

The background of the entire page is a photograph of a person's hands holding a smartphone. The person is wearing a dark jacket and a grey sweater. The phone is a white iPhone with a gold case. The background is a blurred outdoor scene with trees and a path.

## **THIRD-PARTY GUARANTEES – THE ROLE OF FINANCIAL KNOWLEDGE AND SOCIAL NORMS**

### **Technical Report**

**Christa Hainz  
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### Abstract

Third-party loan guarantees facilitate access to credit and lead to lower interest rates for borrowers as banks gain loan security. Since granting a third-party loan guarantee does not directly involve a financial transaction, guarantors might not understand that they are taking on a liability, albeit contingent.

We consider two different aspects of third-party loan guarantees: the role of guarantee literacy and the role of social norms in the granting of such guarantees. First, we introduce literacy about guarantees as a novel and distinct aspect of financial literacy. We investigate whether this form of financial literacy influences the probability of acting as a guarantor using instrumental-variables estimation. Second, we analyse the role on social norms play for granting a guarantee and whether guarantors are part of broader “give-and-take” networks of financial support. In addition, we study the interplay of both aspects in an information-provision experiment.

We conclude that regulation requiring banks to inform guarantors about potential risks may be of limited efficiency as it might be (too) late for guarantors driven by social norms to reconsider the decision at the stage of contract conclusion with the bank. Policy intervention should rather enable individuals to make informed decisions by building up guarantee literacy. Guarantee-literate consumers will be better able to weigh the costs and benefits at the point in time when they make a commitment.

**Keywords:** Third-party loan guarantees, guarantee literacy, financial literacy, social norms

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# 1. Introduction

*Money and friendship don't mix. (German proverb)*

Proverbs and novels express common wisdom that borrowing from or lending money to a friend may put both the friendship and the money at risk. Compared to loans, third-party loan guarantees are often not treated with the same degree of caution. Since granting a third-party loan guarantee does not involve a financial transaction at the point of contract conclusion, guarantors are frequently not aware of the associated risks and potential consequences.

To conclude a third-party guarantee, three parties are required: bank, borrower, and guarantor. For the borrower, providing a guarantor as security will lead to lower interest rates and facilitate access to credit. Guarantees grant the bank, up to the amount outstanding including interest, access to the wealth of the guarantor and, in contrast to collateral, not only to the pledged assets (De Haas and Millone, 2020). The guarantor, while initially only agreeing to help the borrower gain access to credit, has to step in if the borrower defaults.

Agreeing to act as a guarantor for a loan is common in both emerging and advanced economies. In Albania, for instance, eleven percent of the adult population are currently acting as guarantors. In Poland, the share is four percent, with eleven percent of guaranteed loans being in arrears before the pandemic (BIK, 2018). In Germany, about three percent of over-indebted individuals name guarantee-related issues as the main reason for their indebtedness (Creditreform Wirtschaftsforschung, 2020). In the UK, nine percent of individuals have experience in acting as a guarantor for a loan (YouGov, 2021). During the last few years, guarantees have become widespread in the UK high-cost credit market—a development over which the Financial Conduct Authority has expressed alarm (FCA, 2017).

In this project, we address three questions. First, how financially literate are individuals regarding third-party loan guarantees (short: guarantees)? Second, does guarantee literacy reduce the probability that an individual grants guarantees? Third, which role do financial support networks driven by social norms play in (informal) financing arrangements, such as guarantees?

To measure how well individuals understand the consequences of acting as a guarantor, we designed a new survey question on guarantee literacy. This question was included in the 2018 and 2019 waves of the OeNB Euro Survey—a survey on household finance conducted by the Austrian Central Bank in ten countries in Central, Eastern, and Southeastern Europe (short: Eastern Europe).

This project contributes to the understanding of individuals' financial decisions and the key findings can be summarized as follows. First, 45 percent of individuals are not aware of the consequences associated with a guarantee. Second, guarantee-literate people are 11 percentage points less likely to act as guarantors than those who are guarantee illiterate. Third, about 45 percent of individuals are involved in financial support networks either giving or receiving support. This report focusses on the first two questions and briefly discusses the role of financial support networks.

For our main question regarding the effect of guarantee literacy on the granting of a guarantee, we have to address endogeneity concerns which we do by employing two strategies. First, when using the OeNB Europe Survey data, we develop an instrumental-variables strategy in which regional cohort-specific general financial literacy serves as an instrument for individual guarantee literacy. We also conduct a placebo analysis where the information whether

someone is currently granting an informal loan to family or friends is the dependent variable. We find that guarantee literacy has no effect on granting informal loans, which demonstrates that our results are not driven by unobserved characteristics, such as social norms or trust. This corroborates our finding that being guarantee literate lowers the probability that someone acts as a guarantor.

Second, we prepare a survey experiment in which we randomly provide individuals information about the potential legal and financial consequences of granting a guarantee. This is expected to provide additional evidence supporting this result. By using another methodological approach, we can directly address causality issues. Moreover, we have added additional questions that allow us to study the role of social norms. Conducting the survey experiment in the UK allows us to provide evidence of a country with a highly developed financial market – in which guarantees nevertheless are a commonly used means of securing loans.

By introducing the concept of guarantee literacy, our research adds a new aspect to the research on financial literacy and financial decision-making. There is a large body of research documenting individuals' levels of financial literacy and analyzing its impact on savings and investment behavior.<sup>2</sup> By contrast, the household liability side has received much less attention—even though a lack of literacy may result in poor borrowing decisions that ultimately have a severe negative impact on individuals' financial well-being, especially in times of crises. With regard to financial literacy, the aspect of contingent liabilities that individuals take over when granting a guarantee has been neglected so far.

Regarding household liabilities, using the “big three” financial-literacy questions covering interest rates, inflation, and risk diversification (Lusardi and Mitchell, 2008), individuals with higher financial literacy borrow less (Stango and Zinman, 2009), are less likely to have a costly mortgage (Disney and Gathergood, 2013), and are less likely to default on a sub-prime mortgage (Gerardi et al., 2013). Moreover, those with high financial literacy less often borrow informally, but more often formally (Klapper et al., 2013).

In addition, research has developed measures to capture specific liability aspects of financial literacy. Proposing a novel set of questions on debt literacy, Lusardi and Tufano (2015) show that people who are more literate with respect to the debt-specific questions are less likely to have high-cost debt products or excessive debt. Almenberg et al. (2020) add questions on attitudes towards debt and find that those who are uncomfortable with debt have lower debt ratios. Gathergood and Weber (2017) introduce questions on mortgage products and demonstrate that individuals with better mortgage literacy are less likely to choose expensive interest-only mortgages. Also focusing on mortgages, Van Ooijen and van Rooij (2016) show that debt literacy is lower than financial literacy in general and that those taking financial advice hold riskier mortgages, in particular, if they have a low level of debt literacy. Individuals with a better understanding of the exchange-rate risk of foreign-currency loans are less likely to take out such loans (Beckmann and Stix, 2015).

The main contributions of our research are as follows: First, conceptually we introduce contingent liabilities, as created by a guarantee, as a new aspect to the financial-literacy literature. For this purpose, we develop a measure of how well individuals understand the consequences of a guarantee. Second, we present novel evidence, which is harmonized and comparable across countries, on how widespread guarantee literacy, third-party guarantees and other forms of financial support. To the best of our knowledge, we provide the only evidence on third-party guarantees and (informal) financial support networks that is comparable across countries. Third, we analyze the effect of guarantee literacy on granting guarantees by using two methodological approaches (employing an

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<sup>2</sup> For an overview of the respective literature before 2014, see Lusardi and Mitchell (2014); for more recent studies, see for example, Almenberg and Dreber (2015), Gaudecker (2015), Badarinsa et al. (2016), Boisclair et al. (2017), Bianchi (2018), Morgan and Long (2020), or Hastings and Mitchell (2020).

instrumental-variables approach when using survey data and an information provision survey experiment). In our research with survey data, we introduce financial literacy in the peer group as an instrument which we measure by average regional cohort-specific financial literacy

This technical report is organized as follows. In Section 2, we describe our data and introduce our new survey question on guarantee literacy. In Section 3, we demonstrate the validity and specificity of our new question and present descriptive evidence on the correlates of guarantee literacy. In Section 4, we study how guarantee literacy affects the granting of guarantees. We explain our empirical framework and present our main results. Moreover, we briefly present our information provision experiment. In Section 5, we show evidence on the presence of financial support networks. Finally, we summarize and discuss our findings in Section 6.

## 2. Data and Background

We introduce questions regarding guarantees and financial support networks into the *OeNB Euro Survey*, a survey of private individuals on household finance and conduct an information provision experiment in the UK. The *OeNB Euro Survey* has been conducted by the Austrian Central Bank since 2007 as a repeated cross-sectional face-to-face survey in ten Eastern European countries: six EU member states that are not part of the euro area (Bulgaria, Croatia, Czech Republic, Hungary, Poland, and Romania) and four EU candidates and potential candidates (Albania, Bosnia and Herzegovina, North Macedonia, and Serbia). In each country and in each survey wave, around 1,000 individuals are interviewed based on multistage random sampling procedures. Samples reflect a country's population characteristics in terms of age, gender, region, and ethnicity. Weights are calibrated on census population statistics for each country and each wave separately. When pooling several countries, weights also take into account the relative size of each country's population.<sup>3</sup> We use data from the survey waves conducted in fall 2018 and 2019. In these waves, we introduce a new survey question that is central to our analysis of guarantee literacy.

The law of guarantees, based on contract law, stipulates that the guarantor is liable for the borrower's outstanding debt including interest in case the borrower does not repay. Although there might be slight differences in the laws across countries, the core of the guarantee, namely the legal obligation it involves, is comparable across the ten countries (see Beckmann, Hainz and Reiter, 2022). When signing the guarantee, the guarantor takes over a contingent risk—a fact, and the extent of which, the guarantor may not be aware of. With our new question, shown in Table 1, we measure individuals' literacy about the consequences of granting a guarantee.

**Table 1:** Survey question on guarantee literacy

Concept	Survey question
Third-party guarantee	<p>Suppose your friend has taken out a consumer loan from a bank to finance his/her new car and you acted as a guarantor for this consumer loan. Then your friend loses his/her job and therefore is no longer able to repay the loan. What is your legal obligation as a guarantor?</p> <p>As a guarantor, I am obliged to</p> <ol style="list-style-type: none"> <li>(1) immediately inform the bank about any financial difficulties my friend may run into, but I have no financial obligations.</li> <li>(2) financially support my friend but I do not have any financial obligations towards the bank where he/she took out the loan.</li> <li>(3) repay the outstanding amount of the loan excluding interest to the bank.</li> <li>(4) repay the outstanding amount of the loan including interest to the bank.</li> <li>(5) None of the statements is correct.</li> <li>(6) Do not know</li> <li>(7) No answer</li> </ol>

*Notes:* The table shows the survey question on guarantee literacy included in the OeNB Euro Survey. The correct answer is (4).

