>	0.084 (0.064)	0.103 (0.067)
Non-working <i>vs. Qualified</i>	-0.121 (0.076)	-0.194* (0.078)
Pensioner <i>vs. Qualified</i>	-0.017 (0.046)	-0.051 (0.048)
Specialist with higher education <i>vs. Qualified</i>	-0.030 (0.046)	-0.000 (0.047)
Student <i>vs. Qualified</i>	-0.065 (0.101)	-0.076 (0.104)
Employed in service industry <i>vs. Qualified</i>	0.061 (0.074)	0.039 (0.078)
City up to 1 mln <i>vs. City up to 100,000</i>	-0.079* (0.036)	-0.078* (0.037)
City over 1 mln <i>vs. City up to 100,000</i>	-0.021 (0.035)	0.025 (0.036)

Numbers in the table are marginal effects after tobit regression.

Standard errors are reported in parentheses.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%

Table D3. Implications of financial literacy for saving behavior – cont.

Eastern	0.024	-0.068
<i>vs. Western</i>	(0.041)	(0.040)
Central	0.091	0.053
<i>vs. Western</i>	(0.051)	(0.052)
Northern	-0.107*	-0.134**
<i>vs. Western</i>	(0.047)	(0.048)
Southern	-0.025	-0.090
<i>vs. Western</i>	(0.052)	(0.053)
Not enough for food	-0.345***	
<i>vs. Enough for food and clothes</i>	(0.051)	
Enough only for food	-0.134***	
<i>vs. Enough for food and clothes</i>	(0.032)	
Can buy durable and expensive goods	0.177***	
<i>vs. Enough for food and clothes</i>	(0.049)	
	Pseudo R Squared	0.1867
	0.0939	
	Number of observations	854
		854

Numbers in the table are marginal effects after tobit regression.

Standard errors are reported in parentheses.

\*\*\* Significance at 1%, \*\* significance at 5%, \* significance at 10%