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Tabea Bucher-Koenen, Bettina Lamla

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THE LONG SHADOW OF SOCIALISM:

ON EAST-WEST GERMAN DIFFERENCES IN FINANCIAL LITERACY

Tabea Bucher-Koenen[1]
Max-Planck Institute for Social Law and Social Policy and Netspar
and
Bettina Lamla
Max-Planck Institute for Social Law and Social Policy

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Abstract:
We use the German reunification as a natural experiment to understand drivers of financial literacy accumulation. With the transformation from a planned to a market-based economy in 1990, the incentives to invest in financial literacy were changed exogenously for East Germans and remained the same for West Germans. Our results show that even 20 years after reunification there is evidence for a significant financial literacy gap between East and West. While some groups, for instance women and those who have migrated from the East to the West, show similar levels of financial literacy compared with their West German peers, others do not. Differences in financial literacy are present across all educational groups and at the top and the bottom of the income distribution. We decompose the financial literacy gap taking account of factors commonly integrated in theoretical models of financial literacy. Most of the gap remains unexplained. Extending empirical and theoretical models by including differences in attitudes and values might improve our understanding of financial literacy acquisition.

Keywords: Financial sophistication, financial education, East Germany, decomposition.
JEL classification: D91

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1. INTRODUCTION

The radical changes in the public pension systems in the last decades, the gradual shift of pension plans from defined-benefit towards defined-contribution as well as the recent economic and financial crises, require individuals to master increasingly difficult financial decisions. Existing research has established a strong link between financial literacy and financial decision-making. Financial literacy, for example, has been connected to wealth accumulation, retirement planning, and investment behaviour.[2] Consequently, improving financial literacy has become an important policy goal (Lusardi, 2008; Lusardi and Mitchell, 2014). However, literature determining how people acquire financial literacy is limited. Some recent theoretical contributions model the acquisition of financial literacy as a human capital accumulation process (e.g. Delavande et al., 2008; Lusardi et al., 2013), but only few empirical analyses exist. So far most empirical studies focus on the evaluation of the short-term effects of very specific financial education interventions which are often provided for particular target groups. These studies hardly examine long-term outcomes and behavioural changes. Thus, there is a lack of empirical contributions that show how financial literacy is acquired in the general population and how this process might change over time.

We use the shock of German reunification in 1990 as a natural experiment to determine how an exogenous change in the incentives to acquire financial literacy might affect the accumulation process. By analyzing financial literacy in East and West Germany almost 20 years after those sudden changes to the institutional framework we hope to draw inferences about the accumulation of financial literacy and factors promoting or hindering this process.

As a result of post-war German occupation in 1945, two separate German states – the Federal Republic of Germany (FRG; West Germany) and the German Democratic Republic (GDR; East Germany) – existed from 1948/49 until 1990. While West Germany was organized as a social market economy with free capital markets, in East Germany, during this period, no capital markets existed and savings and credit options were available only to a very limited extent. Thus, prior to 1990 East Germans had few opportunities and low incentives to acquire financial literacy. Reunification of the two German regions occurred rather unexpectedly after a peaceful

[2] See, e.g., Lusardi and Mitchell (2007, 2008, 2011b), Bucher-Koenen and Lusardi (2011), van Rooij et al. (2011b, 2012), and Bucher-Koenen and Ziegelmeyer (2013).

revolution in 1989. This resulted in sudden changes of the institutional setting for East Germans when West German institutions were adopted and East Germany was transformed from a planned to a market based economy almost from one day to another.

In a recent contribution, Jappelli (2010) connects the institutional framework and financial market development to the level of financial sophistication. The author shows that in former socialist countries, levels of financial literacy are lower on average. He argues that by raising the incentives to invest in financial knowledge, the levels of financial literacy will eventually rise but the improvements will happen only slowly over time. Testing this hypothesis is problematic as institutional and societal changes usually develop gradually and parallel to each other with multiple feedback effects.The German reunification "experiment" is different in that it provides us with an exogenous and permanent change in institutions requiring immediate adaptations by individuals.[3]

In a previous study, Bucher-Koenen and Lusardi (2011) use three questions of financial literacy and find fundamental differences in responses between East and West Germans based on data from 2009. On average, East Germans appear to have lower levels of financial knowledge. We extend their analysis in various dimensions: Using a broader set of financial literacy questions, we draw a more differentiated picture of the East-West differences in financial literacy. Specifically, we distinguish between basic math-related and advanced financial literacy. Second, some groups in East Germany might have characteristics that allow them to close the gap in financial literacy quickly. Therefore, we examine if the difference in financial literacy between East and West Germany is uniform for all socio-demographic groups. Third, more than two decades after the German reunification, there are still fundamental discrepancies in economic well-being as well as preference parameters between East and West Germany. In particular, average levels of income and wealth are lower in East compared to West Germany (see, e.g., Fuchs-Schündeln et al., 2010). Consequently, we investigate to what extent these persisting differences in socio-economic characteristics and preferences between the two German regions

[3] Various studies have exploited German re-unification and the related sudden change in institutions to examine causal effects, for example, of risk aversion and occupational choices (Fuchs-Schündeln and Schündeln, 2005), market access and economic development (Redding and Sturm, 2008) and the impact of social ties on regional economic growth (Burchardi and Hassan, 2013). Fuchs-Schündeln (2008) examines the effects of German re-unification on savings behaviour and Fuchs-Schündeln and Haliassos (2014) study the effects of product familiarity on product purchase in this context.

can account for differences in financial literacy that we observe today. In a fourth step, we estimate separate regressions of financial literacy for East and West Germany to understand if the "returns" to financial literacy are equal in the two regions. We combine the results from the third and fourth step and conduct a thought experiment: What would happen to the East-West difference in financial literacy if East Germans had the characteristics of West Germans? In other words, we want to know how much of the difference in financial literacy between East and West Germany can be attributed to differences in observable characteristics, and which fraction remains unexplained. This exercise is informative since it shows to what extent East Germans could close the gap in financial literacy when convergence along other dimensions is reached.

Our main results are: there is evidence for a significant financial literacy gap between East and West Germany using three different financial literacy measures. While some groups, for instance women and those who have migrated from the East to the West, have mastered to catch up with their West German peers, others did not. Differences in financial literacy are present across all educational groups and at the top as well as the bottom of the income distribution. Differences in socio-economic characteristics cannot explain the gap in financial knowledge. Our evidence indicates that this might be due to the fact that characteristics translate differently into financial literacy between the two German regions. Most importantly, we do not find a gender gap in East Germany and we find relatively flat education and income gradients in financial literacy. The decomposition of the financial literacy gap reveals that it remains largely unexplained by our empirical models which take account of factors commonly integrated in theoretical models and empirical investigations of financial literacy. Thus, even if the East Germans had all (observable) characteristics of the West Germans a gap in financial literacy would persist. This is rather puzzling and has two implications: The first implication is that theoretical and empirical models need to be revised. Existing models of financial literacy accumulation so far seem to be unable to adequately explain the variation of financial literacy observed between East and West Germany. Other mechanisms are at play which contribute to the accumulation of financial literacy and therefore should be investigated. Differences in values and attitudes or the explicit modelling of peer effects might be relevant. Thus, drawing from the literature which analyses differences between East and West Germans after reunification, might

enhance our understanding of financial literacy acquisition in the future. The second implication is political. If the level of financial literacy is not even similar after reaching convergence on other levels, more effort might be necessary in terms of financial literacy education to avoid permanently lower levels of financial literacy in East Germany and adverse effects on financial decision-making.

