

# Financial literacy gaps of the Austrian population

*Most people lack financial knowledge and have trouble dealing competently with their financial affairs, as evidenced by recent empirical research on financial literacy in various countries. We investigate financial literacy among Austrians based on a novel dataset covering about 2,000 persons. Our findings corroborate the existence of substantial knowledge gaps, which are most conspicuous among respondents with low educational attainment and low incomes, among younger and older people as well as women. We provide tentative evidence for a positive link between financial knowledge scores and financial behavior, such as setting aside rainy day funds or using several sources of information when choosing financial products.*

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Over the last years, numerous empirical studies, including large-scale and international ones, have consistently shown that a considerable share of the population has substantial knowledge gaps in basic financial concepts, such as interest rates or inflation (Atkinson and Messy, 2012). At the same time, financial products and economic relationships have become ever more complex over the past decades, requiring a higher level of financial knowledge.

In this paper, we investigate the level of financial literacy of the Austrian population as well as the relationship between financial knowledge and sound financial behavior. Our analysis is based on a new quantitative dataset resulting from a survey of about 2,000 Austrian individuals. This survey was part of an OECD initiative to collect comparable data on financial literacy for a broad set of countries (OECD, 2013). In line with the OECD's definition of financial literacy, the dataset therefore covers information on financial knowledge, attitudes and behavior.

The paper is structured as follows: Section 1 defines financial literacy and

financial knowledge and gives an overview of findings of previous empirical research. Section 2 describes the new Austrian dataset and analyzes the determinants of financial knowledge. Section 3 deals with respondents' self-assessment of their financial knowledge. Section 4 links financial knowledge to a set of behavior patterns and section 5 concludes.

## 1 Financial literacy and financial knowledge: definitions and empirical findings

As with many other complex terms and concepts, there is no single generally accepted definition of financial literacy. Researchers and organizations have defined financial literacy in many different ways (Hung et al., 2009; Holzmann, 2010). We apply the rather broad definition used by the Organisation for Economic Co-operation and Development (OECD) and its International Network on Financial Education (INFE), which integrates financial knowledge, skills, attitudes and behavior, as well as their mutual relationships: Financial literacy is defined as “a combination of

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financial awareness, knowledge, skills, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing” (Atkinson and Messy, 2012).

Let us turn to some of the elements used in the OECD’s definition. Financial knowledge relates to the possession of know-how and understanding in particular of one’s personal financial matters and of important everyday financial concepts. It thus refers to a rather basic form of financial literacy. Furthermore, actual financial knowledge also influences the way people themselves assess their understanding of finance matters, i.e. perceived financial knowledge, as well as their financial skills (Hung et al., 2009). People’s actions, i.e. their financial behavior, in turn, depend on all three elements (actual knowledge, perceived knowledge, and skills). Finally, the experience people gain through financial behavior feeds back to both their actual and perceived financial knowledge. Still, the relationships are likely to be imperfect, as each of these elements also depends on other factors internal and external to the individual, such as attitudes or resources.

Even the most comprehensive definition of financial literacy leaves several crucial questions unsolved: How are the different elements of financial literacy interrelated? Which elements contribute most to effective decision making? Is financial literacy a construct of its own and in which way does it differ from reading skills and numeracy (Sälzer and Prenzel, 2014)? Is there a clear distinction between financial literacy and the broader concept of economic literacy (Retzmann et al., 2010; Retzmann and Frühauf, 2014)?

Despite this ongoing discussion within the scientific community, most studies on financial literacy have focused

on measuring financial knowledge of individual persons. By contrast, values, attitudes and behavior as well as a broader perspective on critical economic thinking have played a comparatively minor role.

In our research, we adopt the OECD approach to measuring financial literacy (Atkinson and Messy, 2012) and include not only financial knowledge, but also financial behavior and attitudes as highly relevant elements of financial literacy. This decision is based on research showing a relationship between people’s attitudes toward money and the extent to which they face financial problems (Barry, 2014), as well as between their money attitudes and level of satisfaction with their financial situation (Shim et al., 2009).

The empirical financial literacy research can be classified into three broad categories: One strand of literature deals with the design and use of methods to assess financial knowledge (e.g. Knoll and Houts, 2012). Nowadays, most studies use survey techniques based on questionnaires asking respondents various knowledge questions, with both open and multiple choice answers. Some of the questions have become well established and have been used in several countries around the world, providing international benchmarks (Lusardi and Mitchell, 2011a and 2011b; Atkinson and Messy, 2012). Nevertheless, the validity of these items is doubtful: they possibly cover knowledge that is not necessarily indicative of a respondent’s capability to take sound financial decisions. For instance, a person’s ability to properly calculate interest rates may not reveal much about his or her success in dealing with financial decisions and products (Greimel-Fuhrmann, 2014).

A second strand of literature investigates the personal characteristics that

influence financial knowledge (see e.g. Atkinson and Messy, 2012). Lusardi and Mitchell (2014) summarize the existing empirical literature. The surveyed studies consistently identify important knowledge gaps, especially in more sophisticated financial topics, such as real interest, compound interest or the effect of exchange rate changes. They moreover show that financial knowledge correlates with socio-demographic characteristics: knowledge increases with education level and income. Men tend to achieve higher scores in financial knowledge tests than women. This gender gap remains even after correcting for differences in education, profession or income and may be partly explained by women's different response behavior in survey tests. Studies examining whether this gender gap is ascribable to couples' division of financial responsibilities, proxied by marital status and budget responsibility, have yielded rather inconclusive results.