<sup>3</sup> For the remainder of the paper, we employ individual weights when showing statistics for countries separately. We employ the combined individual-population weights when showing statistics that pool several countries. We do not weight survey data when conducting regression analyses.

Respondents who choose answer (4) are fully aware of the risk involved in granting a guarantee; we classify them as being *guarantee literate*. Respondents selecting a response distinct from answer (4) are classified as being *guarantee illiterate*. Respondents selecting answer (3) grasp the contingent nature, but they underestimate the amount for which they are liable.<sup>4</sup>

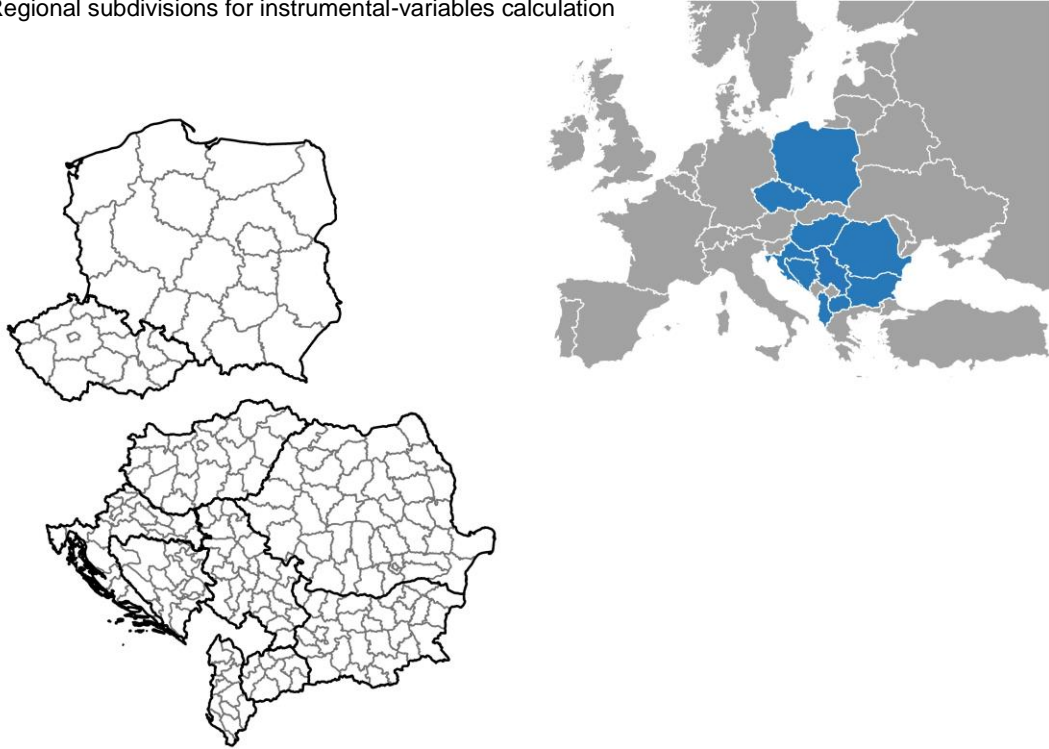
We also ask respondents whether they have helped a family member or a friend during the last twelve months by (i) granting a loan, or (ii) acting as a guarantor for a loan. Moreover, the survey contains questions on whether other forms of (informal) financial support, i.e. pledging assets as a loan security for someone else's loan, and acting as a co-borrower, have been granted. At the same time, we ask in which form financial support has been received. Given the term structure of loans in these countries, we can clearly assume that the different forms of help would still be ongoing at the time of the interview.

The OeNB Euro Survey data include a rich set of information on individuals' socio-demographic characteristics, individual beliefs, attitudes, proxies for wealth, and usage of financial products. It also contains the addresses of the interviewer starting points for the random route sampling, i.e., we know that a respondent's residence is within walking distance of that starting point. This allows us to merge the survey data geographically with two indicators of the area where the respondent lives: (i) an indicator of regional economic activity measured by nightlight data (following Henderson et al., 2012) and (ii) an indicator of the regional banking environment (as in Beckmann et al., 2018). All variables used in our empirical analysis are described in Table A1.

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<sup>4</sup> In a robustness check, we show that classifying respondents who answer (3) or (4) as *guarantee literate*, does not change our results qualitatively.

**Figure 1:** Regional subdivisions for instrumental-variables calculation



*Notes:* The figure shows regional subdivisions on which the calculation of our instrument is based. We distinguish regional subdivisions in line with the Eurostat NUTS 2016 classification. Our definition of regional subdivisions is generally equivalent to regions at the NUTS 3 level. In Poland, our definition of regional subdivisions is equivalent to regions at the NUTS 2 level (due to small numbers of observations at the NUTS 3 level).

We further make use of the fact that the OeNB Euro Survey (i) has been conducted over a long period of time, and (ii) contains the big three financial-literacy questions (see Table A3 in the Appendix for the exact wording).<sup>5</sup> The data, which stems from a total of seven survey waves (2012–2016, 2018, and 2019), provides us with sufficient observations (around 70,000) to compute *regional cohort-specific financial literacy*, which we use as an instrument for guarantee literacy. Figure 1 illustrates the regional subdivisions we use, which are mostly equivalent to the smallest regions of the NUTS-2016 classification developed by Eurostat.

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<sup>5</sup> We use the terms financial literacy and financial knowledge as synonyms, i.e., we use a narrow definition of the financial-literacy concept (see World Bank, 2014).

## 3. Guarantee Literacy

In this section, we address our first research question: *How financially literate are individuals regarding third-party loan guarantees?* We provide descriptive statistics on guarantee literacy, compare it to the big three questions on financial literacy, and investigate how it is associated with individuals' socio-demographic and socio-economic characteristics.

### 3.1. Guarantee Literacy Versus General Financial Literacy

Our results show that 55.3 percent of the individuals correctly answer the survey question on guarantee literacy (by selecting answer 4) and can thus be considered *guarantee literate* (see Table 2).

**Table 2:** Answers to guarantee-literacy question

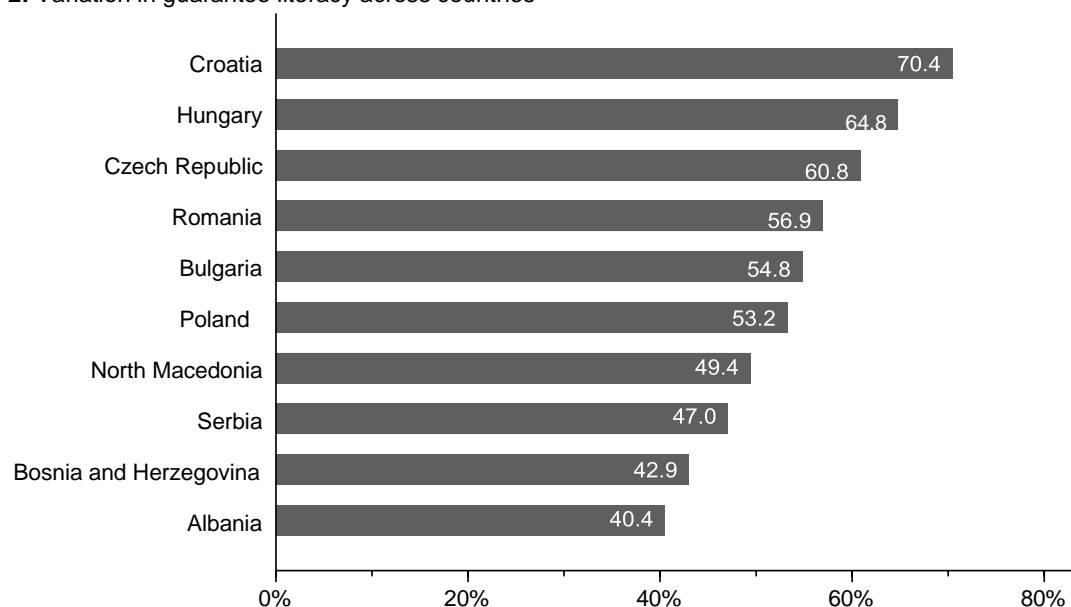
As a guarantor, I am obliged to . . .	% of individuals
(1) Immediately inform the bank (but no financial obligations)	6.4
(2) Financially support my friend (but no financial obligations towards bank)	6.8
(3) Repay the outstanding amount of the loan excluding interest to the bank	9.2
(4) Repay the outstanding amount of the loan including interest to the bank	55.3
(5) None of the statements is correct	6.1
(6) Do not know	16.1

*Notes:* The table shows the distribution of responses to the survey question on guarantee literacy. Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey, including all ten Eastern European countries covered by the survey.  $N = 19,965$ .

Figure 2 shows that the level of guarantee literacy varies considerably across countries. In Croatia, 70.4 percent of the individuals select the correct answer. In Hungary and the Czech Republic, guarantee literacy is above 60 percent. More than half of the individuals are guarantee literate in Romania, Bulgaria, and Poland. Figures are below 50 percent in North Macedonia, Serbia, as well as in Bosnia and Herzegovina. Individuals in Albania are the least literate, with only 40.4 percent answering correctly.

To put our new survey measure into perspective, we compare the answers on guarantee literacy with the big three financial-literacy questions on interest rates, inflation, and risk diversification. Table 3 shows that guarantee literacy is correlated with interest-rate, inflation, and risk-diversification literacy. The correlation is most pronounced for inflation literacy, where two thirds with the correct answer on guarantees also provide the correct answer on inflation. At the same time, 58 percent of those who are guarantee illiterate also give an incorrect answer to the inflation question. For risk diversification, the positive correlation is smaller, which is not surprising as literacy about risk diversification is much lower than about guarantees. While the association is positive, these results also indicate that guarantee literacy is a specific aspect of financial literacy that is not captured by the frequently used big three questions.

**Figure 2:** Variation in guarantee literacy across countries



*Notes:* The figure shows the country-specific percentage of individuals with correct answers to the survey question on guarantee literacy. Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey.  $N=19,965$ .

**Table 3:** Cross-question consistency of guarantee literacy and financial literacy

	Interest-rate literate		Inflation literate		Risk-diversification literate	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
All individuals	53.8	46.2	57.0	43.0	44.6	55.4
Only individuals . . .						
Guarantee literate	62.1	37.9	68.7	31.3	51.0	49.0
Guarantee illiterate	43.4	56.6	42.1	57.9	36.5	63.5

*Notes:* The table shows the percentage of individuals with (in)correct answers to the survey questions on guarantees, interest rates, inflation, and risk diversification (detailed in Tables 1 and A.3). Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey, including all ten Eastern European countries covered by the survey.  $N=19,464$ .