The paper is structured in the following way: in section 2, we provide a literature overview. After giving a brief introduction to the historical background we formulate our hypotheses. Section 3 explains the data set and variables. Results are presented in section 4 and discussed in section 5. We conclude in section 6.

2. LITERATURE, HISTORICAL BACKGROUND, AND HYPOTHESES

2.1 FINANCIAL LITERACY AND FINANCIAL DECISION-MAKING

The literature measuring financial literacy and examining the empirical link between financial literacy and financial decision-making has grown rapidly in recent years.[4] The first central empirical finding is that financial literacy is not widespread. Most studies measure financial knowledge based on quiz-like questions and self-evaluations in the United States (e.g. Bernheim, 1995, 1998; Lusardi and Mitchell, 2007, 2011b). Studies from other countries, such as the Netherlands (van Rooij et al. 2011a) or Germany (Bucher-Koenen and Lusardi, 2011), draw similar conclusions: on average levels of financial literacy are low.

The second general finding is that financial literacy influences financial decisions. Those with low levels of financial literacy have difficulties with financial planning, in particular planning for retirement (e.g. Lusardi and Mitchell, 2007, 2011b; Bucher-Koenen and Lusardi, 2011). Furthermore, they accumulate lower levels of wealth and therefore are facing lower levels of assets when they retire (e.g. Lusardi and Mitchell, 2007; van Rooij et al., 2012). Less financially savvy persons also face difficulties when making investment decisions. They are less likely to invest in the stock market (e.g. Christiansen et al., 2008; Christelis et al., 2010; van Rooij et al., 2011b), less likely to diversify their assets (e.g. Guiso and Jappelli, 2008; von Gaudecker, 2011),

[4] See Lusardi and Mitchell (2014; 2011a) for overviews.

and they are more likely to have incurred substantial financial losses during the recent financial crisis (Bucher-Koenen and Ziegelmeyer, 2013). Furthermore, financially illiterate households are more financially fragile and faced with higher levels of (high-cost) debt (e.g. Jappelli et al., 2013; Lusardi and Tufano, 2009).

Some literature on the acquisition of financial literacy has been established. Most of the recent empirical studies fall into two categories: those describing sub-groups among the population with higher or lower levels of knowledge and those providing evidence of financial education interventions mostly for specific target-groups. The first set of studies is purely descriptive.[5] Findings are, for example, that women, people with low income, and those with low education tend to be less financially literate. Moreover, young and old individuals tend to be less financially savvy. In these studies, though, no answers are given on why those groups have lower levels of financial literacy compared to others. The second group of studies examines the effects of financial education programmes at school and at the work place as well as programmes targeting specific groups at risk of low literacy.[6] Lusardi and Mitchell (2014) provide an extensive discussion of this literature and its limitations: apart from flaws in the experimental designs, the central point of critique is that many of the studies lack theoretical models and clear hypotheses about who should or should not invest in financial literacy. Most of the time, these evaluation studies only measure the short-term effects of very specific interventions and do not allow for an examination of the long-term outcomes and behavioural changes. Therefore, it seems crucial to look for more natural contexts in which the accumulation of financial literacy can be studied so that inferences about the process can be made.

Compared to the extensive empirical literature, theoretical contributions on financial literacy are rather limited. Peress (2004) provides a purely static model in which available resources and investment experience drive information acquisition. Monticone (2010) adapts this model to the context of financial literacy and wealth accumulation. Dynamic human capital models of financial literacy accumulation are set up by Delavande et al. (2008), Jappelli and Padula (2013), and Lusardi et al. (2013). In these frameworks, financial literacy enables the realisation of higher

[5] See, for example, evidence provided in the country studies in special issues of the Journal of Pension Economics and Finance (Vol. 104, 2011) and Numeracy (Vol. 6, 2013).

[6] See Fernandez et al. (2014) for a meta study.

returns, but requires time and money investments. Thus, individuals will invest in financial literacy until their marginal benefits of acquiring financial knowledge are equal to their marginal costs. While Delevande et al. (2008) and Jappelli and Padula (2013) focus on two period frameworks, Lusardi et al. (2013) model a full life-cycle model with endogenous financial literacy. In their model, the need to smooth consumption at retirement simultaneously drives the savings decision (wealth accumulation) and investment in financial knowledge. There are several key insights from these models. First, there might be individuals for whom it is optimal *not* to invest in financial literacy. Second, the institutional context matters for investments in financial literacy. Specifically, in the model from Lusardi et al. (2013), the prediction is that the greater the gap between income from work and income from retirement, the greater the need for consumption smoothing, and the greater the incentive to acquire relevant knowledge. This is in line with the empirical observation by Jappelli (2010) who shows that financial literacy is higher in countries with less generous social security systems and more resources available for private wealth accumulation. This insight is crucial for the derivation of our hypotheses in the following section.

2.2 THE HISTORICAL BACKGROUND AND EMPIRICAL APPROACH

From 1948/49 to 1990, Germany was divided into two parts: the market-based FRG (West Germany) and the socialist GDR (East Germany). The reunification occurred rather unexpectedly in October 1990 after a peaceful revolution in 1989 and the first free elections in East Germany in March 1990. A large series of policy reforms followed the political reunification. A complete monetary union and a market-based economic union were introduced rapidly and West German institutions were adopted in East Germany, such as the pay-as-you-go social security and unemployment insurance (Börsch-Supan and Schmidt, 2001). We use the German reunification as a natural experiment to understand drivers of financial literacy accumulation. More specifically, we investigate how changes in the institutional environment might drive financial literacy investments and which factors promote and hinder financial literacy accumulation.

In this way we can avoid common problems that arise in controlled experiments such as small sample size, limited heterogeneity of participants, small stakes, and hypothetical decision situations (Fuchs-Schündeln and Haliassos, 2014). The approach also has the advantage that we

can analyse a long time horizon. Previous studies of specific financial literacy interventions had the disadvantage of only evaluating very specific interventions after relatively short horizons. Our approach can analyse the accumulation of financial literacy due to a fundamental change in the economic environment over 20 years ago. On the other hand, using the German reunification as natural experiment is limited by the fact that measures of financial literacy have only been inserted in population wide surveys in recent years since the research field is relatively young.[7] Unfortunately, this makes it impossible to use a classical difference in difference estimation strategy to determine effect sizes. Instead, we can only examine financial literacy in cross-sectional data from 2009. Nevertheless we think that our approach is helpful. We make the following central assumptions:

(1) Before the division of Germany, West and East Germans were comparable in terms of their financial literacy.

Germany as a country was created in 1860 as a result of the political unification of 18 independent political units. It remained a single country until the end of the Second World War when it was split amongst the winning Allies. The separation into the British, the French, the American and the Soviet Zone was decided in the Conference of Jalta in 1945 and the political tensions at the Potsdam Conference in August 1945 are seen as the onset of the cold war and as step towards a separation of Germany into East and West. The separation was sealed in 1949 with the foundation of the FRG by the three West German occupation zones and the foundation of the GDR of the Soviet zone. Our identification strategy relies on the fact that the division of Germany was a purely political event and not driven by financial literacy of its residents after the Second World War or any factors which might be directly related to financial literacy accumulation after 1990.

(2) With the transformation from a planned to a market-based economy in 1990, the incentives to invest in financial literacy were changed exogenously for East Germans and remained the same for West Germans.