Respondents with a migration background tend to show relatively weak test results. The link between age and knowledge appears to be U-shaped, with younger and older participants performing particularly poorly. In the case of younger respondents, this may be due to missing or scant experience of work life and in financial markets. The elderly, on the other hand, may not be familiar with new financial products and/or lack the skills and technological tools necessary to understand them. Respondents from large cities tend to attain better scores than respondents from rural areas.

The third main strand of literature investigates the link between financial

knowledge and behavior. Atkinson and Messy (2012) for example find that respondents with greater financial knowledge show more competent behavior. According to Gerardi et al. (2010), limited financial literacy was one of the drivers of mortgage delinquency and default in the U.S. subprime mortgage market. Lusardi and Tufano (2009) confirm that the least financially savvy use high-cost borrowing and pay higher fees. Brown and Graf (2013) show that financial literacy is positively related to retirement planning in Switzerland. Klapper et al. (2013) point out that Russians with elevated financial literacy participate more actively in formal financial markets and are more likely to have unspent income left, which enables them to better deal with macroeconomic shocks. Beckmann and Stix (2015) find that a majority of respondents is aware that depreciations increase loan installments and that knowledge about exchange rate risk greatly impacts on the choice of the loan currency.

Few papers describe field experiments corroborating the effectiveness of financial training measures. Lührmann et al. (2012) for example show that financial training increases not only German teenagers' actual financial knowledge, but also their interest in financial matters as well as their self-assessed knowledge. They are moreover less prone to make impulse purchases and are better at identifying the riskiness of assets.

## 2 A novel dataset on Austrians' financial knowledge

The financial literacy survey this article focuses on was carried out among about

2,000 individuals in Austria aged 15 and above in the fall of 2014.<sup>2</sup> It consisted of face-to-face interviews covering questions on financial knowledge, several aspects of financial behavior and attitudes as well as a rich set of socio-demographic variables. The survey was part of an initiative of the OECD's INFE working group to run a unified and extended survey on financial literacy, behavior and attitudes in a wide range of countries. A pilot study had already been conducted in 14 countries in 2010 and 2011, in which Austria had not participated, however.

The questions of the OECD survey were based on previous international research and were designed to be of relevance for people from very different backgrounds in a wide range of countries (Atkinson and Messy, 2012). The questionnaire consisted of open and

multiple choice questions. In addition to the full set of mandatory question and a wide choice of optional items (OECD, 2013), the Austrian survey<sup>3</sup> also included some supplementary questions that we considered to be of special relevance in the Austrian context. For details on the socio-demographic distribution of the sample, see table A1 in the annex.

## 2.1 Survey identifies important knowledge gaps

In the survey, 11 questions covered various aspects of financial knowledge. They test the understanding of basic and more sophisticated economic and financial concepts, such as inflation, interest rates, the risk-return link and exchange rates. None of the questions required expert knowledge. Box 1 shows the 11 questions in detail.<sup>4</sup>

Box 1

### Questions on financial knowledge in the survey

The survey of financial literacy covers 11 questions on financial knowledge, which we classified – for later use – into basic questions (“B”) and sophisticated questions (“S”). The split follows intuition, but is also supported by the share of correct answers shown in chart 2. The correct answers are given in bold at the end of each question.

**B “Division”:** Imagine that five brothers are given a gift of EUR 1,000. If the brothers have to share the money equally, how much does each one get? **(EUR 200)**

**S “Inflation”:** Now imagine that the brothers have to wait for one year to get their share of the EUR 1,000 and inflation stays at 2%. In one year's time, will they be able to buy (a) more with their share of the money than they could today, (b) as much as today, (c) or less than they could buy today? **(c)**<sup>1</sup>

**S “Real interest rate”:** Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year: After one year, how much would you be able to buy with the money in this account? (a) More than today, (b) exactly the same, (c) less than today. **(c)**

<sup>1</sup> If respondents came up with the alternative answer “It depends on the types of things they want to buy” (not part of the set of options), this answer was counted as correct.

<sup>2</sup> The survey comprised 1,994 computer-assisted personal interviews (CAPIs) from October to November, 2014. The non-response rate was about 30%. If not indicated differently, we use survey weights to produce descriptive population statistics throughout the paper. The weights consist of a combination of sampling/design weights and poststratification weights based on external population statistics on age and gender at the province level.

<sup>3</sup> The full questionnaire is available from the authors upon request.

<sup>4</sup> While most of these survey questions have been repeatedly used in research and are thus especially suited for international comparison, they share a general validity caveat: Is the ability to perform simple calculations and understand basic concepts, such as interest or inflation, really the relevant prerequisite for responsible and sound financial behavior? Or are general attributes, e.g. being a well-organized and forward-looking person, or interest in financial issues more relevant for financial success?

**B “Zero interest”:** You lend EUR 25 to a friend one evening and he gives you EUR 25 back the next day. How much interest has he paid on this loan? **(0)**

**S “Interest after 1 year”:** Suppose you put EUR 100 into a no-fee savings account with a guaranteed interest rate of 2% per year. You do not make any further payments into this account and you do not withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made? **(102 EUR)**

**S “Interest after 5 years”:** And how much would be in the account at the end of five years? (a) More than EUR 110, (b) exactly EUR 110, (c) less than EUR 110, (d) It is impossible to tell from the information given. **(a)**

**S “Exchange rate”:** Suppose you have taken out a loan in Swiss francs. Then the exchange rate of the euro depreciates against the Swiss franc. What happens to the euro amount you owe? (a) It increases, (b) it stays exactly the same, (c) it decreases. **(a)**

**S “Interest – bond”:** If interest rates rise, what will typically happen to bond prices? (a) They will rise, (b) they will fall, (c) they will stay the same, (d) there is no relationship between bond prices and the interest rate. **(b)**