### 3.2. Heterogeneity in Guarantee Literacy

To study which groups are more likely to be guarantee literate, we perform a multivariate regression analysis. We present results from estimating a linear probability model in Table 4. In the first specification, we study how individuals' guarantee literacy correlates with their socio-demographic characteristics. In the second specification, we add the three standard financial-literacy questions. In the third specification, we control for interviewer characteristics as suggested by Crossley et al. (2020), who show that interviewers introduce measurement error, especially when it comes to questions evaluating individuals' levels of financial literacy. Our results show that younger individuals (18–35) are less likely to select a correct answer.

Married and higher-educated individuals are more literate. Guarantee literacy is also more prevalent among those who are working and those with higher income. Our results mirror quite well what has been found in previous studies with respect to age and education (Lusardi and Mitchell, 2011) as well as income (Brown and Graf, 2013). The absence of a gender difference in the ten Eastern European countries may not be too surprising as they used to be communist, with comparatively equal gender roles. In other papers on formerly communist countries, the gender gap is also low (Bucher-Koenen and Lusardi, 2011; Cupák et al., 2018). For the countries in our dataset there is no gender difference in interest-rate literacy either, and only a small difference in literacy regarding inflation and risk diversification (Beckmann and Reiter, 2020).

Regarding the three standard financial-literacy questions, our results are in line with what we expected from our earlier analysis on cross-question consistency (Table 3). The positive coefficient is highest for inflation and lowest for risk diversification. When adding interview duration and interviewer characteristics, the results for socio-demographic characteristics and financial literacy do not change. Among these additional control variables, only the interviewer's age is positive and statistically significant, but the size of the coefficient is small.

**Table 4:** Multivariate analysis of guarantee literacy

Dependent variable	Guarantee literate		
	(1)	(2)	(3)
<i>Socio-demographic characteristics</i>			
Female	−0.006 (0.007)	0.005 (0.007)	0.004 (0.007)
Age (ref: 36–50)			
18–35	−0.070*** (0.010)	−0.065*** (0.010)	−0.060*** (0.010)
51–65	0.020** (0.009)	0.012 (0.009)	0.011 (0.009)
65 or older	0.010 (0.015)	0.006 (0.015)	0.002 (0.014)
Education (ref: Secondary)			
Primary	−0.122*** (0.013)	−0.091*** (0.013)	−0.092*** (0.013)
Tertiary	0.056*** (0.010)	0.033*** (0.010)	0.035*** (0.010)
Married	0.015* (0.009)	0.016* (0.008)	0.017** (0.008)
Working	0.032*** (0.010)	0.037*** (0.009)	0.040*** (0.010)
Household income (ref: Low)			
Medium	0.048*** (0.012)	0.036*** (0.011)	0.034*** (0.011)
High	0.102*** (0.014)	0.069*** (0.013)	0.069*** (0.013)
Missing information	0.003 (0.014)	0.003 (0.014)	0.004 (0.014)
Size of town (log)	0.002 (0.003)	0.000 (0.003)	0.000 (0.003)
<i>Financial literacy (Big Three)</i>			
Interest-rate literate		0.127*** (0.010)	0.125*** (0.010)
Inflation literate		0.170*** (0.010)	0.164*** (0.010)
Risk-diversification literate		0.056*** (0.010)	0.056*** (0.009)
<i>Interview(er) characteristics</i>			
Interviewer female			0.018 (0.016)
Interviewer age			0.002*** (0.001)
Interviewer education (ref: Secondary)			
Primary			0.133 (0.137)
Tertiary			−0.005 (0.014)
Interviewer experienced			−0.021 (0.015)
Interview duration			−0.001 (0.001)
Constant	0.325*** (0.040)	0.240*** (0.039)	0.192*** (0.050)
Mean DepVar	0.55	0.55	0.55
R-squared	0.06	0.11	0.12
N	19,935	19,434	19,434
Country FE	✓	✓	✓
Wave FE	✓	✓	✓

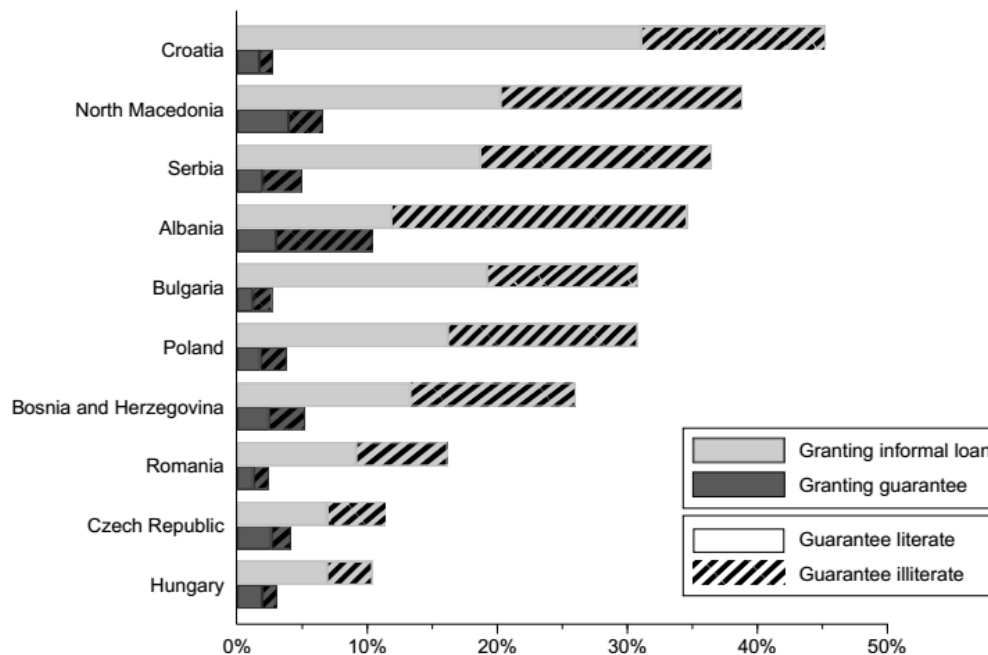
Notes: The table shows estimates from a linear probability model. The dependent variable is equal to 1 if an individual is guarantee literate, i.e., correctly answering the survey question on guarantee literacy (as detailed in Table 1), and 0 otherwise. Standard errors in parentheses are adjusted for clustering at the *primary-sampling-unit* and *time* level. 'ref.' indicates the omitted category. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Data Source: OeNB Euro Survey.

## 4. Guarantee Literacy and Guarantors

### 4.1. Granting of Guarantees

Figure 3 shows the percentage of individuals who are currently granting a guarantee (dark gray) or an informal loan (light gray). While individuals are more likely to provide informal loans, there is also a non-negligible share of individuals granting guarantees. In Albania, for instance, the share of individuals granting a guarantee is as high as ten percent. For those currently granting a guarantee or an informal loan, the figure further shows the percentage of individuals who are illiterate (striped) or literate (solid) about guarantees. In some countries, the majority of individuals currently acting as guarantors is actually not aware of the potential legal and financial consequences of guarantees.

**Figure 3:** Granting informal loans and guarantees



*Notes:* The figure shows the percentage of individuals currently granting an informal loan or a guarantee to someone else. Statistics are based on weighted data from the 2018 and 2019 waves of the OeNB Euro Survey. For *granting an informal loan*,  $N=19,888$ ; for *granting a guarantee*,  $N=19,523$ .

## 4.2. Empirical Methodology

In this section, we address our second research question: *How does guarantee literacy reduce the probability that an individual grants guarantees?* We describe our model, discuss identification challenges, and explain our identification strategy.

### 4.2.1. Model

First, we estimate a linear probability model of the following form:

$$\mathbb{1}(\text{Guarantor})_i = \alpha + \beta \mathbb{1}(\text{GuaranteeLiteracy})_i + X_i' \gamma + X_r' \delta + \text{CountryFE} + \text{WaveFE} + \epsilon_i \quad (1)$$

The dependent variable,  $(\text{Guarantor})_i$ , is an indicator of whether individual  $i$  is currently granting a guarantee. The main variable of interest,  $(\text{GuaranteeLiteracy})_i$ , indicates whether individual  $i$  is considered guarantee literate in the sense that they know guarantors have to repay outstanding loan amounts including interest if the main borrower defaults.  $X_i'$  is a vector of control variables for an individual's socio-demographic characteristics (such as gender, age, education, and marital status) and socio-economic characteristics (such as labor-market status, income, wealth, and personal attitudes and beliefs).  $X_r'$  is a vector of control variables at the regional level  $r$ , including proxies for economic and financial development (such as night-light intensity and bank density). All regressions include country-fixed and wave-fixed effects.

Second, to isolate the effect of guarantee literacy from other factors and to address potential endogeneity issues, we propose an instrumental-variable strategy. To estimate Equation 1, we use two-stage least-squares. In the first stage, we estimate the effect of regional cohort-specific average financial literacy ( $\text{RCFLit}_j$ ) on guarantee literacy.

$$\mathbb{1}(\text{GuaranteeLiteracy})_i = \alpha + \beta \text{RCFLit}_i + X_i' \gamma + X_r' \delta + \text{CountryFE} + \text{WaveFE} + \epsilon_j \quad (2)$$

### 4.2.2. Identification Challenges

Estimating Equation (1) using ordinary least squares (OLS) likely causes our point estimates for  $\beta$  to be biased. Our list of control variables may well exclude factors that are correlated with guarantee literacy and that might also drive the decision to grant a guarantee. *Cognitive ability* is one example of an omitted variable in the financial-literacy research (Lusardi and Mitchell, 2014). While it is plausible to assume that one's cognitive ability is positively correlated with guarantee literacy, it is not clear ex-ante if individuals with higher cognitive ability are more or less likely to act as guarantors.

Reverse causality may be another issue as individuals who have granted a guarantee might have better literacy due to their experience acting as a guarantor. In particular, guarantees might have been called on and, as a result, a guarantor would have been obliged to make loan repayments on behalf of the main borrower, which in turn would improve the guarantor's understanding of the potential consequences of granting a guarantee. Guarantors may also be more literate simply because of having gone through the process of granting a guarantee.

In the literature about the effect of financial literacy on financial behavior, reverse causality usually leads to an upward bias of OLS estimates. For example, higher literacy increases the propensity to be financially included, and financial inclusion increases literacy—the two effects are reinforcing each other. In our case, however, OLS estimates are attenuated because in one direction the effect is positive, whereas in the other direction the effect is negative. Better guarantee literacy lowers the propensity to grant a guarantee, i.e., the expected coefficient is negative. Experience with granting a guarantee, however, increases guarantee literacy, i.e., the expected coefficient is positive. The OLS estimate would capture the combined effect of holding a guarantee, and the true effect of guarantee literacy on behavior would be a stronger negative one.

Another concern is that the responses to our survey question on guarantee literacy are a noisy measure of a person's true guarantee literacy, giving rise to measurement error. Such measurement error could arise, for example, from respondents guessing the answer. If a respondent guesses the correct answer, we would wrongly classify this person as guarantee literate. As both the dependent variable and the main regressor are binary, the measurement error takes the form of misclassification. A positive probability of misclassification would lead to attenuation bias in our estimates of  $\beta$  (Aigner, 1973). Assuming that  $\beta$  is negative, this would imply a positive bias.