In general, the separation of Germany was seen to be permanent. In the so-called "Grundlagenvertrag" from 1972 the FRG gave up on their claim to be the solitary German state

[7] The first population wide survey of financial literacy was available in Germany in 2007 (SAVE 2007).

and accepted the existence of the GDR. In 1973 both countries joint the United Nations. Unification occurred rather unexpectedly in 1990 after a peaceful revolution and the fall of the Berlin wall in 1989. In March 1990 the first free election were held in the GDR followed by a rapid political, monetary and economic union. In general, West German institutions were adopted in East Germany, state owned property was privatized, the "Deutsche Mark" was introduced, and social and labor market institutions of the West were established. Thus, the economic environment for East Germans changed almost overnight while the institutions in the West remained largely stable. Our identifying assumption relies on the fact that the rapid and unexpected change of the economic environment after unification exogenously changed the incentives to invest in financial literacy for the East Germany, while incentives for the West Germans were unaffected.

(3) At the time of reunification, financial literacy in East Germany was very low.

A series of institutional factors influencing the costs and benefits of investing in financial literacy were different in East Germany under the socialist system in comparison to West Germany. In the model of financial literacy accumulation by Lusardi et al. (2013) the central mechanism driving financial literacy accumulation is the need to build up wealth in order to smooth life-cycle consumption. Incentives to invest in financial literacy in order to smooth consumption were negligible during socialism. Due to the egalitarian doctrine of the socialist system, the income path was predictable as wages were set centrally and unemployment did not exist (Kohn and Antonczyk, 2013). Consequently, income variations were small in all occupations and thus savings in order to smooth consumption unnecessary (Fuchs-Schündeln and Schündeln, 2005). In addition, labour market experience accumulated under the communist system was not rewarded (Hauser et al., 1994) as age-earnings as well as experience-earnings-profiles were quite flat (Kohn and Antonczyk, 2013). Besides, East Germans did not have access to "capitalist" financial instruments such as stocks, bonds or consumer credit under the socialist system (Sauter 2009; Fuchs-Schündeln and Haliassos 2014). Consequently, they had limited possibilities to acquire investment experiences and did not need to invest in financial literacy. Both aspects contribute to the insight that levels of financial literacy were very low among East Germans shortly after the reunification. Incentives to invest in financial literacy were largely introduced with the implementation of West German institutions, unification of the monetary system and

introduction of free markets for labour and consumption goods. We are interested in how levels of financial literacy have evolved since.

2.3 HYPOTHESES

There are various ways to define and measure financial literacy and depending on the underlying concept, the gap in financial literacy between East and West Germans might differ. While some definitions require the ability to perform simple mathematical calculations, others relate to specific financial experiences. The mathematical abilities that are needed to understand basic financial concepts, e.g., calculating interest, were part of both, the East and the West German curricular. Today, East German students perform even better in mathematical tasks than their West German counterparts (Pant et al., 2013). Thus,

H1a: We do not expect a gap in financial literacy between East and West Germans if the measures largely require mathematical abilities.

On the other hand, there might be reasons to expect differences in experience driven measures of financial literacy. While massive transfers from the West to the East followed the reunification, economic conditions did not fully converge until today (Fuchs-Schündeln et al., 2010), which might create different incentives to invest in financial literacy. For instance, East Germans have lower wealth levels (Deutsche Bundesbank, 2013), earn less and have more discontinuous working lives (Geyer and Steiner, 2010). Furthermore, Sauter (2009) observes that participation rates in the security markets in East Germany are still lower than in West Germany. He argues that habit persistence can explain this behaviour: if East Germans have always used savings accounts as their most important savings vehicle, they might just continue to follow this pattern even when the security market is available to them. At the same time, Fuchs-Schündeln and Haliassos (2014) show that participation, e.g., in consumer debt has converged between East and West Germany. While this result might cast doubt on the relevance of familiarity with a financial instrument for its usage, it does not imply that the capabilities for using these instruments are the same between the two German regions. In fact,

individuals might be tempted to mimic peers with higher means or more knowledge without having the means or knowledge themselves (Georgarakos et al., 2013). Therefore,

H1b: We expect a gap in experience-driven financial literacy measures.

Zooming in on financial literacy among specific socio-economic groups, we are particularly interested in the question, who among East Germans was able to close the gap in financial literacy after 20 years. Since not all individuals have the same incentives to invest in financial literacy, some groups might be quicker in accumulating knowledge than others. In other words, the returns to financial literacy investments are not uniform in the population and this should be reflected when comparing financial literacy levels among sub-groups. According to Lusardi et al. (2013), individuals with higher income and education have higher incentives to invest in financial literacy because their income profile is steeper and their consumption drop at retirement tends to be larger. Therefore,

H2a: We expect those with high income and education to be quicker in closing the gap in financial literacy.

With the introduction of the new institutional settings, East Germans had to adapt to the new incentives. Due to their psychological predisposition, some individuals might be more prone to stick to their habits and learned behaviour while others might be more open to the new environment. We propose that

H2b: Less habit persistent individuals are more likely to close the gap in financial literacy.

In addition, there was extensive migration from East to West Germany in the years after reunification. Between 1991 and 2006, net East-West migration amounted to 1.45 million people, with gross flows of 2.45 million migrating from East to West Germany (Fuchs-Schündeln et al., 2010). Migrants are considered a self-selected group (Fuchs-Schündeln and Schündeln, 2005). In particular, younger people and people with higher education were more likely to move

from East to West Germany, which potentially led to a brain drain (Arntz, 2010). Based on three financial literacy questions, Bucher-Koenen and Lusardi (2011) find that individuals who migrated from East to West Germany have higher financial knowledge compared to those who have stayed in the former GDR. These individuals might be more likely to have closed the gap in financial literacy for various reasons. First, they have more favourable characteristics (age, education, income) for acquiring financial literacy. Second, they might have learned from their West German peers, and third, they might be more open to changes.

H2c: We expect that East Germans who migrated to the West of Germany have similar levels of financial literacy as their West German peers.

One widely found result is that women tend to have lower levels of financial literacy compared to men (Bucher-Koenen et al., 2012). One of the drivers of the gender gap in financial literacy could be the lower labour force participation of women. Compared to West Germany, female labour force participation was very high in the GDR. Before the collapse of the socialist system, more than 80% of working-age women participated in the labour market (Bonin and Euwals, 2002). After the reunification, participation levels in East Germany declined, but did not completely converge (Geyer and Steiner, 2010). Since East German women are more likely to earn and manage their own income, they might have had favourable circumstances to catch up with their West German peers. Thus, nowadays East German women might have the same or even higher financial literacy levels compared to West German women.

H2d: We expect no gap in financial literacy for women in East and West Germany.

The previous hypotheses describe the existing gap in financial literacy between East and West Germans in total and for specific groups. The following hypotheses will go one step further and focus on how the gap can be explained by differences in background characteristics. Socio-economic characteristics have been found to correlate with financial literacy.[8] 20 years after

[8] See Bucher-Koenen and Lusardi (2011) for results on Germany.

reunification, there are still fundamental differences in economic circumstances which might be related to the East-West differences in financial literacy. Therefore, we would like to know, how much of the difference in financial literacy can be explained by differences in socio-economic characteristics. We expect that

H3a: Once we control for socio-economic variables, the East-West gap in financial literacy becomes smaller (composition effect I).