**B “Risk – return”:** Is the following statement (a) true or (b) false? An investment with a high return is likely to be high risk. **(a)**

**B “Cost of living”:** Is the following statement (a) true or (b) false? High inflation means that the cost of living is increasing rapidly. **(a)**

**S “Risk diversification”:** Is the following statement (a) true or (b) false? It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares. **(a)**

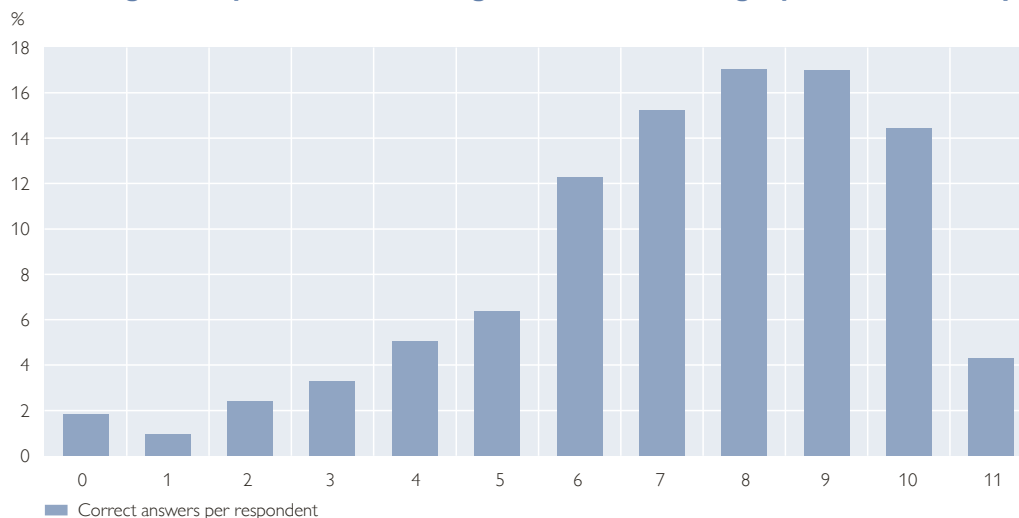
Chart 1 shows that 4% of the respondents answered all 11 questions correctly and a total of 36% were able to give the correct answer to at least 9 questions. Furthermore, about 11% of the respondents answered at least

5 questions incorrectly (not including “don’t know” answers).

Taking a closer look at the responses to the 11 knowledge questions, we find comparatively low levels of financial knowledge for some of the questions.

Chart 1

### Percentage of respondents answering x financial knowledge questions correctly

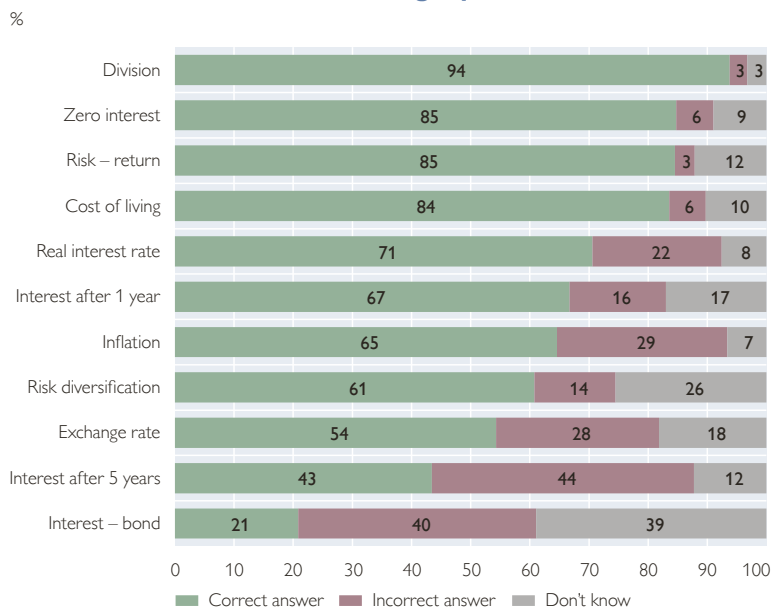


Source: OeNB.

Note: N = 1,994. The bars add up to 100%.

Chart 2

## Answers to 11 financial knowledge questions



Source: OeNB.

Note: N = 1,994.

Very basic questions that require an understanding of division, interest rates, risk diversification or inflation were answered correctly by a vast majority of respondents. The portion of correct answers exceeded 80% and the net number of correct answers (i.e. correct minus false answers) was also high. For example, 94% of the respondents managed to correctly divide 1,000 by five (“Division”). 85% of them knew that the interest rate is zero when you lend someone EUR 25 and get back the same amount the next day (“Zero interest”). The same fraction understood that higher return is usually associated with higher risk (“Risk – return”). And 84% of the respondents understood the concept of inflation (“Cost of living”).

However, with slightly more complex questions, we observe that the number of correct responses declined

markedly, to well below 80%. Also, the number of wrong answers increased sharply, and more people stated that they did not know the answer:

- The concept of real interest rates, i.e. interest minus inflation, was understood by 71% of the respondents, while 22% failed this question (“Real interest rate”).
- 67% correctly answered the question about the amount of money you are left with after setting EUR 100 aside for one year in an account with an interest rate of 2% (“Interest after 1 year”).
- 65% of the respondents understood that inflation implies that over time one can buy less with a fixed amount of money (“Inflation”).
- 61% of the respondents understood that investment risk can be reduced by buying a wide range of stocks and shares (“Risk diversification”).
- 54% of the respondents understood the effect of exchange rate fluctuations on a foreign currency loan (“Exchange rate”). Note that this share increases to 89% if we only consider those 22 respondents that indicated that they have a foreign currency loan.