Lusardi and Mitchell (2017) and Van Rooij et al. (2011) provide evidence that guessing is indeed prevalent in financial-literacy questions. To reduce the chance of a respondent guessing the right answer, we include six different response options in our survey question on guarantee literacy. This is different from the standard financial-literacy questions, which usually offer only up to four different response options (Lusardi and Mitchell, 2014). Taken together, there is still a probability of 1:6 that a respondent randomly guesses the right answer. As discussed in Section 3, measurement error could also arise from interviewer effects. Crossley et al. (2020) show that such interviewer-induced measurement error is particularly pronounced for financial-literacy questions. We address concerns regarding interviewer-related measurement error by including interviewer-level control variables in our robustness analyses.<sup>6</sup>

#### 4.3. Estimation Strategy

To address the concerns related to endogeneity, we perform instrumental-variables estimations. Agnew et al. (2013) and Van Rooij et al. (2011) use financial literacy of siblings and parents as instruments for an individual's financial literacy. However, one may question whether the financial literacy of parents or siblings is beyond the control of the individual. Bucher-Koenen and Lusardi (2011) and Klapper et al. (2012) use regional financial literacy as an instrument for an individual's financial literacy. These papers employ proxies for regional financial literacy, such as the voting share of liberal parties, the number of universities, or the newspapers in circulation.

We combine these two types of instruments and introduce a new instrument to the literature: We use *cohort-specific averages of financial literacy in the region where the respondent lives* as an instrument for guarantee literacy. In using cohort-specific averages of financial literacy in the region where the respondent lives as an instrument for guarantee literacy, we contend that exposure to more financially-literate individuals increases guarantee literacy.<sup>7</sup> Here, we draw on the empirical evidence that individuals' financial choices are influenced by that of their peers (Brown et al., 2008; Kaustia and Knüpfer, 2012). It is further reasonable to assume that the financial literacy of a whole cohort is beyond the control of a single individual belonging to that cohort. This instrument is based on data from seven survey waves of the OeNB Euro Survey (2012–2019),<sup>8</sup> which includes the big three questions on financial literacy (Lusardi and Mitchell, 2008). These three questions serve to calculate a financial-literacy score (for each respondent) which equals the number of correctly answered financial-literacy questions—ranging from 0 to 3. Our instrument is calculated as the average financial-literacy score for all unique combinations of *region* and

<sup>6</sup> The number of interviews per interviewer is too low for fixed-effects estimation.

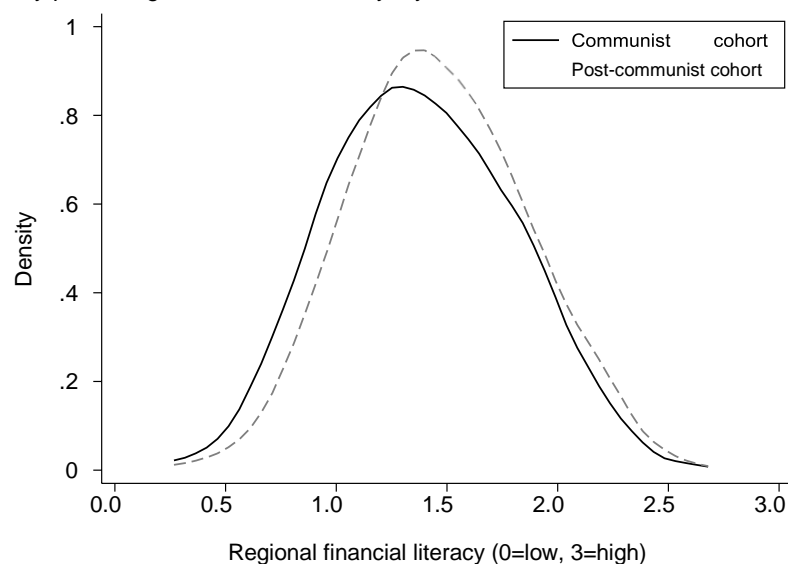
<sup>7</sup> Bailey et al. (2018a) show that individuals are influenced by their geographically distant friends when buying a house, providing strong evidence that social networks and the extent of "social connectedness" have an impact on economic activity. This would suggest that geographic exposure may only cover one aspect of exposure to financially-literate individuals. However, the countries we cover exhibit a relatively low indicator of geographically-distant social connectedness (Bailey et al., 2018b). Moreover, in our countries under study, internet penetration and access varies strongly, from 52% of individuals with internet access at home in Albania to 84% in Poland. For those countries where internet penetration is low, the social connectedness indicator likely overstates the importance of geographically-distant social linkage, because the sample of individuals who are using the internet and social media is not representative of the population.

*cohort*. Regions are defined in line with the EU Nomenclature of Territorial Units (NUTS) at level 3 (see Figure 1 for an illustration).

Cohorts are defined in terms of whether or not individuals experienced communism during their adult lives: The first cohort consists of individuals who experienced communism (*communist cohort*), i.e., individuals aged 18 or older in 1989. The second cohort consists of individuals who were younger than 18 in 1989, or not yet born (*post-communist cohort*). We define cohorts in this manner for two reasons. Firstly, the banking sector during the communist regimes was merely used for transaction purposes. Financial markets that require consumers to take informed and more complex financial decisions only developed after transition from planned to market economies. For the younger cohort, the formative years fall into this time, which is not the case for the older cohort. Secondly, during transition from planned to market economies, most countries experienced banking, currency, or other economic crises. It is reasonable to assume that such crisis experience will also affect literacy, e.g., in terms of an improved understanding of inflation after living through hyperinflation.

In terms of possible collinearities of our instrument and control variables, especially age, the following points need to be made: To calculate the regional cohort-specific average financial literacy, we calculate leave-out means (Townsend, 1994), i.e., we take into account responses from all the respondents living in the respective region and belonging to the respective cohort, but exclude the financial-literacy score of the respondent, whose guarantee literacy we instrument; this means that our instrument varies at the individual-respondent level (and not at the regional level). It is also important to note that depending on the survey wave, some age groups may fall into different cohorts: For example, a 41-year old respondent in the 2012 wave would belong to the “communist” cohort; in contrast, a 41-year old respondent in the 2019 wave would belong to the “post-communist” cohort. In Figure 4, we show the kernel densities of average regional financial literacy separately for the two cohorts. For the post-communist cohort (dashed line), the regional financial-literacy score is slightly higher on average than for the communist cohort (solid line).

**Figure 4:** Kernel-density plot of regional financial literacy, by cohort



*Notes:* The figure shows kernel-density estimates of the leave-out-mean regional financial-literacy score (ranging between 0 and 3) for the communist cohort (solid line) and the post-communist cohort (dashed line). The expected financial-literacy score would be 0.75 if response options were chosen randomly.

The identifying assumption underlying our estimation strategy is that, conditional on the observable characteristics of the individual and other controls, the instrument—regional cohort-specific financial literacy—is uncorrelated with the error term. The following two concerns may arise: First, regional financial literacy is likely correlated with economic prosperity or other characteristics of the region that may directly drive the prevalence of guaranteed loans;

it is unlikely, though, that such regional factors would be correlated with *cohort-specific* regional financial literacy. Second, it might be that the cohort-specific regional reference group, which we employ to calculate our instrument, has similar social norms as the respondent, especially since the cohorts are defined in terms of experience of communism. Some of our control variables, in particular religion, may partially capture social norms. Not being able to fully control for social norms might weaken the validity of the exclusion restriction associated with our instrument. We address this concern by conducting a placebo analysis, where the dependent variable is an indicator of whether individuals are currently lending money to family members or friends. The outcome for the main borrower (receiving a loan) and the risk of losing money for the person helping the main borrower is comparable. Of course, the two concepts differ in that not everyone may have the necessary liquidity to directly lend money, which we take into account by controlling for income and wealth. But the decisions to financially support family members or friends directly (by lending money), or indirectly (by granting a guarantee) are correlated with similar social norms. Guarantee literacy, however, should only affect the granting of a guarantee. If, in the instrumental-variables (IV) estimation, we were to observe an effect of guarantee literacy on granting informal loans, this would indicate that the instrument captured omitted variables, such as social norms. If we do not observe an effect of guarantee literacy on granting informal loans in the IV estimation, we would be confident that the instrument does not pick up omitted variables, such as social norms and trust.

#### 4.4. Main Results

##### 4.4.1. Baseline Analysis

In Table 5, we report results from the OLS analysis (Panel A) and from the IV analysis (Panel B). In regression (1), we control for basic socio-demographic characteristics. In regression (2), we add control variables for income and wealth, and in regression (3), we additionally control for economic and financial development at the regional level. OLS estimates show a negative and significant association between guarantee literacy and the probability of granting a guarantee.

For the IV estimation, the results of the first stage (reported in Panel C) show a positive and highly significant relationship between the regional cohort-specific financial literacy and an individual's guarantee literacy. The Kleibergen-Paap F-statistic varies between 121.9 and 141.7 (for the different specifications in columns 1–3),<sup>9</sup> indicating that the instrument of regional cohort-specific financial literacy is a strong predictor of individual guarantee literacy. The estimates of the reduced form (reported in Panel D) show a negative and significant association between the instrument and the probability of granting a guarantee, further supporting the validity of our instrument.

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<sup>9</sup> According to Lee et al. (2021), 2SLS inference requires correction if the first-stage F-statistic is below 104.7. In our analyses (see Table 5), obtained F-statistics are above this threshold.

**Table 5:** Baseline and placebo analysis

	Baseline analysis: Granting guarantee			Placebo analysis: Granting informal loan		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A: OLS</b>						
Guarantee literate	−0.013*** (0.003)	−0.014*** (0.003)	−0.014*** (0.003)	−0.000 (0.006)	−0.006 (0.006)	−0.005 (0.006)
Mean DepVar	0.05	0.05	0.05	0.29	0.29	0.29
N	19,290	19,290	19,290	19,652	19,652	19,652
<b>Panel B: 2SLS (second stage)</b>						
Guarantee literate	−0.077** (0.036)	−0.110*** (0.040)	−0.110*** (0.039)	0.064 (0.074)	−0.008 (0.078)	−0.012 (0.077)
Mean DepVar	0.05	0.05	0.05	0.29	0.29	0.29
N	19,290	19,290	19,290	19,652	19,652	19,652
<b>Panel C: 2SLS (first stage) – Guarantee literate</b>						
Regional cohort-specific financial literacy	0.189*** (0.016)	0.175*** (0.016)	0.177*** (0.016)	0.193*** (0.016)	0.179*** (0.016)	0.182*** (0.016)
Kleibergen-Paap F-stat.	141.7	121.9	124.7	149.7	129.4	132.9
<b>Panel D: Reduced form (OLS)</b>						
Regional cohort-specific financial literacy	−0.015** (0.007)	−0.019*** (0.007)	−0.020*** (0.007)	0.012 (0.014)	−0.001 (0.014)	−0.002 (0.014)
Mean DepVar	0.05	0.05	0.05	0.29	0.29	0.29
N	19,290	19,290	19,290	19,652	19,652	19,652
Country FE	✓	✓	✓	✓	✓	✓
Wave FE	✓	✓	✓	✓	✓	✓
Socio-demographic controls	✓	✓	✓	✓	✓	✓
Socio-economic controls		✓	✓		✓	✓
Regional controls			✓			✓

*Notes:* The table shows estimation results for granting a guarantee (columns 1 to 3), or granting an informal loan (columns 4 to 6). Sociodemographic controls include gender, age, education, marital status, working status, religion, risk aversion, and size of town. Socio-economic controls include household income, savings, and secondary residence. Regional controls include local nightlife and local number of banks. For full results see Appendix, Table A.4 and A.5. Robust standard errors in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*Data Source:* OeNB Euro Survey.