The division of Germany has also created differences in values and attitudes that might be related to differences in financial knowledge. A recent string of literature has shown that socialism has affected individuals' preferences with long-lasting effects (e.g., Alesina and Fuchs-Schündeln, 2007; Corneo and Grüner, 2002). In the context of financial literacy, investment risk preferences play a crucial role. Jappelli and Padula (2013) argue that risk averse individuals are less interested in investing in risky assets and are therefore less likely to invest in specific financial knowledge. The evidence on risk preferences in East and West Germany is mixed. East Germans are found to be less risk averse by Heineck and Süßmuth (2013) and Bonin et al. (2009). However, Heineck and Süssmuth (2013) find that risk preferences mostly converged in recent years. We hypothesize that

H3b: Once we control for preferences (in particular risk preferences), the East-West gap in financial literacy becomes smaller (composition effect II).

In the next section, we will present the data and the sample which we will use to test our hypotheses.

3. DATA AND SAMPLE

3.1 THE SAVE STUDY

The analysis is based on the German SAVE study, a representative survey of households' financial behaviour with a special focus on savings and old-age provision.[9] The person living in the household who knows most about the household's finances, answers all the questions in the survey. Measures of financial literacy as well as socio-demographic characteristics reported in this paper refer to this person. Information on the financial situation, in particular on income and wealth, refers to the household as a unit.

Our analysis is based on data from SAVE 2009, which includes the broadest set of questions on financial literacy. We drop all observations for which one or more answers on the financial literacy task are missing (see section 3.2). Moreover, we drop observations if information on the educational attainment remains unspecified. Missing values for all other variables are imputed using a multiple imputation procedure based on a Markov Chain Monte Carlo simulation (Schunk 2008; Ziegelmeyer 2009, 2013).[10] Thus, our sample contains 973 observations in total.

We compare two groups of households based on whether the respondent currently lives in East or West Germany: 353 (36%) of the respondents currently live in East Germany and 620 (64%) live in West Germany. In addition, we have information on whether households completed their education prior to 1990 in the GDR. We are using this information to investigate the effects of migration between East and West on financial literacy accumulation.

Sample specific weights with respect to age and income are constructed based on the German Microcensus. They are used for the descriptive analysis. Regressions reported in the paper are not weighted. Appendix A.1 displays the construction of all variables and appendix A.2 contains summary statistics for respondents in East and West Germany.

[9] SAVE was initiated in 2001 by the Mannheim Research Institute (since 2011 Munich Center) for the Economics of Aging (MEA) and is run on an annual base since 2005. The following analysis will focus on a Random Sample which was drawn from the community-based population registers in a multistage procedure.

[10] Results in the paper are based on the first of five implicates. Our results do not change when using the alternative data sets (imputation 2 to 5). Additional analyses can be obtained upon request.

3.2 MEASURING FINANCIAL LITERACY

There are various ways to define and measure financial literacy. Lusardi and Mitchell (2011a) develop three quiz-like questions in order to measure objective – as opposed to subjective or self-assessed – financial literacy. The questions cover the understanding of inflation, interest rates as well as risk diversification. They have been added to a series of surveys around the world and allow for an international comparison of financial literacy. The focus of these questions is on measuring actual knowledge rather than decision-making skills or financial experience (Bucher-Koenen, 2011). A larger set of up to 21 financial literacy questions has been used in the Dutch Household Panel (van Rooij et al., 2011a) as well as the RAND American Life Panel (Lusardi and Mitchell, 2007). A subset of these questions was also added to the SAVE survey.[11] Appendix A.4 reports the answering behaviour for eight of the questions for the complete sample (including respondents with missing answers), and separated by region.[12] As mentioned previously, we drop respondents with at least one missing answer on the financial literacy tasks for the following analyses. Therefore, our sample is reduced from 1,076 to 973 observations.[13]

Van Rooij et al. (2011a) conduct a factor analysis to categorize the questions and aggregate them into measures of basic and advanced financial literacy. We follow this categorization and aggregate the answers from the eight questions into three different measures of financial literacy, which have been used in the literature before. The "three questions task" contains the interest, the inflation and the risk question. It is the measure previously used by the Flat World (Financial Literacy around the world) project. We construct a dummy variable which takes the value 1 if all three questions are answered correctly and 0 otherwise. Additionally, we construct a dummy for "basic financial literacy" if all four questions labelled as "basic" by van Rooij et al. (2011a) are answered correctly. This measure is picking up mathematical skills and has been used as a proxy for numeracy previously (van Rooij et al. 2011a). We also construct a dummy for "advanced financial literacy" which is one if all four questions labelled "advanced" are answered

[11] The wording of all questions is reported in appendix A.3.

[12] The share of missing answers ranges between 2.4% and 4.0% for each of the eight questions. The overall share of observations with missing answers is not significantly different between respondents in West and East Germany.

[13] As a robustness check we treated missing values as a zero in the financial literacy indicators. This does not affect our results. Additional analyses are available upon request.

correctly. This measure asks for the understanding of certain financial products and financial markets in general and thus is more experience related. Since the three questions are part of the other two measures, there is some overlap. We choose this approach to be comparable to previous results presented by Bucher-Koenen and Lusardi (2011).

4. EMPIRICAL EVIDENCE

This chapter presents our empirical findings. Section 4.1 answers if there is an East-West gap in financial literacy using a broad set of financial literacy questions. In section 4.2, we examine financial literacy by socio-economic groups in West and East Germany, analysing which groups have mastered to close the financial literacy gap. Section 4.3 investigates if we can explain the East-West gap in financial literacy by differences in socio-economic characteristics and preference parameters. In section 4.4, we consider different returns to financial literacy in East and West Germany. We combine the composition and the return effects in section 4.5: we conduct a Blinder-Oaxaca decomposition which is equivalent to a thought experiment asking: What would happen if East Germans had the same characteristics as West Germans?

4.1 THE GERMAN EAST-WEST GAP IN FINANCIAL LITERACY

Irrespective of the measure, West Germans are on average more financially literate than East Germans (table 1). The raw gap ranges between 11 and 13 percentage points.[14] Specifically in the three-question task, 58% of the West Germans and 45% of the East Germans are classified as financially literate. The basic financial literacy questions are correctly answered by 43% of the West German sample and by 32% of the East Germans. This is rather surprising, since in hypothesis 1a we proposed that the math-related questions should be answered correctly with equal likelihood in East and West. Questions on advanced financial literacy appear to be particularly difficult. They are answered correctly by 33% of the West and 19% of the East Germans, in line with hypothesis 1b. All differences are statistically significant using a one-sided t-test. Summing up, we find robust evidence that 20 years after the reunification, there is a gap

[14] As a robustness check, we have excluded potential migrants from East to West and West to East as well as young East Germans who did not complete their education in the GDR (168 observations) from our analysis. We find that the East-West gap decreases to 4 to 9 percentage points, but remains highly significant for all three measures of financial literacy.

in financial knowledge between East and West Germany. The gap is not only present for experience-related and difficult financial literacy questions but even for simpler questions that require largely mathematical skills.

Table 1: Financial literacy in West and East Germany

	All	West	East	West vs. East
3 Questions	54%	58%	45%	***
Basic financial literacy	39%	43%	32%	***
Advanced financial literacy	28%	33%	19%	***
N	973	620	353	-

Source: SAVE 2009. Own calculations.
Notes: Stars indicate significant differences based on a one-sided t- test. H_0: West-East>0. * p<0.1; ** p<0.05; ***p<0.01. Data is weighted.

4.2 WHO CLOSED THE GAP?

There are various reasons to assume that the differences in financial literacy between East and West Germany are not uniform across socio-economic groups. Our hypotheses state that those with higher education and income, those who characterize themselves as being open to change, individuals who migrated from East to West Germany, and women should be better in closing the gap to their West German peers. In table 2, we report mean levels of financial literacy by region and socio-demographic group. We also indicate if differences between East and West Germany are significant. Some of the comparisons have to be treated with care since the cells contain very small numbers of observations.