For questions with an even more advanced level of sophistication, the net correct answers, i.e. the number of correct answers minus the number of false responses, is actually negative: 43% of the respondents grasped the concept of compound interest, i.e. the fact that leaving an amount of money in your account for five years usually gives you interest not only on the principal, but also on the interest gained in the past. At the same time, 44% failed on that question (“Interest after 5 years”).<sup>5</sup>

<sup>5</sup> The exact wording of the question on “Interest after 5 years,” taken from the OECD questionnaire, does not unambiguously specify that annual interest payments are credited to the same account. Yet, it is not uncommon that interest is credited to a different account. Hence, we cannot rule out that this has biased the results.

The question on the link between interest rates and bond prices produced even fewer correct answers (21%), while 40% failed (“Interest – bond”). Furthermore, the number of respondents who said that they did not know the answer was as high as 39%, which may in part have been due to their unfamiliarity with the term bond. If we only consider the bondholders among the respondents, the fraction knowing the correct answer increases to 41% (as compared to 21% for the entire sample).

Overall, this first evaluation shows that there are remarkable knowledge gaps as regards most of the questions. While the majority of respondents are familiar with basic concepts such as interest rates or inflation, other important concepts such as real interest, compound interest, the link between interest rates and bond prices or the effect of exchange rate fluctuations on foreign currency loans are not understood by at least one-quarter of the population. This is a source of concern, given that most Austrians are – either directly or indirectly – consumers of financial products that involve these concepts.

Table 1 compares the results of our survey and of the OECD pilot study (Atkinson and Messy, 2012) for the eight survey questions that were used in both questionnaires.<sup>6</sup> Austrian respondents appear to have relatively good financial knowledge in comparison with the respondents (mean) from the 14 countries that participated in the OECD pilot study. 67% of the Austrian respondents answered six of the eight questions correctly compared with 51% in the OECD sample average. Besides, the average number of correctly answered questions is 73% in Austria,

Table 1  
**Comparison of Austrian data with data from other OECD countries<sup>1</sup>**

|                                  | Mean of correct answers to the 8 knowledge questions | Correct answers to 6 or more questions |
|----------------------------------|--|--|
|                                  | %  |  |
| Austria                          | 73   | 67                                     |
| OECD sample average <sup>2</sup> | 66   | 51                                     |
| Germany                          | 71   | 58                                     |
| United Kingdom                   | 69   | 53                                     |
| Norway <sup>3</sup>              | 59   | 40                                     |
| Hungary                          | 77   | 69                                     |

Source: OECD, authors' calculations.

<sup>1</sup> See Atkinson and Messy (2012).

<sup>2</sup> The 14 countries participating in the OECD pilot study were: Albania, Armenia, Czech Republic, Estonia, Germany, Hungary, Ireland, Malaysia, Norway, Peru, Poland, South Africa, United Kingdom, British Virgin Islands.

<sup>3</sup> Norway reformulated the questions slightly.

versus 66% in the OECD sample average. However, these results should be interpreted against the background of the selection of countries surveyed by the OECD: most of them are less developed than Austria. When comparing the Austrian survey results with countries of a similar level of economic development, we find that the results are more mixed: Austria's score, for instance, broadly matches the German results of the pilot study, but is outperformed by Hungary.

## 2.2 The impact of socio-demographic characteristics on financial knowledge

The new dataset clearly points to knowledge gaps among the Austrian population. These vary, however, substantially among different socio-demographic groups. Overall, we are able to confirm many of the empirical findings summarized by Lusardi and Mitchell (2014). We use the question on interest after one year for a detailed breakdown of respondents' scores based on socio-demographic criteria. Chart 3, hence,

<sup>6</sup> Questions 1, 2, 4, 5, 6, 9, 10 and 11 listed in box 1.

reveals that men score better than women and that the level of education and income appears to be of high relevance for scores. More specifically, 83% of university or college graduates know the correct answer to the question, while the fraction is as low as 46% for those having only completed compulsory education. In this subgroup, the share of respondents who do not know the answer is high, too (34%). The respective charts for the ten other knowledge questions broadly confirm this picture.

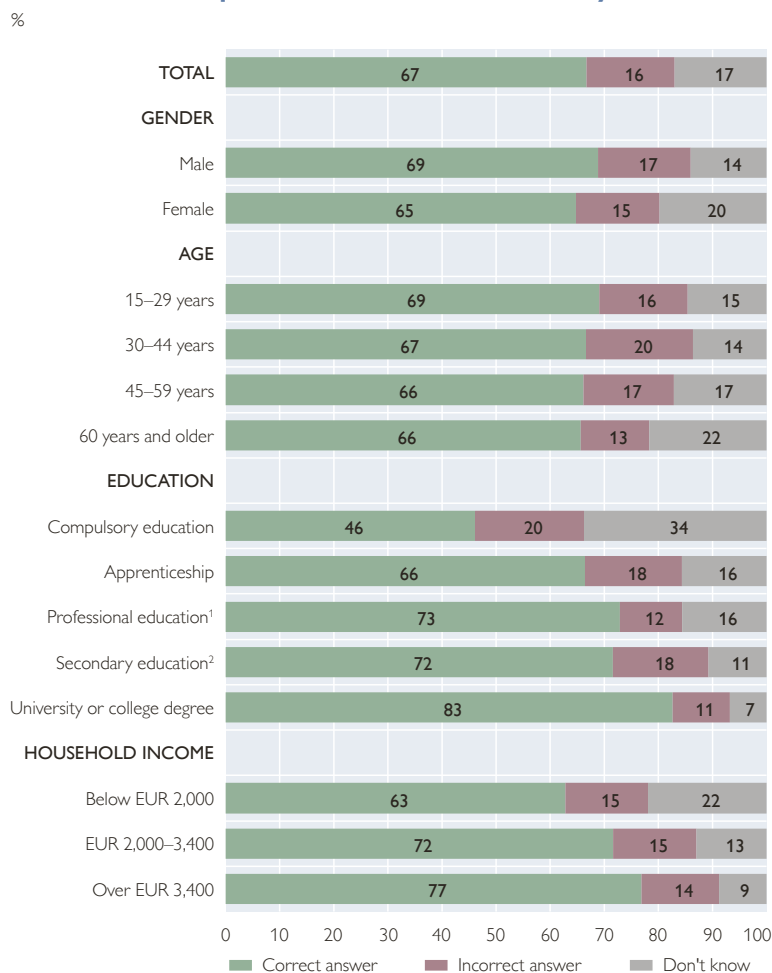
To assess whether these differences are statistically significant while holding other variables constant, we construct a financial knowledge score by counting the number of correct responses of each respondent, following Atkinson and Messy’s approach (2012). We then regress this knowledge score (as dependent variable) on the following independent variables: a dummy for gender; age and age squared (testing the U-shaped link suggested by the literature); dummies for low education, medium/vocational education and general/high education; dummies for the income level (low/medium/high); a dummy for the employment status (employed full time/unemployed/not working/employed part time/self-employed); and a dummy for town size (small/medium/large = Vienna).