Panel B reports the results of the second stage. Across all specifications we find that guarantee literacy has a negative effect on granting a guarantee: Being guarantee literate decreases the probability of granting a guarantee by 7.7–11 percentage points. This result is statistically significant and also economically relevant as about 5 percent of individuals in our sample are guarantors. The significance level and size of the coefficient does not change when adding controls for regional economic and banking market development (compare specifications 2 and 3), which reassures us that our instrument does not pick up regional differences that drive our result. Notably, the coefficients of guarantee literacy are larger (in absolute values) than OLS estimates in all specifications, which we would expect from our discussion of endogeneity concerns in Section 4.1.

#### 4.4.2. Placebo Analysis and Further Sensitivity Checks

In Table 5, columns 4–6, we present our placebo analysis estimating the effect of guarantee literacy on granting an informal loan. As discussed in Section 4.3, guarantee literacy should not influence the decision to grant an informal loan to family and friends unless it is correlated with some unobservable characteristics, such as social norms. Indeed, we do not see a significant effect of guarantee literacy on the lending to family and friends in any of the regression specifications. In the OLS estimation and the second stage of the IV estimation (Panel A and B), the coefficient of guarantee literacy is insignificant and so is the coefficient of regional cohort-specific financial literacy in the reduced-form estimation (Panel D).

We conduct several sensitivity checks which show that our results are very robust.<sup>10</sup> First, we restrict the sample so that we can compare individuals who are currently granting a guarantee with individuals who have not yet had any experiences with guarantees. Second, we vary the likelihood of interaction with peers when constructing our

<sup>10</sup> For the results see Beckmann, Hainz and Reiter (2022).

instrument. Therefore, we calculate general financial literacy at the regional level only (and do *not* take into account potential differences in literacy across cohorts), control for mobile coverage and for an index of social connectedness at the NUTS 3 level (Bailey et al., 2018b). Third, we classify those individuals as *guarantee literate* who either state that the obligation of a guarantor consists in repaying the outstanding loan *including* interest or *excluding* interest. Fourth, we repeat our baseline analysis and control for interviewer age, which is the only interviewer characteristic that we found to be correlated with a person's guarantee literacy in our regression analysis (see Table 4). Finally, instead of estimating a linear probability model using IV, we estimate a bivariate probit model and report marginal effects.

## 5. Risk of Granting a Guarantee and Guarantees

To provide even more support to our findings we have prepared an information provision experiment which will be conducted in summer 2022.<sup>11</sup> This will provide another piece of evidence regarding the causal effect guarantee literacy has on the granting of guarantees. In addition, this survey allows us to ask questions regarding social norms which is, besides guarantee literacy, another important aspect in the decision to grant a guarantee.

The risk associated with a loan guarantee consists of (i) the probability of default and (ii) the loss given default. In the information provision experiment we will manipulate both to study how it affects the survey participants' risk perception. Regarding the probability of default, we inform survey participants about the country-level default rate and that there exists an ingroup-bias in the risk perception. Regarding loss given default, we provide information about the legal consequences. As the probability of default should matter only for those who understand the legal consequences, we investigate the effect of the combined information about the probability of default as well as the legal consequences. We also elicit prior beliefs about the default rate. To separate the effect of salience and information, we also run a salience treatment. Thus, in addition to the pure control group, we distinguish the following treatment groups: (1) salience, (2) salience and legal information, (3) salience, and legal as well as default information.

We plan to estimate the effect of the treatment on the granting of a guarantee in a hypothetical scenario by comparing (i) each of the treatments with the pure control group and (ii) the combined salience and information treatments with the salience treatment. Second, we study belief updating for the default rate. Third, we study how the effect varies with individuals' social norms.

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<sup>11</sup> The information-provision experiment has been approved by the Ethics Committee of the University of Munich. The pre-analysis plan has been submitted to the AEA RCT registry.

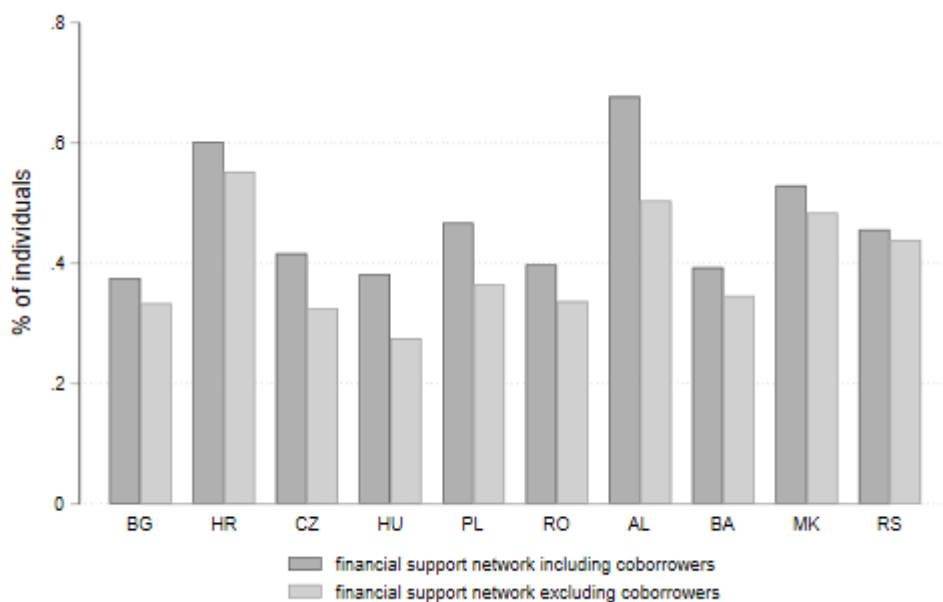
## 6. Guarantees and Social Norms

In this part of our project, we turn to the role of social norms for acting as a guarantor. It could be the case that individuals are required - based on social norms - to lend financial support to family and friends irrespective of possibly being aware of the risks. Loan guarantees could be just one form of such financial support. We address the following questions: Are there give-and-take networks of financial support? What type of financial support is covered by give-and-take networks? Do these networks overlap? Do individuals either act as takers or as givers of financial support or do they also do both?

The questions we designed for the OeNB Euro Survey allow us to cover four different forms of financial support: informal loans, loan guarantees, pledging assets as loan security and acting as a co-borrower. We study whether someone is part of a support network by either giving or taking (informal) financial support. In the case of co-borrowing, it is not straightforward to delineate giving from taking support. Therefore, we apply two definitions of support networks (i) including acting as a co-borrower (*Type I Network*) and (ii) excluding acting as a co-borrower (*Type II Network*). On average across the ten countries covered by the OeNB Euro Survey, 45% of adults are part of Type I Network and 38% of adults are part of a Type II Network. 5 shows that percentages differ quite strongly between countries ranging from 39% in Bulgaria to 68% in Albania. Including or excluding co-borrowing makes the largest difference in Hungary at 11 percentage points and the smallest difference in Serbia at 2 percentage points.

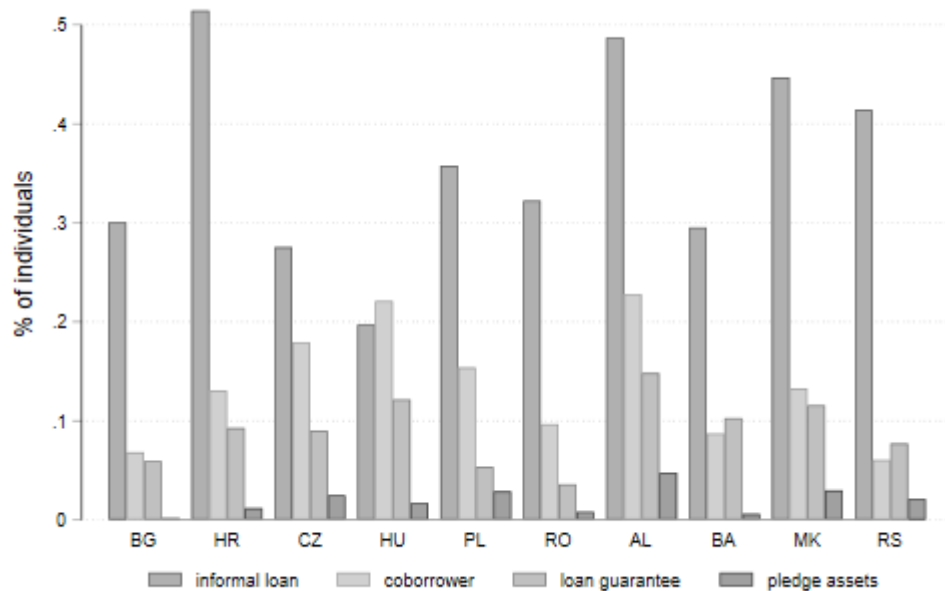
The figure also reveals, however, that in seven of the countries, the majority of individuals are not involved in any financial support – in Bulgaria, Hungary, Bosnia and Herzegovina, Romania and Czech Republic it is around 60%; in Albania only every third individual is not involved in financial support.

**Figure 5:** Financial support networks



The dominant form of financial support networks are informal loans. Only in Hungary, co-borrowing is more frequent (see Figure 6). In the ten Eastern European countries, 7% of the adult population are either giving or taking a loan guarantee. The figure is highest in Hungary at 12% and lowest in Romania at 3.5%. Less than 2% of the adult population either have a loan where someone else pledged assets as security or pledged assets for someone else's loan.

**Figure 6:** Types of financial support networks



Do the different types of financial support shown in Figure 6 overlap? The vast majority of individuals are involved only in one type of support, however, with the exception of Bulgaria and Romania, every fifth individual is involved in at least two types of financial support (see Table 6). Albania and Hungary stick out with the lowest percentage of individuals involved in only one type of financial support and close to ten percent being involved in 3 or 4 different types of financial support.