Education. In hypothesis 2a, we propose that those with high levels of income and education in East Germany are more likely to have similar levels of financial literacy compared to their West German counterparts. However, table 2 shows significant differences in financial literacy between East and West Germany for all levels of education. Contrary to our hypothesis, the differences in financial literacy between East and West Germany are particularly high for respondents with a university degree. Thus, education alone does not seem to help individuals to accumulate financial knowledge.

Income. Comparing levels of financial literacy by income quartiles in East and West Germany reveals that the levels of financial knowledge are very similar in the middle of the income

distribution. However, we find substantial differences in the tails. There is a large and significant gap in financial literacy between East and West Germany at the bottom of the income distribution for the three question task as well as for advanced financial literacy. At the top of the income distribution, the East-West gap is present for all three financial literacy measures, which again is in contrast to our initial hypothesis.

Openness. We do not find evidence supporting hypothesis 2b, which proposes that openness to change as opposed to habit persistence might help in closing the gap. In fact, we find fundamental differences in financial literacy between East and West Germans, irrespective of their self-assessed openness to change.

Migration. Using the SAVE data, we cannot explicitly measure when individuals migrated from East to West Germany. We know, however, where individuals are currently living and whether or not they completed their education in the GDR.[15] Thus, if they completed the education in the GDR and are currently living in West Germany, we assume that those individuals are migrants. In order to test hypothesis 2c, we compare these individuals to those who completed their education in West Germany and are still living in the region. Moreover, we can compare the migrants to those who have been educated and have stayed in the former GDR. While migrants have significantly higher levels of financial literacy according to the three questions in comparison to those who stayed in East Germany, the gap decreases in the case of basic financial literacy and it completely vanishes when considering advanced financial literacy. In addition, migrants appear to have closed the gap between them and their West German peers in the case of basic and advanced financial literacy. They perform even better in financial literacy when considering the three question task.[16] Overall, the results seem to support our hypothesis 2c.

Gender. In hypothesis 2d, we argue that women in the GDR had higher incentives to invest in financial literacy than West German women. Our results in table 2 indicate that East and West

[15] 9% of the respondents currently living in West Germany and 66% of the respondents in East Germany indicate they went to school in the GDR. The remaining 34% East German respondents who were not educated in the GDR can be migrants from West to East Germany as well as old people who completed school before 1948 and young people who started school after the reunification.

[16] We have conducted t-tests, testing whether the coefficients in the column West are different for those who have been educated in the GDR and those who have not been educated in the GDR. Only in the case of the three question task, the difference is significant.

German women have indeed quite similar levels of financial literacy. The gap ranges between 2 and 7 percentage points, but it is not statistically significant. In contrast to that, West German men have higher financial literacy than East German men. The gap varies between 18 and 20 percentage points depending on the definition.

In summary, we find rather heterogeneous patterns of financial literacy levels across socio-economic groups. Contrary to our expectations, a financial literacy gap between West and East Germany persists across all educational groups, among high-income earners, and among those who describe themselves as being open to change. In support of our hypotheses, the gap appears smaller and insignificant for migrants, and women.

Table 2: Financial literacy in West and East Germany by socio-economic groups

	3 Questions			Basic financial literacy			Advanced financial literacy		
variable	West	East	West vs. East	West	East	West vs. East	West	East	West vs. East
education									
low secondary degree	40%	22%	***	28%	19%	*	19%	4%	***
intermediate secondary degree	64%	48%	***	51%	33%	***	33%	24%	*
high secondary degree	82%	65%	***	57%	43%	**	55%	28%	***
no university degree	55%	40%	***	39%	29%	***	29%	18%	***
university degree	81%	64%	**	66%	44%	***	60%	25%	***
income									
income: 1st quartile	48%	31%	**	31%	27%		24%	13%	*
income: 2nd quartile	45%	46%		28%	26%		23%	16%	
income: 3rd quartile	56%	60%		45%	41%		27%	26%	
income: 4th quartile	74%	56%	**	56%	40%	**	49%	33%	**
openness									
not open to change	56%	46%	**	43%	32%	**	32%	23%	**
open to change	60%	45%	***	43%	31%	***	33%	17%	***
migration									
educated in GDR	69%	54%	**	43%	36%		24%	24%	
not educated in GDR	57%	29%	***	43%	23%	***	33%	10%	***
gender									
men	67%	49%	***	50%	30%	***	41%	20%	***
women	49%	43%		36%	33%		24%	19%	

Source: SAVE 2009. Own calculations.

Notes: Stars indicate significant differences based on a one-sided t-test. H_0: West-East>0. * p<0.1; ** p<0.05; ***p<0.01. Data is weighted.

4.3 COMPOSITION EFFECTS

The gap in financial literacy between the two German regions might result simply due to the different situations of East and West German households. In order to investigate how much of the East-West differences in financial literacy can be explained by accounting for differences in characteristics, we estimate the following Linear Probability Model using Ordinary Least Squares.[17]

$$Y = \alpha + X'\beta + \gamma East + \varepsilon \text{ with } E(\varepsilon) = 0 \qquad (1)$$

The dependent variable *Y* is a binary variable indicating if an individual is considered financially literate. As mentioned above, we employ three different measures of financial literacy. In order to investigate composition effects, we sequentially add more covariates captured under the vector *X.* We have four different blocks of explanatory variables which have been shown to be relevant for financial literacy in the previous literature: background characteristics (age, gender, education and living in a rural area), employment characteristics (employment situation and the logarithm of income), preference parameters (risk preferences and self-assessed openness), and log financial wealth. The main variable of interest is a dummy equal to 1 if the individual is currently living in the East of Germany.

Estimation results are summarized in table 3.[18] We find that living in East Germany is negatively correlated with financial literacy. The first columns of each measure reflect the raw gap in financial literacy presented previously. It ranges from around 12 to 13 percentage points. This gap is only slightly reduced by 1 to 2 percentage points and remains statistically significant even after controlling for the full set of covariates (see last column for each measure). Neither the differences in socio-economic characteristics nor differences in selected preference parameters can explain the East-West gap in financial literacy. If at all, there is only a small composition effect, as postulated by our hypotheses 3a and 3b. All other covariates are related to financial literacy as expected. The full models including the complete set of explanatory variables account for between 13% (in the case of basic financial literacy) and 20% (in the case of the three question task) of the variation in the respective

[17] Since the dependent variables are binary, we also conducted Probit regressions and results are very similar. Here we focus on OLS regressions for consistency with the results of the instrumental variable regressions (appendix A.6) and decomposition (section 4.5). See Wooldridge (2002) and Greene (2002) for a discussion of advantages and disadvantages of Linear Probability Models. See Farilie (2005) for an example of how to decompose non-linear models.

[18] The full regressions results are displayed in appendix A.5.

financial literacy measure (see appendix A.5). Overall, the model fit seems rather low, but in line with previous financial literacy studies (see, e.g., Bucher-Koenen et al. 2012).[19] Despite that fact that we include the most common variables used in this literature, it seems that important variables that affect financial literacy accumulation are missing. In section 5, we will draw on the large string of literature on historical differences between East and West Germany, in order to extend the list of relevant factors that might determine financial literacy accumulation.