The regression results are shown in table 2. The asterisks indicate the level of statistical significance. The first three columns use different subsets of the 11 questions: The first column shows the regression results when the dependent variable is the number of correct answers to the total set of 11 knowledge questions presented in box 1. The second column focuses exclusively on the correct answers to the four most basic questions, namely the first four questions in chart 2 or those indicated with a “B” in box 1. The dependent variable in the third column is the number of correct answers to the seven more sophisticated knowledge questions, marked with an “S” in box 1. The coefficients in most rows need to be interpreted against a benchmark, which is shown in italics. For example, a positive coefficient for males indicates that test scores of men are higher than those of the benchmark “female.”

Overall, the results are largely in line with the findings of previous empirical research. Men achieve scores

Chart 3

Answers to the question on interest after one year



Source: OeNB.

<sup>1</sup> Technical, commercial or vocational education not qualifying for university.

<sup>2</sup> General or vocational secondary education qualifying for university.

Note: N = 1,994.



that are significantly higher than those of women, as was the case in almost all of the 14 countries of the OECD pilot study (Atkinson and Messy, 2012). As we control for a comprehensive set of socio-demographic characteristics, this difference cannot be attributed to gender differences in education, income or labor force status. Furthermore, an alternative regression (not shown here) using the number of incorrect answers as dependent variable likewise indicates that men outperform women. In other words, men show a lower likelihood of giving an incorrect answer. By contrast, women admit significantly more often than men that they do not know the answer. Overall, we find that women are less likely to answer the financial knowledge ques-

tions correctly and that they are more likely to answer them incorrectly or with “don’t know.” This gender gap is subject to future investigation in Greimel-Fuhrmann et al. (2015a).

Our study also confirms the non-linear shape of the link between knowledge and age, which indicates that the youngest and the oldest respondents perform worst. Knowledge scores are maximized at an age of 51. The effect of the highest educational attainment on knowledge is also highly significant. Respondents who have (at most) only finished compulsory education score significantly worse than those having completed medium-level vocational education. Graduates from general higher schools (including tertiary education), by contrast, perform significantly better

Table 2

### OLS regression on financial literacy

|  | All 11 questions | Basic questions | Sophisticated questions | Self-assessment |
|--|------------------|-----------------|-------------------------|-----------------|
| Male   | 0.49***          | 0.10*           | 0.40***                 | 0.06            |
| <i>Female</i>                                      |                  |                 |                         |                 |
| Age  | 0.06***          | 0.03***         | 0.04**                  | 0.02**          |
| Age squared  | -0.00***         | -0.00**         | -0.00**                 | -0.00*          |
| Education – low <sup>1</sup>                       | -0.99***         | -0.38***        | -0.60***                | -0.41***        |
| <i>Education – vocational training<sup>2</sup></i> |                  |                 |                         |                 |
| Education – high <sup>3</sup>                      | 0.68***          | 0.18***         | 0.51***                 | 0.22***         |
| Income below EUR 2,000                             | -0.32**          | -0.07           | -0.25**                 | -0.19***        |
| <i>Income EUR 2,000–3,400</i>                      |                  |                 |                         |                 |
| Income over EUR 3,400                              | 0.19             | 0.03            | 0.17                    | 0.20**          |
| <i>Employed (more than 35 hours per week)</i>      |                  |                 |                         |                 |
| Unemployed   | 0.26             | 0.02            | 0.24                    | 0.06            |
| Not working  | 0.27             | -0.03           | 0.30*                   | -0.04           |
| Employed part time (max. 35 hours per week)        | 0.12             | 0.02            | 0.10                    | 0.11            |
| Self-employed                                      | 0.43*            | 0.09            | 0.34*                   | 0.12            |
| Town size (up to 5,000 inhabitants)                | -0.13            | 0.15**          | -0.29**                 | 0.06            |
| Town size (5,000 to 1 million inhabitants)         | 0.13             | 0.24***         | -0.11                   | -0.12           |
| <i>Town size (Vienna)</i>                          |                  |                 |                         |                 |
| Constant   | 5.65***          | 2.71***         | 2.95***                 | -0.26           |
| N  | 1994             | 1994            | 1994                    | 1994            |
| R <sup>2</sup>                                     | 0.11             | 0.08            | 0.10                    | 0.09            |

Source: Authors' calculations.