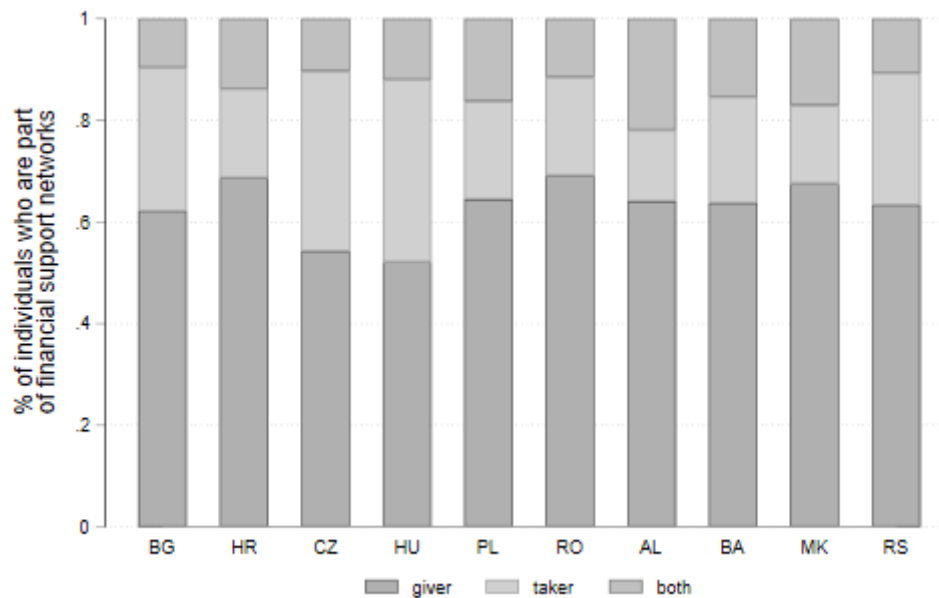
**Table 6:** Number of types of financial supports individuals are involved in

Number of types of financial support	1	2	3	4
<i>in % of individuals involved in any network</i>				
Bulgaria	86.82	10.65	2.53	0.00
Croatia	80.62	14.76	4.36	0.26
Czech Republic	72.88	18.22	7.70	1.20
Hungary	64.77	25.82	8.20	1.21
Poland	79.22	14.74	4.57	1.47
Romania	86.53	10.50	2.54	0.44
Albania	64.14	29.45	5.15	1.25
Bosnia and Herzegovina	78.69	17.12	3.94	0.25
North Macedonia	74.07	16.86	7.23	1.84
Serbia	79.86	14.92	4.58	0.64

Turning from overlaps in the types of financial support, we now look at overlaps in terms of giving and taking support. Looking at Type II financial support networks, i.e., excluding co-borrowing, allows us to distinguish support into giving and taking. Fehler! Verweisquelle konnte nicht gefunden werden. 7 shows that the majority of individuals who are involved in financial support networks give support. Almost every fourth individual receives financial support

and more than 10% both receive and give support. Taking into account that the sample is representative of the respective countries' populations this suggest that those who receive support do so from several sources at once.

**Figure 7:** Giving and taking financial support



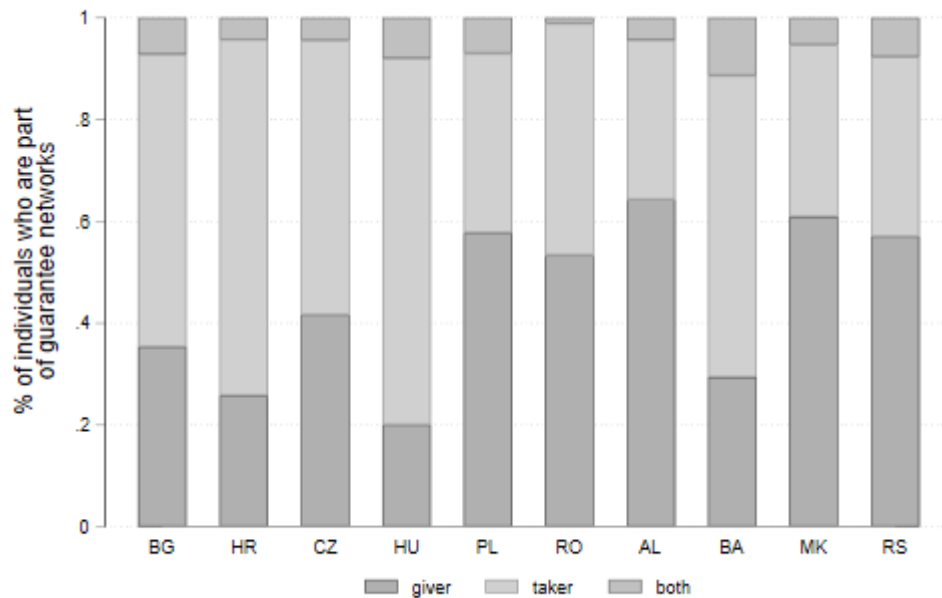
How do these general findings relate to guarantee networks? Table 7 shows that between 40% (Albania) to 72% (Bulgaria) of those who are taking or giving a guarantee are not involved in other types of financial support. At the same time, at least every fifth person who is involved in a guarantee-network is also involved in at least one further type of financial support. Comparing 6 and 7 indicates that the probability for being involved in a further type of financial support is higher for individuals who are giving or taking a guarantee.

**Table 7:** Number of types of financial support guarantee networkers are involved in

Number of types of financial support	1	2	3	4
<i>in % of individuals involved in a guarantee network</i>				
Bulgaria	71.71	21.57	6.72	0.00
Croatia	59.48	26.18	13.49	0.84
Czech Republic	52.35	28.67	16.21	2.77
Hungary	52.01	32.00	13.88	2.12
Poland	61.64	21.03	11.43	5.90
Romania	61.85	26.89	9.27	1.99
Albania	39.82	48.24	9.07	2.87
Bosnia and Herzegovina	70.22	23.49	5.92	0.37
North Macedonia	54.73	26.06	14.37	4.85
Serbia	49.51	39.61	8.94	1.95

Turning to whether individuals give or take a guarantee, Figure 8 reveals a striking difference between guarantee networks and overall financial support networks. While the majority of individuals involved in any type of financial support network are givers (see Figure 6 **Fehler! Verweisquelle konnte nicht gefunden werden.**), the majority of those involved in a guarantee network are taking a loan guarantee.

**Figure 8:** Giving and taking loan guarantees



In the empirical analysis for this project, we plan to study in-depth which factors determine whether individuals are part of a financial support network at all, i.e., we will run a probit regression where the dependent variables are financial support networks Type I and II. We will control for socio-economic characteristics as well as personal beliefs, expectations and trust. In addition, we will include indicators of the local economic development and in particular indicators of the local banking sector development.

We will then turn to the question which type of financial support networks most frequently overlap and what factors determine overlaps. In a final step, we will address the question what determines whether individuals give, take or both give and take financial support.

## 7. Conclusion and Discussion

In this project, we study guarantee literacy, its effect on financial decision-making and the role of social norms. We design a novel survey question to capture how well individuals understand the potential consequences of granting a guarantee. Comparing our new question with the so-called big three questions on financial literacy shows that we capture a specific aspect of financial literacy. According to our descriptive statistics, almost half of the individuals in Eastern Europe lack literacy about guarantees. Similar to other financial-literacy measures, guarantee literacy is associated with age, education, and income. In an IV estimation using regional cohort-specific financial literacy as an instrument, we show that literate individuals have a 11 percentage-point lower probability of granting a guarantee than illiterate individuals. Moreover, we find that (informal) financial support networks are widespread. To provide further evidence on the effect of guarantee literacy on the granting of a guarantee, we study this question with a different methodology and in another country by conducting an information provision experiment in the UK. Including questions on social norms allows us to investigate how they influence the effect of information on financial decision making.

Our findings have important implications for consumers, banks and policy makers. They are particularly timely, as guarantors will be increasingly called upon to repay loans secured by guarantees when the recession in the wake of the Covid-19 pandemic leads to a surge in loan defaults. As a result, guarantors may themselves fall into financial distress and lose an important share of their wealth, potentially facing economic and social difficulties. This could lead to demands to severely restrict loan guarantees in the future. Before reacting to these demands, policy makers should carefully consider the costs and benefits that guarantees have for society.

On the benefit side, guarantees are a potent means to foster access to credit which can be limited for two reasons. First, due to the characteristics of the borrower or the loan, the bank may demand additional security. Granting a guarantee may be much less costly than using an asset as collateral in terms of transaction costs. Second, in countries where the institutional underpinning of the market is less sophisticated, guarantees are an important alternative to collateralization with immovable or movable property. Our results are based on ten countries that differ significantly in their economic and financial market performance and development—guarantees are likely used for both reasons, and contribute to making financial markets more efficient.

On the cost side, guarantors are primarily affected as they bear the risks associated with the contingent liability. Our research shows that individuals who are guarantee literate are less likely to grant a guarantee; they will consider the consequences of their decision more carefully.

A number of policy measures are discussed that could improve the situation, in particular, for guarantors. One important measure that is already in place is that banks need to inform the potential guarantor about the potential consequences acting as a guarantor has. However, the efficacy of such a measure might be limited by the specific contractual situation. In contrast to most other contracts, there are not only two contracting partners but there are three. Thus, before the borrower presents the guarantor to the bank, the borrower already asks the potential guarantor to act as a guarantor. This implies that the decision to act as a guarantor is taken (long) before the guarantee is signed formally. As our data show, there exist financial support networks which are evidence for close social ties between the borrower and the guarantor. Thus, it might be (too) late to reconsider the decision to act as a guarantor at this stage. A similar logic applies to suggestions that aim to grant the guarantor a cooling-off period after s/he has signed the guarantee at the bank.

Based on these arguments the aim of any policy intervention should, therefore, be to enable individuals to make informed decisions by building up guarantee literacy. Guarantee literate consumers are aware of the potential consequences of granting a guarantee. They can decide at the point in time when the decision to grant a guarantee is made between two persons that have close social ties. Consumers that are guarantee literate will be better able to weigh the costs and benefits for their decision for themselves and make an informed decision. When the borrower gets into financial difficulties they may still be disappointed but they will not be surprised when the bank asks them to repay the loan. Making guarantee literacy part of financial literacy programs should benefit banks and borrowers because they have guarantors who know what risk they are taking and, most importantly, the consumers as potential guarantors because they are able to make better decisions.