We are aware that adding financial wealth as a control in our final regressions is problematic for different reasons. First, financial literacy might affect financial wealth rather than the other way around: it has been shown that those who are financially literate are able to accumulate more financial wealth (e.g. Lusardi and Mitchell, 2007). Second, omitted variable bias might occur due to missing information on cognitive ability or interest in financial topics. Third, there can be measurement error. This might bias all estimated coefficients. In order to understand the size and direction of the bias on the effect of the main variable of interest (East dummy), we have resorted to an instrumental variable strategy related to the approach taken by Monticone (2010).[20] The results are presented in appendix A.6. The main outcome is that even when we account for the endogeneity of financial wealth, the East-West gap remains almost unchanged.

[19] This study compares financial literacy using data from the US, the Netherlands, and Germany. Regressions including similar controls as the one presented here reveal R2 of 12.6 for the Netherlands, 14.1 for Germany and 18.7 for the US.

[20] To our current knowledge, there is no other study using instruments in regressions explaining the determinants of financial literacy which we could use to compare our results.

Table 3: Determinants of financial literacy – Results after OLS regressions

added controls	raw gap	background characteristics	employment characteristics	preferences	financial wealth
dep. var			*3 Questions*		
East dummy	-0.115	-0.147	-0.114	-0.116	-0.100
	[0.033]***	[0.032]***	[0.033]***	[0.033]***	[0.032]***
R2	0.01	0.15	0.16	0.16	0.20
dep. var			*Basic financial literacy*		
East dummy	-0.119	-0.156	-0.125	-0.122	-0.108
	[0.032]***	[0.032]***	[0.033]***	[0.033]***	[0.033]***
R2	0.01	0.08	0.10	0.10	0.13
dep. var			*Advanced financial literacy*		
East dummy	-0.133	-0.151	-0.125	-0.123	-0.108
	[0.030]***	[0.029]***	[0.030]***	[0.030]***	[0.030]***
R2	0.02	0.12	0.13	0.13	0.16

Source: SAVE 2009. Own calculations.
Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

4.4 EAST AND WEST GERMAN GRADIENTS IN FINANCIAL LITERACY

Before we decompose the gap in financial literacy, we would like to check if returns to financial literacy are different in the two German regions. We already argue in section 2.2 that different characteristics enabled individuals to close the gap in financial literacy. Similarly, one could argue that this leads to different gradients in financial literacy in East and West Germany. For example, gender might be related differently to financial literacy in the two regions. Educational gradients might differ due to different educational systems prior to reunification. The income gradient might also be different due to flatter income profiles in East Germany. Accordingly, we estimate separate equations for the East and the West German sample using the Linear Probability Model introduced in the previous section. The vector X contains the set of controls with the exception of financial wealth due to the endogeneity problems outlined above.[21]

$$Y_l = \alpha_l + X_l^{'}\beta_l + \varepsilon_l \text{ with } E(\varepsilon_l) = 0; l \in (East, West) \qquad (2)$$

Table 4 presents our results. The most striking difference in coefficients is that, in contrast to West Germany, we do not find a gender gap in East Germany for any of the financial literacy measures. This is in line with the arguments related to hypothesis 2d. Women in the East of

[21] Due to the small sample size when splitting our sample by regions, we do not present the IV estimates. Results remain similar if we include financial wealth.

Germany were better integrated in the labour market under the socialist regime and afterwards. Consequently, they had similar incentives to accumulate financial knowledge compared to East German men.

Education is correlated with financial literacy in both regions. Individuals with higher education are more likely to give correct answers to the questions included in the three question task as well as to the questions subsumed under advanced financial literacy. However, we find important differences in the way education translates into basic financial literacy between West and East Germany. While there are no differences in basic financial literacy by educational groups in East Germany, we find a strong educational gradient for the West German sample. Due to the egalitarian doctrine of the socialist system, students in the GDR received the same basic education while the West German system used performance-related measures to decide about the secondary schooling track, which might have induced different educational gradients in basic financial literacy. Educational opportunities are still different between East and West Germany (Riphahn and Schieferdecker, 2010).

The employment status is not systematically associated with financial literacy with one exception: self-employed in the East of Germany have significantly higher advanced financial literacy in comparison to people who are not employed. Income is positively correlated with all three financial literacy measures in the Western part of Germany. In the East, however, income does not seem to matter for basic and advanced financial literacy. As mentioned above, the need for consumption smoothing was low under the communist regime due to low life cycle variations in income. Therefore, all income groups had similar incentives to invest in financial literacy in the East. Interestingly, we seem to find a feedback effect as indicated by the arguments which resulted in hypothesis 2a.

Considering preference parameters, we find that risk parameters are associated with basic financial literacy in East Germany. The direction of the effect, however, is not clear. In comparison to risk neutral respondents, both risk averse and risk seeking respondents are more likely to have basic financial literacy. In addition, risk averse respondents in the West of Germany are less likely to have advanced financial literacy while the indicator is not significant in the East German case.

Due to the low number of observations when splitting the samples, our coefficients can only be estimated quite imprecisely. Nevertheless, we find different patterns of financial literacy across individual-specific characteristics in East and West Germany. There is no gender gap

in financial literacy in East Germany and the educational gradient appears less steep in the East compared to the West of Germany. In order to test whether the estimated coefficients for the East German sample are equal to the estimated coefficients for the West German sample, we compute a Chow test (Chow, 1960). The test does not reject the Nullhypothesis which states that coefficients are equal for the three question task (P value 0.198). In contrast, the test suggests that we have two different sets of coefficients for West and East Germany when explaining basic (P value 0.031) as well as advanced financial literacy (P value 0.000). In the next section, we will use decomposition in order to account for the fact that East and West Germans have different characteristics as well as different coefficients.[22]

[22] Despite the fact that the Chow test did not reject the hypothesis of equality of coefficients for the three question task, we will perform the decomposition for all three financial literacy measures to be consistent with our previous approach.

Table 4: Determinants of financial literacy in West and East Germany – Results after OLS regressions

dep. var.	3 Questions		Basic financial literacy		Advanced financial literacy	
	West	East	West	East	West	East
female	-0.153	-0.065	-0.103	0.034	-0.153	-0.030
	[0.038]***	[0.051]	[0.040]***	[0.050]	[0.037]***	[0.042]
age <35	ref.	ref.	ref.	ref.	ref.	ref.
age 36-50	0.047	0.118	-0.043	-0.039	0.071	0.034
	[0.064]	[0.092]	[0.066]	[0.090]	[0.061]	[0.075]
age 51-65	-0.018	0.109	-0.010	-0.064	0.102	0.007
	[0.070]	[0.093]	[0.072]	[0.091]	[0.067]	[0.076]
age 66 +	-0.083	0.062	0.053	-0.034	-0.007	0.008
	[0.093]	[0.127]	[0.096]	[0.124]	[0.089]	[0.103]
living in rural area	0.017	-0.084	-0.029	0.021	-0.061	0.010
	[0.054]	[0.065]	[0.056]	[0.064]	[0.052]	[0.053]
low secondary degree	ref.	ref.	ref.	ref.	ref.	ref.
intermediate sec. degree	0.214	0.230	0.223	0.091	0.124	0.131
	[0.046]***	[0.068]***	[0.047]***	[0.066]	[0.044]***	[0.055]**
high secondary degree	0.345	0.383	0.210	0.138	0.264	0.219
	[0.058]***	[0.089]***	[0.060]***	[0.087]	[0.055]***	[0.073]***
university degree	0.032	0.045	0.137	0.084	0.051	-0.048
	[0.065]	[0.085]	[0.068]**	[0.083]	[0.063]	[0.069]
not employed	ref.	ref.	ref.	ref.	ref.	ref.
employed	0.040	0.064	-0.047	0.009	-0.057	0.074
	[0.059]	[0.077]	[0.061]	[0.075]	[0.056]	[0.062]
self-employed	-0.043	-0.032	-0.181	-0.113	-0.145	0.228
	[0.113]	[0.131]	[0.117]	[0.128]	[0.108]	[0.107]**
retired	0.036	0.078	-0.076	-0.077	-0.050	-0.021
	[0.081]	[0.103]	[0.084]	[0.100]	[0.077]	[0.084]
log(income)	0.058	0.088	0.087	0.057	0.066	0.034
	[0.026]**	[0.040]**	[0.026]***	[0.039]	[0.024]***	[0.032]
risk averse	0.002	0.021	-0.001	0.164	-0.113	0.039
	[0.050]	[0.070]	[0.051]	[0.068]**	[0.048]**	[0.057]
risk neutral	ref.	ref.	ref.	ref.	ref.	ref.
risk loving	-0.022	-0.034	0.047	0.264	-0.004	-0.042
	[0.074]	[0.123]	[0.076]	[0.120]**	[0.071]	[0.100]
open to change	0.028	-0.007	0.000	-0.002	0.004	-0.066
	[0.037]	[0.052]	[0.038]	[0.050]	[0.036]	[0.042]
constant	0.024	-0.487	-0.267	-0.289	-0.122	-0.180
	[0.190]	[0.288]*	[0.197]	[0.281]	[0.182]	[0.235]
R2	0.17	0.15	0.12	0.07	0.15	0.10
N	620	353	620	353	620	353