<sup>1</sup> At most completed compulsory education.

<sup>2</sup> Apprenticeship; technical, commercial or vocational education not qualifying for university.

<sup>3</sup> Secondary academic or vocational education qualifying for university education; other education qualifying for university education; university of applied sciences; technical or vocational college; university: bachelor's, master's and doctoral degrees.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Note: Variables in italics are benchmarks for dummy variables. The regression is based on unweighted survey data.

than the intermediate benchmark group. This result suggests that the payoff of offering financial education measures to those with the lowest education levels is likely to be especially high.

There is furthermore some evidence that lowest-income respondents perform worse than those with medium or high income. The former may have less flexibility to “learn by doing” as they cannot afford to make mistakes (Atkinson and Messy, 2012). There is no significant difference between medium- and high-income earners. The employment status is not significant throughout all regressions with the exception of self-employment, which appears to be associated with higher financial knowledge.

The evidence on the town size for the entire set of 11 questions is insignificant. However, when we split the set into basic and more sophisticated questions, we find that respondents from Vienna outperform those from smaller towns or rural areas in the more sophisticated questions. By contrast, the former perform worse in the more basic questions.

Throughout all regression models, the value of  $R^2$  is rather low. This means that we can only explain about 10% of the variation in financial knowledge scores by the socio-demographic variables that we use. This is a common feature of microdata studies on financial knowledge (see e.g. Brown and Graf, 2013; Bucher-Koenen and Lamla, 2014; Fonseca et al., 2014).<sup>7</sup> It is not the purpose of our model to predict literacy scores, however. Instead, we aim at identifying the least knowledgeable portions of the population to be able

to target them especially via new tailor-made financial education measures.

### 3 Respondents’ self-assessment of financial knowledge

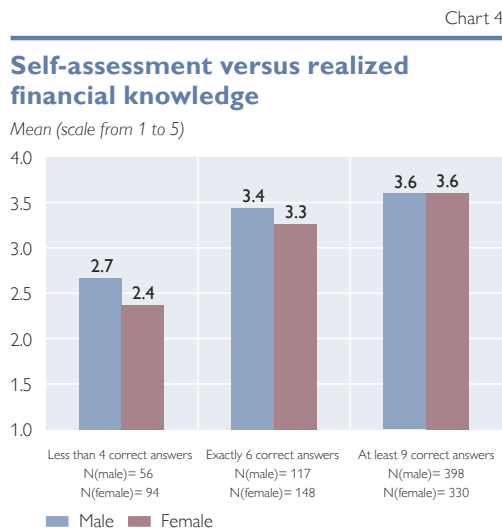
The level of self-confidence in financial matters may shape financial behavior, and also how confidently people answer knowledge questions, thus avoiding the “don’t know” option. In our survey, we explicitly ask people to self-assess their knowledge:

**“Self-assessment”:** *How would you rate your level of financial knowledge on a scale of 1 to 5? (1 = not at all knowledgeable, 5 = very knowledgeable).*

The answers to this question reveal that respondents are broadly aware of existing knowledge gaps. The average self-assessment is 3.3, which is only a little higher than the “neutral” value 3. The mean for men is slightly higher than that for women (3.31 versus 3.21). At the same time, the self-assessment scores also increase with the financial knowledge measure, as also found by Van Rooij et al. (2011). This correlation may be the result of causality that runs both ways, as higher knowledge can be assumed to support self-confidence in one’s own financial capabilities, while self-confidence, in turn, may give respondents the courage to answer difficult questions instead of refusing, which potentially raises the test score. Overall, women appear to have a more realistic perception of their own financial capabilities, as indicated by the higher correlation coefficient compared with men (0.32 versus 0.28).

Chart 4 confirms the positive relationship between perceived financial

<sup>7</sup> We experimented with several additional explanatory variables that are common in the literature, such as migration background, marital status or a proxy for the risk aversion of the respondent. The coefficients are, however, not significant, while the major results remain unchanged.



Source: OeNB.

knowledge and realized knowledge scores. In this chart, we juxtapose the average self-assessment of respondents with the lowest level of financial literacy (defined here as less than 4 correct answers), those with the highest knowledge score (at least 9 correct answers) and those with exactly 6 correct answers, always differentiating between men and women.

However, in line with the findings presented by Lusardi and Mitchell (2014), we can also see from chart 4 that respondents with low financial knowledge overestimated their literacy, which was more pronounced in the case of men: Respondents who were not able to answer more than three questions correctly still showed a rather elevated self-assessment, with an average score of 2.7 (men) and 2.4 (women), only slightly below the neutral value 3.<sup>8</sup> Unrealistic perceptions of one's financial knowledge may motivate people to choose complex products such as foreign currency loans or repayment vehicles without properly understanding their properties and risks.

Column 4 in table 2 shows that perceived financial knowledge depends on roughly the same variables as the knowledge score itself: People with higher educational attainment not only have greater financial knowledge but are also very much aware of this. Vice versa, lower-income groups also have a lower level of self-confidence in financial matters. We also observe similar age effects. Most interestingly, however, the gender gap disappears when it comes to the self-assessment; the coefficient is no longer significant. Further research would be needed to understand this absence of a gender gap.

#### 4 The link between financial knowledge and financial behavior

Financial education measures usually rely on the assumption that people with a higher level of financial knowledge take better investment and financing decisions. Investigating the relationship between knowledge and behavior via regression analysis is complicated given the possibility of reverse causalities, which could potentially introduce an endogeneity bias into regression analyses. For example, we may find it desirable that people carefully check several options before taking financial decisions. A higher level of financial knowledge may indeed induce people to compare more financial products and to consider a variety of sources of information before arriving at a decision. On the other hand, the process of comparing products and using information may in turn contribute to financial knowledge.