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## 9. Appendix

**Table A.1:** Description of variables

Label	Description
Granting guarantee	=1 if the respondent has been acting as guarantor for someone else's loan during the past 12 months prior interview, and 0 otherwise.
Granting informal loan	=1 if the respondent granted a loan to family or friends over the past 12 months prior interview, and 0 otherwise.
Guarantee literate	=1 if correct answer to survey question on guarantees, and 0 otherwise (see Table 1).
Interest-rate literate	=1 if correct answer to survey question on interest rates, and 0 otherwise (see Table A.3).
Inflation literate	=1 if correct answer to survey question on inflation, and 0 otherwise (see Table A.3).
Risk-diversification literate	=1 if correct answer to survey question on risk diversification, and 0 otherwise (see Table A.3).
Female	=1 if female, and 0 otherwise.
Age 18–35	=1 if aged between 18 and 35 years, and 0 otherwise.
Age 36–50	=1 if aged between 36 and 50 years, and 0 otherwise.
Age 51–65	=1 if aged between 51 and 65 years, and 0 otherwise.
Age 65+	=1 if aged 65 or older, and 0 otherwise.
Education primary	=1 if the respondent has primary education, and 0 otherwise.
Education secondary	=1 if respondent has lower secondary, upper secondary, or post-secondary non-tertiary education, and 0 otherwise.
Education tertiary	=1 if the respondent has first or second stage of tertiary education, and 0 otherwise.
Married	=1 if the respondent is married or living with a partner, and zero otherwise.
Working	=1 if the respondent is employed, self-employed, a contributing family worker, or an own account worker; and zero otherwise.
Religious	=1 if the respondent is religious (e.g., Christian, Muslim, Jew, Buddhist, etc.), and 0 otherwise.
Risk averse	=1 if risk averse, and 0 otherwise.
Size of town (log)	Logarithm of the number of inhabitants living in the town/village in which the respondent lives.
Household income low	=1 if the net household income is included in the first tercile, and 0 otherwise. Sample values are used to construct terciles.
Household income medium	=1 if the net household income is included in the second tercile, and 0 otherwise. Sample values are used to construct terciles.
Household income high	=1 if the net household income is included in the last tercile, and 0 otherwise. Sample values are used to construct terciles.
Household income info missing	=1 if the respondent does not provide an answer to the income question, and zero otherwise.
Savings	=1 if the respondent has any of the following forms of savings: cash, bank accounts, life insurance, mutual funds, stocks, pension funds, bonds, or current account; and 0 otherwise.
Secondary residence	=1 if the respondent or someone else in the household owns a secondary residence, and 0 otherwise.
Local nightlight (asinh)	Inverse hyperbolic sine of VIIRS nightlight within a radius of 20km around the respondent's place of residence.
Local number of banks	Number of banks within a radius of 20km around the respondent's place of residence.
Mobile coverage	indicator of local mobile coverage ranging from 0 (no mobile coverage) to 1 (4G coverage since 2012) based on annual maps from 2011 to 2018 by Collins Bartholomew's Mobile Coverage Explorer
Social connectedness index	Based on Bailey et al. (2018b), gadm1_nuts3 indicator. We use the maximum value of social connectedness outside the region of individuals' residence.
Interviewer female	=1 if interviewer is female, and 0 otherwise.
Interviewer age	Age of the interviewer; integer value ranging from 18 upwards.
Interviewer education primary	=1 if the interviewer has primary education, and 0 otherwise.
Interviewer education secondary	=1 if the interviewer has lower secondary, upper secondary, or post-secondary non-tertiary education, and 0 otherwise.
Interviewer education tertiary	=1 if the interviewer has first or second stage of tertiary education; and 0 otherwise.
Interviewer experienced	=1 if the interviewer has conducted interviews on behalf of the OeNB Euro Survey during the two survey waves prior the current interview.
Interview duration	Duration of the total interview in minutes.

Notes: The table shows a detailed description of all variables used.

Table A.2: Summary statistics

	Min	Max	N	AL	BA	BG	CZ	HR	HU	MK	PL	RO	RS	Total
<i>(a) Respondents</i>														
Granting guarantee	0	1	19,523	0.11 (0.31)	0.06 (0.23)	0.03 (0.17)	0.04 (0.20)	0.03 (0.16)	0.03 (0.17)	0.07 (0.25)	0.03 (0.18)	0.02 (0.15)	0.06 (0.24)	0.05 (0.21)
Granting informal loan	0	1	19,888	0.34 (0.47)	0.27 (0.44)	0.32 (0.47)	0.11 (0.32)	0.45 (0.50)	0.10 (0.31)	0.37 (0.48)	0.31 (0.46)	0.16 (0.37)	0.40 (0.49)	0.28 (0.45)
Guarantee literate	0	1	19,965	0.41 (0.49)	0.44 (0.50)	0.56 (0.50)	0.61 (0.49)	0.71 (0.45)	0.65 (0.48)	0.49 (0.50)	0.53 (0.50)	0.57 (0.50)	0.50 (0.50)	0.55 (0.50)
Interest-rate literate	0	1	19,946	0.26 (0.44)	0.38 (0.49)	0.50 (0.50)	0.65 (0.48)	0.73 (0.44)	0.50 (0.50)	0.54 (0.50)	0.60 (0.49)	0.37 (0.48)	0.68 (0.47)	0.52 (0.50)
Inflation literate	0	1	19,834	0.33 (0.47)	0.40 (0.49)	0.77 (0.42)	0.68 (0.47)	0.63 (0.48)	0.61 (0.49)	0.46 (0.50)	0.50 (0.50)	0.56 (0.50)	0.63 (0.48)	0.56 (0.50)
Risk-diversification literate	0	1	19,934	0.48 (0.50)	0.35 (0.48)	0.29 (0.45)	0.62 (0.48)	0.42 (0.49)	0.45 (0.50)	0.29 (0.45)	0.53 (0.50)	0.29 (0.45)	0.38 (0.49)	0.41 (0.49)
Female	0	1	20,189	0.46 (0.50)	0.51 (0.50)	0.55 (0.50)	0.50 (0.50)	0.57 (0.49)	0.57 (0.50)	0.58 (0.49)	0.51 (0.50)	0.53 (0.50)	0.51 (0.50)	0.53 (0.50)
Age 18–35	0	1	20,182	0.35 (0.48)	0.29 (0.45)	0.20 (0.40)	0.27 (0.44)	0.33 (0.47)	0.22 (0.42)	0.28 (0.45)	0.34 (0.47)	0.29 (0.45)	0.28 (0.45)	0.28 (0.45)
Age 36–50	0	1	20,182	0.31 (0.46)	0.26 (0.44)	0.32 (0.47)	0.32 (0.47)	0.31 (0.46)	0.36 (0.48)	0.27 (0.44)	0.25 (0.44)	0.30 (0.46)	0.33 (0.47)	0.30 (0.46)
Age 51–65	0	1	20,182	0.32 (0.47)	0.30 (0.46)	0.33 (0.47)	0.24 (0.43)	0.27 (0.45)	0.30 (0.46)	0.27 (0.45)	0.23 (0.42)	0.25 (0.44)	0.28 (0.45)	0.28 (0.45)
Age 65+	0	1	20,182	0.02 (0.15)	0.15 (0.36)	0.15 (0.36)	0.17 (0.37)	0.09 (0.29)	0.12 (0.33)	0.18 (0.38)	0.17 (0.38)	0.16 (0.36)	0.10 (0.30)	0.13 (0.34)
Education primary	0	1	20,164	0.09 (0.28)	0.20 (0.40)	0.10 (0.29)	0.06 (0.24)	0.08 (0.27)	0.11 (0.32)	0.23 (0.42)	0.23 (0.42)	0.02 (0.15)	0.18 (0.38)	0.13 (0.34)
Education secondary	0	1	20,164	0.56 (0.50)	0.68 (0.47)	0.66 (0.47)	0.81 (0.39)	0.73 (0.44)	0.74 (0.44)	0.57 (0.49)	0.60 (0.49)	0.79 (0.40)	0.57 (0.50)	0.67 (0.47)
Education tertiary	0	1	20,164	0.35 (0.48)	0.12 (0.32)	0.24 (0.43)	0.13 (0.34)	0.19 (0.39)	0.14 (0.35)	0.20 (0.40)	0.17 (0.38)	0.18 (0.39)	0.25 (0.43)	0.20 (0.40)
Married	0	1	20,189	0.74 (0.44)	0.58 (0.49)	0.70 (0.46)	0.69 (0.46)	0.59 (0.49)	0.65 (0.48)	0.68 (0.47)	0.66 (0.48)	0.66 (0.47)	0.63 (0.48)	0.66 (0.47)
Working	0	1	20,189	0.68 (0.47)	0.39 (0.48)	0.64 (0.46)	0.70 (0.46)	0.61 (0.49)	0.74 (0.44)	0.42 (0.49)	0.57 (0.49)	0.57 (0.50)	0.61 (0.49)	0.59 (0.49)
Religious	0	1	20,189	0.97 (0.16)	0.99 (0.11)	0.93 (0.26)	0.30 (0.46)	0.89 (0.32)	0.77 (0.42)	0.99 (0.09)	0.86 (0.34)	0.98 (0.13)	0.99 (0.12)	0.87 (0.34)
Risk averse	0	1	20,189	0.28 (0.45)	0.24 (0.43)	0.26 (0.44)	0.22 (0.42)	0.31 (0.46)	0.36 (0.48)	0.34 (0.47)	0.26 (0.44)	0.27 (0.45)	0.13 (0.34)	0.27 (0.44)
Household income low	0	1	20,189	0.28 (0.45)	0.20 (0.40)	0.19 (0.40)	0.31 (0.46)	0.29 (0.45)	0.21 (0.41)	0.30 (0.46)	0.27 (0.44)	0.25 (0.43)	0.21 (0.41)	0.25 (0.43)
Household income medium	0	1	20,189	0.31 (0.46)	0.20 (0.40)	0.23 (0.42)	0.33 (0.47)	0.29 (0.45)	0.24 (0.43)	0.28 (0.45)	0.26 (0.44)	0.25 (0.43)	0.24 (0.42)	0.26 (0.44)
Household income high	0	1	20,189	0.25 (0.43)	0.19 (0.39)	0.22 (0.41)	0.32 (0.47)	0.31 (0.46)	0.21 (0.41)	0.24 (0.43)	0.24 (0.43)	0.25 (0.43)	0.27 (0.44)	0.25 (0.43)
Household income info missing	0	1	20,189	0.17 (0.37)	0.42 (0.49)	0.36 (0.48)	0.04 (0.19)	0.12 (0.32)	0.34 (0.47)	0.18 (0.39)	0.23 (0.42)	0.26 (0.44)	0.28 (0.45)	0.24 (0.43)
Savings	0	1	20,189	0.30 (0.46)	0.21 (0.41)	0.35 (0.48)	0.81 (0.39)	0.52 (0.50)	0.40 (0.49)	0.37 (0.48)	0.48 (0.50)	0.28 (0.45)	0.26 (0.44)	0.40 (0.49)
Secondary residence	0	1	20,189	0.05 (0.22)	0.08 (0.27)	0.12 (0.33)	0.05 (0.23)	0.09 (0.29)	0.04 (0.19)	0.10 (0.29)	0.11 (0.32)	0.05 (0.22)	0.14 (0.34)	0.08 (0.28)
<i>(b) Primary sampling unit</i>														
Size of town (log)	4	14	2,787	9.59 (2.14)	8.53 (2.33)	10.05 (2.65)	9.79 (2.37)	9.19 (2.50)	10.21 (2.45)	9.90 (2.39)	9.69 (2.55)	10.09 (2.25)	10.07 (2.50)	9.67 (2.48)
Local nightlight (asinh)	0	4	2,787	1.08 (0.57)	1.02 (0.43)	1.13 (0.78)	1.79 (0.71)	1.64 (0.84)	1.45 (0.98)	1.16 (0.70)	1.74 (0.88)	1.29 (0.82)	1.71 (0.87)	1.41 (0.83)
Local number of banks	0	31	2,787	9.53 (2.73)	11.75 (5.01)	14.99 (6.31)	15.20 (4.10)	17.25 (7.38)	8.24 (2.39)	11.60 (3.30)	16.12 (6.63)	16.29 (8.34)	22.78 (7.22)	14.42 (7.09)
<i>(c) Interviewers</i>														
Number of interviewers both waves				62	138	149	193	136	188	158	153	101	214	1,492
Number of interviewers 2018 wave				31	70	80	99	65	94	85	78	51	100	753
Number of interviewers 2019 wave				31	138	149	193	136	188	158	153	101	114	739
Interviewer female	0	1	1,492	0.71 (0.46)	0.63 (0.48)	0.88 (0.32)	0.71 (0.45)	0.79 (0.41)	0.81 (0.39)	0.79 (0.41)	0.81 (0.39)	0.80 (0.40)	0.82 (0.38)	0.79 (0.41)
Interviewer age	18	78	1,492	30.02 (4.73)	34.48 (11.51)	53.26 (11.24)	50.22 (13.00)	42.57 (13.56)	48.74 (11.25)	39.07 (12.09)	43.94 (10.47)	42.42 (14.03)	42.03 (11.01)	43.84 (13.17)
Interviewer education primary	0	1	1,492	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.11)	0.00 (0.04)
Interviewer education secondary	0	1	1,492	0.00 (0.00)	0.65 (0.48)	0.40 (0.49)	0.79 (0.41)	0.85 (0.36)	0.85 (0.36)	0.46 (0.50)	0.73 (0.44)	0.41 (0.49)	0.39 (0.49)	0.59 (0.49)
Interviewer education tertiary	0	1	1,492	1.00 (0.00)	0.35 (0.48)	0.60 (0.49)	0.21 (0.41)	0.15 (0.36)	0.15 (0.36)	0.54 (0.50)	0.27 (0.44)	0.59 (0.49)	0.59 (0.49)	0.41 (0.49)
Interviewer experienced	0	1	1,492	0.03 (0.18)	0.46 (0.50)	0.26 (0.44)	0.12 (0.33)	0.48 (0.50)	0.43 (0.50)	0.50 (0.50)	0.11 (0.31)	0.55 (0.50)	0.11 (0.32)	0.32 (0.47)
Interview duration	11	103	1,492	26.19 (6.13)	25.92 (8.47)	22.43 (7.63)	32.97 (8.76)	25.43 (7.50)	30.09 (8.46)	29.46 (12.18)	33.97 (8.18)	20.83 (6.74)	23.98 (10.46)	27.14 (9.68)