Source: SAVE 2009. Own calculations.

Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

4.5 DECOMPOSING THE FINANCIAL LITERACY GAP

In the next step, we will conduct a thought experiment. We decompose the mean difference in financial literacy between East and West Germany in a counterfactual manner, asking what would happen to the level of financial literacy of the East German respondents if they had the same characteristics as the West German respondents. For this purpose, we use a Blinder-Oaxaca decomposition (Jann, 2008; Blinder, 1973; Oaxaca, 1973). The basic idea is to express the difference in average financial literacy *(R)* in terms of the difference in predicted financial literacy resulting from equation 2:

$$R = E(Y_{East}) - E(Y_{West}) = (\alpha_{East} - \alpha_{West}) + \{E(X_{East})'\beta_{East} - E(X_{West})'\beta_{West}\} \quad (3)$$

In order to identify the contribution of differences in coefficients to the overall difference in financial literacy between East and West Germany, equation 3 can be rearranged in the following way (Jones and Kelley, 1984):

$$\begin{aligned} R = {} & (\alpha_{East} - \alpha_{West}) + E(X_{West})'(\beta_{East} - \beta_{West}) + \\ & \{E(X_{East}) - E(X_{West})\}'\beta_{West} + \{E(X_{East}) - E(X_{West})\}'(\beta_{East} - \beta_{West}) \end{aligned} \quad (4)$$

Following Jones and Kelley (1984), we have chosen a three-fold decomposition, as we believe that there is no unambiguous way of allocating the interaction term to either coefficients or returns.[23] Thus, we decompose the mean difference in financial literacy into a part that is explained by differences in coefficients evaluated in terms of the endowments of West Germans, including differences in intercepts ("unexplained part"), a part that is caused by differences in observable characteristics ("endowment effect") valued at the rates of return under which West Germans accumulate financial literacy, and an interaction term that accounts for the fact that the differences in endowments and coefficients exist at the same time.[24]

Table 5 displays the results of the decomposition.[25] In the top panel of table 5, the mean predictions by groups and their difference are shown. In the bottom panel of the table, the mean difference in financial literacy is divided into three parts. Neither the endowment effect nor the interaction term significantly account for the gap in any of the three financial

[23] Results remain the same when using a two-fold decomposition.

[24] Standard errors are computed using the delta method (Oaxaca and Ramson, 1998) as implemented in the STATA command *oaxaca* by Jann (2008).

[25] The decomposition is sensitive to the choice of the reference group. Therefore, we display results using East Germans as the reference group in appendix A.7.

literacy measures. Almost the entire gap is attributed to the unexplained part, which subsumes the effect of differences in observable and unobservable predictors.[26]

The same problems as presented in the previous sections might bias the results of the decomposition. In particular, it should be noted that differences in unobservables lead to biased results which are captured in all three decomposition terms (Jones and Kelley, 1984). The presented results do not include financial wealth. However, including financial wealth in the decomposition has no effect on the results of the decomposition. Our thought experiment indicates that convergence in socio-economic characteristics alone might not close the gap in financial literacy as long as characteristics translate differently into financial literacy between the two German regions. However, as mentioned previously, our models do not contain all factors that influence financial literacy as explanatory variables. Thus, we are likely to overestimate the unexplained component of the financial literacy gap as we are not able to measure the true endowment effect. Therefore, in the next section, we discuss several further aspects that are different between East and West Germany and which might play a role in financial literacy acquisition.

Table 5: Decomposition of the financial literacy gap between East and West Germany

dep. var.	3 Questions	Basic financial literacy	Advanced financial literacy
West	0.574	0.434	0.326
	[0.020]***	[0.020]***	[0.019]***
East	0.459	0.314	0.193
	[0.027]***	[0.025]***	[0.021]***
difference	0.115	0.119	0.133
	[0.034]***	[0.032]***	[0.029]***
endowments	-0.001	-0.001	-0.005
	[0.025]	[0.022]	[0.019]
coefficients	0.114	0.121	0.118
("unexplained part")	[0.035]***	[0.035]***	[0.032]***
interaction	0.002	-0.001	0.020
	[0.027]	[0.027]	[0.025]
N	973	973	973

Source: SAVE 2009. Own calculations.
Notes: West Germans are the reference group. Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

[26] This finding is robust to different model specifications.

5. DISCUSSION: HOW THE PUZZLE MIGHT BE SOLVED

Despite the fact that we accounted for many of the variables commonly included in theoretical models and other empirical investigations of financial literacy, much of the East-West gap in financial literacy remains unexplained by differences in these characteristics. Thus, the evidence provided in the previous sections suggests that convergence in economic and demographic characteristics between East and West Germany will not close the gap in financial literacy. In order to solve the puzzle, we have to ask on which levels convergence between the two German regions has to be reached to close the financial literacy gap. There is, for example, evidence that the division of Germany and the two different political and institutional systems has long-term effects on values and attitudes which might in turn influence financial knowledge acquisition and which are not part of our models. In this section we are discussing some potential aspects that might be relevant and should be considered in future theoretical and empirical analyses of financial literacy accumulation.

First, economic transitions affect *savings behaviour*. Fuchs-Schündeln and Schündeln (2005) show that East Germans have different savings motives compared to West Germans. In their paper, the authors argue that precautionary savings are more important to people living in the former GDR. This might in turn require different levels of financial literacy due to the investment in different financial products. An argument along similar lines is put forward by Stix (2012). The author shows that for people in former socialist countries, cash represents an important savings instrument and that cash preferences are driven by a lack of trust in banks. Accumulating large amounts of cash arguably requires lower financial literacy than investing in complex financial products.