A thorough analysis of the link between financial knowledge and behavior would be beyond the scope of this

<sup>8</sup> Note that in the survey the question on self-assessment was asked before the 11 knowledge questions. Respondents thus assessed their knowledge before answering the test questions.

paper and is subject to a special investigation in Greimel-Fuhrmann et al. (2015b).<sup>9</sup> In charts 5 and 6, we nevertheless show tentative evidence corroborating that greater financial knowledge may indeed have an impact on financial behavior. Our survey questionnaire includes several questions that may be used to assess whether

respondents show sound financial behavior. The full list of questions is shown in box 2. This list includes questions on how people select financial products, whether they put enough money aside for tough economic times and retirement, and whether they take out a loan for economically sound reasons.

Box 2

### Questions on financial behavior

The survey includes six questions that we use to investigate financial behavior. At the end of each question we define what we consider to be positive financial behavior, i.e. behavior that reflects well-thought-out decisions on financial products and keeps people from falling into debt traps in difficult economic circumstances.

**“Knows many financial products”:** Can you tell me whether you have heard of any of these types of financial products? (a) Current account, (b) savings book, (c) building loan contract, (d) personal pension fund, (e) investment fund, (f) stocks and shares, (g) bonds, (h) financial derivatives, (i) insurance policies, (j) mobile phone payment account, (k) prepaid payment card, (l) microfinancing/crowd financing **(Positive: knows several financial products, measure: number of financial products known)**

**“Pension funds”:** Do you currently hold a personal pension fund? **(Positive: yes, measure: dummy = 1 if yes, 0 otherwise)**

**“Shopping around”:** Which of the following statements best describes how you last chose a product? (a) I considered several products from different companies before making my decision, (b) I considered the various products from one company, (c) I didn’t consider any other products at all, (d) I looked around but there were no other products to consider. **(Positive: considers other products, measure: dummy = 1 if (a), (b) or (d), 0 otherwise)**

**“Sources of information”:** Which of the following sources of information had the greatest influence on your most recent financial product choice? (a) Unsolicited information sent through the mail, (b) Information picked up in a branch, (c) Product-specific information found on the Internet, (d) Information from sales staff of the firm providing the products, (e) Best-buy tables in financial pages of newspapers/magazines, (f) Best-buy information found on the Internet, (g) Specialist magazines/publications, (h) Recommendation from independent financial adviser or broker, (i) Advice from friends/relatives not working in the financial services industry, (j) Advice from friends/relatives working in the financial services industry, (k) Employer’s advice, (l) Newspaper articles, (m) Television or radio programs, (n) Newspaper advertisements, (o) Television advertisements, (p) Other advertising, (q) Own experience, (r) Other source **(Positive: uses various sources of information, measure: number of sources of information used)**

**“Reason for taking out a loan”:** Have you personally used credit (e.g. loan, leasing, installments or overdraft) in the past 12 months for any of the following purposes and paid interest on the balance? (a) To pay regular bills, (b) For everyday spending, (c) To help support family or friends outside your immediate household, (d) To buy something on impulse, (e) To buy a gift for someone, (f) To buy a house or pay for renovation, (g) To pay for holidays, (h) To

<sup>9</sup> To our knowledge only a few studies try to solve this endogeneity problem via instrumental variable estimation. Lusardi and Mitchell (2014) conclude that the link between financial knowledge and behavior tends to get stronger if instruments are used, implying that the noninstrumented estimates underestimate the true effect.

buy a car, (i) To pay for education or training (for you or a family member), (j) To invest in your business or in the business of a family member, (k) For financial investment (**Negative: (a), (b), (c), (d), (e), (g), (k), measure: number of negative reasons for taking a loan**)

**“Rainy day funds”:** If you lost your main source of income, how long could you continue to cover living expenses, without borrowing any money or moving house? (a) Less than a week, (b) At least a week, but not one month, (c) At least one month, but not three months, (d) At least three months, but not six months, (e) More than six months (**Positive: has at least three months of funds set aside, measure: dummy = 1 if (d) or (e), 0 otherwise**)

Charts 5 and 6 link the various proxies for financial behavior to the number of correctly answered knowledge questions. Chart 5 shows that the number of financial products a person knows increases with financial knowledge. Those who answer 11 questions correctly know on average 10 different financial products, while those with low knowledge have heard of only about six products. Similarly, those with the highest knowledge score also consider on average two different sources of information when selecting a financial product. Those with the lowest literacy, in contrast, rely on just one source. Knowing and considering a variety of different products and sources can be assumed to lead to more informed financial decisions. Chart 5 also shows that people with greater knowledge

have a lower tendency to take out a loan for short-term purposes (e.g. buying gifts, everyday spending or impulse purchases or financing holidays) or for risky purposes (e.g. supporting friends or financing financial investment). Relying on credit to fund basic day-to-day purchases or risky investment may be the starting point of a debt trap. About two-thirds of all respondents did not – or would not – take out a loan for any such short-term or risky purpose. Those with the lowest knowledge scores (less than 6 correct answers) listed on average more than one adverse loan motivation. This number declines to 0.5 for those who answered 10 or 11 questions correctly.

Chart 6 links the number of correct answers to the share of respondents indicating that they have a voluntary per-

Chart 5

### Financial behavior indicators: number of ...



Source: OeNB.