Notes: The table shows the (unweighted) sample means and standard deviations (in parentheses) of the respective variables. *Total* refers to the entire sample of observations without adjusting for country size. Panel (a) shows descriptive statistics for variables measured at the respondent level, panel (b) shows descriptive statistics for variables measured at level of primary sampling units, panel (c) shows descriptive statistics for interviewers. *Data Source:* OeNB Euro Survey.

**Table A.3:** The “big three” included in the OeNB Euro Survey

Concept	Survey question
Interest rate	<p>Suppose you had 100 [local currency] in a savings account and the interest rate was 2% per year. Disregarding any bank fees, how much do you think you would have in the account after 5 years if you left the money to grow: more than 102, exactly 102, less than 102 [local currency]?</p> <p>(i) More than 102 [local currency]*  (ii) Exactly 102 [local currency]  (iii) Less than 102 [local currency]?  (iv) Do not know  (v) No answer</p>
Inflation	<p>Suppose that the interest rate on your savings account was 4% per year and inflation was 5% per year. Again disregarding any bank fees – after 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account?</p> <p>(i) More  (ii) Exactly the same  (iii) Less*  (iv) Do not know  (v) No answer</p>
Risk diversification	<p>When an investor spreads his money among different assets, does the risk of losing money</p> <p>(i) Increase  (ii) Decrease*  (iii) Stay the same  (iv) Do not know  (v) No answer</p>

*Notes:* The table shows the three standard financial-literacy questions on interest rates, inflation, and risk diversification included in the OeNB Euro Survey. The correct answer is marked with an asterisk.

**Table A.4:** Baseline estimates – First-stage results

Dependent variable	Guarantee literate		
	ad (1)	ad (2)	ad (3)
Regional cohort-specific financial literacy	0.189*** (0.016)	0.175*** (0.016)	0.177*** (0.016)
Female	−0.011 (0.007)	−0.010 (0.007)	−0.010 (0.007)
Age (ref: 36–50)			
18–35	−0.062*** (0.010)	−0.067*** (0.010)	−0.066*** (0.010)
51–65	0.018* (0.009)	0.021** (0.009)	0.021** (0.009)
65 or older	−0.011 (0.013)	−0.009 (0.014)	−0.008 (0.014)
Education (ref: Secondary)			
Primary	−0.128*** (0.011)	−0.121*** (0.011)	−0.120*** (0.011)
Tertiary	0.067*** (0.009)	0.058*** (0.009)	0.057*** (0.009)
Married	0.028*** (0.008)	0.014* (0.008)	0.015* (0.008)
Working	0.052*** (0.009)	0.035*** (0.009)	0.035*** (0.009)
Religious	0.010 (0.013)	0.009 (0.013)	0.007 (0.013)
Risk averse	0.108*** (0.008)	0.110*** (0.008)	0.110*** (0.008)
Size of town (log)	0.001 (0.001)	0.001 (0.001)	0.005*** (0.002)
Household income (ref: Low)			
Medium		0.044*** (0.010)	0.044*** (0.010)
High		0.089*** (0.011)	0.093*** (0.011)
Missing information		0.006 (0.011)	0.009 (0.011)
Savings		0.031*** (0.008)	0.030*** (0.008)
Secondary residence		−0.070*** (0.013)	−0.070*** (0.013)
Local nightlight (asinh)			−0.055*** (0.007)
Local number of banks			0.006*** (0.001)
Constant	0.129*** (0.032)	0.134*** (0.032)	0.096*** (0.032)
Kl.-Paap F-stat.	141.7	121.9	124.7
N	19,290	19,290	19,290
Country FE	✓	✓	✓
Wave FE	✓	✓	✓

Notes: The table shows detailed first-stage regression estimation results underlying Table 5, Panel C, columns 1–3. ‘ref.’ indicates the omitted category. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Data Source: OeNB Euro Survey.

**Table A.5:** Baseline estimates – Second-stage results

Dependent variable	Granting guarantee					
	Ordinary least squares			Instrumental variables (2SLS)		
	(1)	(2)	(3)	(4)	(5)	(6)
Guarantee literate	−0.013*** (0.003)	−0.014*** (0.003)	−0.014*** (0.003)	−0.077** (0.036)	−0.110*** (0.040)	−0.110*** (0.039)
Female	−0.002 (0.003)	−0.002 (0.003)	−0.002 (0.003)	−0.003 (0.003)	−0.003 (0.003)	−0.003 (0.003)
Age (ref: 36–50)						
18–35	−0.010** (0.004)	−0.010** (0.004)	−0.010** (0.004)	−0.013*** (0.005)	−0.016*** (0.005)	−0.016*** (0.005)
51–65	0.014*** (0.004)	0.014*** (0.004)	0.013*** (0.004)	0.015*** (0.005)	0.015*** (0.005)	0.015*** (0.005)
65 or older	0.004 (0.005)	0.002 (0.005)	0.003 (0.005)	0.003 (0.005)	0.001 (0.005)	0.001 (0.005)
Education (ref: Secondary)						
Primary	0.004 (0.005)	0.007 (0.005)	0.007 (0.005)	−0.005 (0.007)	−0.005 (0.007)	−0.005 (0.007)
Tertiary	0.014*** (0.005)	0.006 (0.005)	0.006 (0.005)	0.018*** (0.005)	0.011** (0.005)	0.011** (0.005)
Married	0.003 (0.003)	−0.001 (0.003)	−0.001 (0.003)	0.005 (0.003)	0.000 (0.003)	0.000 (0.003)
Working	0.032*** (0.004)	0.027*** (0.004)	0.026*** (0.004)	0.036*** (0.004)	0.030*** (0.004)	0.030*** (0.004)
Religious	0.015*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)
Risk averse	−0.020*** (0.003)	−0.019*** (0.003)	−0.019*** (0.003)	−0.013*** (0.005)	−0.008 (0.005)	−0.008 (0.005)
Size of town (log)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.004*** (0.001)
Household income (ref: Low)						
Medium		0.005 (0.004)	0.005 (0.004)		0.009* (0.005)	0.009* (0.005)
High		0.015*** (0.005)	0.015*** (0.005)		0.024*** (0.006)	0.025*** (0.006)
Missing information		−0.011*** (0.004)	−0.011*** (0.004)		−0.011** (0.004)	−0.011** (0.004)
Savings		0.028*** (0.004)	0.028*** (0.004)		0.031*** (0.004)	0.031*** (0.004)
Secondary residence		0.040*** (0.007)	0.040*** (0.007)		0.033*** (0.008)	0.033*** (0.008)
Local nightlight (asinh)			0.005 (0.003)			−0.000 (0.004)
Local number of banks			−0.001*** (0.000)			−0.001* (0.000)
Constant	0.046*** (0.011)	0.045*** (0.011)	0.046*** (0.012)	0.068*** (0.017)	0.078*** (0.018)	0.075*** (0.017)
Mean DepVar	0.05	0.05	0.05	0.05	0.05	0.05
R-squared	0.02	0.03	0.03	0.00	−0.01	−0.01
Kl.-Paap F-stat. first stage				141.7	121.9	124.7
N	19,290	19,290	19,290	19,290	19,290	19,290
Country FE	✓	✓	✓	✓	✓	✓
Wave FE	✓	✓	✓	✓	✓	✓

*Notes:* The table shows estimates from a linear probability model using OLS (columns (1) to (3)) and IV (columns (4) to (6)). The dependent variable is equal to 1 for individuals currently granting a guarantee, and 0 otherwise. First-stage-regression results underlying columns (4) to (6) are shown in the Appendix in Table A4. Robust standard errors in parentheses. ‘ref.’ indicates the omitted category. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . *Data Source:* OeNB Euro Survey.



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