Chart 6

**Financial behavior indicators: share of respondents who state they ...**

sonal pension fund and rainy day funds of at least three months of living expenses and who compare alternative offers before choosing a financial product. The evidence is less clear here. People with higher knowledge have more rainy day funds: among those with the lowest literacy scores, around 40% say they have sufficient funds set aside to cover living expenses for at least three months; this fraction is as high as 65% for those with top scores. When we factor out those with the lowest knowledge scores – subgroups where we only have a couple of dozens of respondents (see chart 1) –, there also appears to be a positive link between literacy and the pension fund question: 17% of the top performers have a private pension fund, which compares with only 5% for those who answered three to four questions correctly. The link to pension funds is less clear cut than in the literature (e.g. Brown and Graf, 2013), which may relate to the fact that, given Austria's comprehensive public pension system, pension funds are generally not much sought after. There appears to be no

clear link between financial knowledge scores and the tendency to compare alternative financial offers.

## 5 Summary and implications

Overall, our results reveal that – like in many other countries – there are remarkable financial knowledge gaps among the Austrian population, especially among women, younger and older people as well as those with a low level of education. Our analysis also suggests that this lack of financial knowledge may be conducive to risky financial behavior, such as insufficient saving for bad times or retirement, basing financial decisions on little advice or comparison or taking out loans for adverse reasons, e.g. impulse purchases or gifts.

Prudent and sound financial decisions by financial market participants support central banks in fulfilling their financial stability mandate. Furthermore, it is easier for central banks to communicate monetary policy decisions if the population has a high level of financial literacy. A better understanding of monetary policy helps predict forthcoming decisions, which in

turn speeds up the transmission to the real economy and hence makes monetary policy more effective.

It is therefore in the clear self-interest of central banks to provide targeted and tailored financial education, especially to the most vulnerable groups of the population, either directly or via multipliers, such as teachers, journal-

ists or financial service providers. As independent and non-commercial expert organizations, central banks are also natural leaders in financial education activities. The results of the new dataset on the knowledge gaps of the Austrian population are an important contribution to shaping the future financial education activities of the OeNB.

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## Annex

Table A1

## Characteristics of respondents with especially high and low financial literacy

|  | All respondents<br>(unweighted) | All respondents<br>(weighted) <sup>1</sup> | Correct ≥9<br>(weighted) <sup>1</sup> | Correct ≤3<br>(weighted) <sup>1</sup> |
|--|---------------------------------|--|---------------------------------------|---------------------------------------|
|  | %                               |  |                                       |                                       |
| TOTAL  |                                 |  | 35.69                                 | 8.42                                  |
| GENDER                                       |                                 |  |                                       |                                       |
| Male   | 46.64                           | 48.12                                      | 42.46                                 | 6.67                                  |
| Female                                       | 53.36                           | 51.88                                      | 29.40                                 | 10.05                                 |
| AGE  |                                 |  |                                       |                                       |
| 15–29 years                                  | 16.70                           | 20.93                                      | 29.11                                 | 9.96                                  |
| 30–44 years                                  | 23.77                           | 24.54                                      | 33.90                                 | 8.03                                  |
| 45–59 years                                  | 27.03                           | 26.65                                      | 39.48                                 | 6.32                                  |
| 60 years and above                           | 32.5                            | 27.88                                      | 38.57                                 | 9.61                                  |
| EDUCATION                                    |                                 |  |                                       |                                       |
| Education – low <sup>2</sup>                 | 16.15                           | 17.59                                      | 18.20                                 | 20.09                                 |
| Education – vocational training <sup>3</sup> | 57.37                           | 55.62                                      | 34.41                                 | 6.93                                  |
| Education – high <sup>4</sup>                | 26.48                           | 26.79                                      | 49.82                                 | 3.86                                  |
| HOUSEHOLD INCOME                             |                                 |  |                                       |                                       |
| Income below EUR 2,000                       | 42.43                           | 41.05                                      | 31.17                                 | 10.07                                 |
| Income EUR 2,000–3,400                       | 37.71                           | 38.1                                       | 39.11                                 | 5.30                                  |
| Income over EUR 3,400                        | 14.89                           | 14.92                                      | 46.86                                 | 6.19                                  |
| Income not indicated                         | 4.96                            | 5.93                                       | 16.80                                 | 22.67                                 |
| EMPLOYMENT STATUS                            |                                 |  |                                       |                                       |
| Employed (more than 35 hours per week)       | 40.87                           | 41.78                                      | 33.64                                 | 5.36                                  |
| Unemployed                                   | 3.86                            | 4.14                                       | 34.69                                 | 7.80                                  |
| Not working                                  | 38.01                           | 36.03                                      | 34.97                                 | 11.38                                 |
| Employed part time (max. 35 hours per week)  | 11.53                           | 11.67                                      | 38.19                                 | 7.11                                  |
| Self-employed                                | 6.67                            | 6.67                                       | 50.82                                 | 5.93                                  |
| TOWN SIZE                                    |                                 |  |                                       |                                       |
| Town size (up to 5,000 inhabitants)          | 43.78                           | 43.97                                      | 32.95                                 | 9.82                                  |
| Town size (5,000–1 million inhabitants)      | 36.21                           | 35.62                                      | 34.00                                 | 7.46                                  |
| Town size (Vienna)                           | 20.01                           | 20.41                                      | 44.53                                 | 7.10                                  |
| N  | 1,994                           | 1,994                                      | 728                                   | 150                                   |

Source: OeNB.

<sup>1</sup> Weights based on external population statistics on age and gender at the province level.<sup>2</sup> At most completed compulsory education.<sup>3</sup> Apprenticeship; technical, commercial or vocational education not qualifying for university.<sup>4</sup> Secondary academic or vocational education qualifying for university education; other education qualifying for university education; university of applied sciences; technical or vocational college; university: bachelor's, master's and doctoral degrees.