A second aspect that might play a crucial role is *trust*. People who experienced an economic transition are found to have low levels of trust. For instance, Gächter and Herrmann (2006) find that there is a lack of trust in institutions among young Russians. Similarly, there are historic reasons why East Germans might have lower levels of trust. The East German regime undermined personal freedom with the help of the State Security Service ("Stasi"). The Stasi monitored the GDR citizens and built a network of civilian informants who were supposed to report politically incorrect behaviour (Rainer and Siedler, 2008). Due to this lack of positive experiences of cooperation, East Germans are still less inclined to see others as fair and are characterised by a high level of social distrust (Heineck and Süssmuth, 2013). Trust can be linked to financial literacy directly and indirectly: A series of papers has related trust and

sociability to financial decisions, in particular stock market participation (Hong et al. 2004, Guiso et al. 2004, Brown et al. 2008, Georgarakos and Pasini 2011). Households with higher levels of trust are more likely to invest in stocks. Accordingly, trust could influence the likelihood to invest in financial literacy. A second channel is that trust promotes social interaction and social interaction is an important determinant of learning (see, e.g. Hellström et al 2013). Thus, trust could have an indirect effect on the accumulation of financial literacy through social interactions.

Consequently, the third important aspect is the *role of peers*. A series of papers has shown that peers play a crucial role for financial decisions (see, e.g. Duflo and Saez 2003, Hong et al., 2004, Brown et al. 2008, Bucher-Koenen and Lusardi 2011, van Rooij et al. 2011a, Hellström et al 2013). Since in East Germany general levels of financial knowledge and experience with the new financial institutions were low at reunification, there were few East German peers from whom to learn. This is particularly relevant since research has shown that friends and family are important sources of financial advice, in particular for those with low levels of financial literacy (see e.g. van Rooij et al. 2011a). Those with high levels of financial literacy are more likely to consult professionals. On the other hand, Fuchs-Schündeln and Haliassos (2014) argue that the higher living standards of West German are related to East German's decisions to participate in stocks and to take up debt in order to keep up with their new, wealthy West German peers.

The fourth and final aspect we would like to discuss is the role of *political attitudes*. Pro-market attitudes might directly influence financial literacy accumulation. Indeed, Bucher-Koenen and Lusardi (2011) as well as Arrondell et al. (2013) find a correlation between financial literacy and political preferences. Such a correlation might be invoked through the following channels: Alesina and Fuchs-Schündeln (2007) as well as Heinemann et al. (2009) find that East Germans are more in favour of state interventions. This perception might lower the incentive to invest in financial literacy if social conditions instead of individual effort are perceived to influence individual well-being. Other evidence in this direction is provided by Kaustia and Torstila (2011) who show that political preferences are related to stock market participation. Left-wing voters are significantly less likely to participate in the stock market compared to right-wing voters. Traditionally, the share of voters for the left-wing parties has been much higher in the former GDR. Thus, differences in political attitudes could explain the East-West gap in financial literacy.

Overall, it might be crucial to extend existing theoretical and empirical models of financial literacy with factors such as *savings motives, trust, peer effects* and *political attitudes* to improve the understanding of financial literacy accumulation and explain persisting differences in financial literacy between East and West Germany.

6. CONCLUSION

Low levels of financial literacy in East Germany might threaten the on-going economic convergence process between the two German regions, a goal that seems politically and socially desirable. In our paper, we show that even 20 years after German reunification, there are fundamental differences in financial knowledge between East and West Germans. These differences can neither be explained by differences in socio-economic characteristics (including income, employment status and financial wealth), by different risk preferences nor by a measure for openness to change. Furthermore, we find that certain groups have mastered to close the gap in financial literacy. For instance, women and those who have migrated from East to West have caught up with their West German peers. On the other hand, a gap in financial literacy between East and West Germany persists across all educational groups, among high-income earners and those who describe themselves as being open to change. In addition, we find different patterns of financial literacy in the two German regions: in East Germany there is no gender gap and only a flat education and income gradient. Moreover, we conduct a thought experiment by assigning West German characteristics to East Germans. We find that most of the financial literacy gap cannot be explained by observable differences in characteristics. Therefore, convergence in those characteristics will most likely not entirely close the gap in financial knowledge.

At the same time the division of Germany has created differences in preferences which are not captured by our empirical models. In particular, there are differences in preferences for state interventions, trust, and savings motives which might nourish differences in financial literacy. Similar feedback effects have been found for other post-communist countries (e.g. Corneo and Grüner, 2002; Stix, 2012) and might help to explain the low levels of financial literacy in countries such as Russia (Klapper and Panos, 2011) or Romania (Beckmann, 2013). We conclude that common factors considered in financial literacy research so far do not seem to be sufficient to explain how convergence can be achieved. It might take a long time until households in former socialist countries have the same levels of financial sophistication

as their peers in Western countries. Research that investigates up to now disregarded aspects like trust, peer effects, political attitudes and saving motives might be able to improve our understanding of financial learning in the general population and contribute to the design of adequate policies to close the gaps in financial literacy in former socialist countries.

An important caveat of our study is that we have no measurement of financial literacy directly after the "shock" in the early 1990's and thus, our hypotheses are based on the assumption that financial literacy was significantly lower in East Germany compared to West Germany at the time of reunification. However, the incentives to invest in financial literacy have also changed for West Germans in recent years. The welfare state underwent major reforms in the last years, which radically changed pension systems, health care systems, and labour markets. Income and longevity risks were shifted from the state to the individuals who nowadays have to privately insure for future financial needs. That requires West Germans to adjust their savings behaviour just as much as East Germans. Since financial literacy is a crucial determinant of retirement preparation, it might be important to improve skills in East and West Germany. In order to target those efforts it is crucial to improve our understanding of the drivers of financial literacy acquisition. Future research in this direction should be pursued.

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APPENDIX

A.1: VARIABLE DEFINITIONS

Variable name	Variable description
3 Questions	Dummy=1 if all answers to the three financial literacy questions are correct.
Basic financial literacy	Dummy=1 if all answers to the basic financial literacy questions are correct.
Advanced financial literacy	Dummy=1 if all answers to the advanced financial literacy questions are correct.
East	Dummy=1 if the respondent lives in East Germany.
female	Dummy=1 if the respondent is female.
age <35	Dummy=1 if age of respondent is 35 years or younger.
age 36-50	Dummy=1 if age of respondent is 36-50 years.
age 51-65	Dummy=1 if age of respondent is 51-65 years.
age 66 +	Dummy=1 if age of respondent is 66 years or older.
living in rural area	Dummy=1 if the respondent lives in a rural area (less than 20,000 inhabitants)
low secondary degree	Dummy=1 if respondent has an elementary school leaving examination.
intermediate secondary degree	Dummy=1 if respondent has an examination of ten years of schooling.
high secondary degree	Dummy=1 if respondent has a high school leaving certificate or comparable certificate.
university degree	Dummy=1 if the respondent has a university degree.
not employed	Dummy=1 if the respondent is not employed but not retired
employed	Dummy=1 if the respondent is employed for wage.
self-employed	Dummy=1 if the respondent is self-employed.
retired	Dummy =1 if the respondent is retired.
log (income)	Logarithm of the average monthly net income of the household.
risk preferences	To what extent do the following statements apply to you? Please answer on a scale from 0 to 10, where 0 means “does not apply at all" and 10 means “applies very well". I do not mind taking risks with respect to financial matters."
risk averse	Dummy=1 if the respondent rates himself between 0 and 3.
risk neutral	Dummy=1 if the respondent rates himself between 4 and 6.
risk loving	Dummy=1 if the respondent rates himself between 7 and 10.
open to change	To what extent do the following statements apply to you? Please answer on a scale from 0 to 10, where 0 means “does not apply at all" and 10 means “applies very well". I am open for change." Dummy=1 if the respondent rates himself between 7 and 10.
log(financial wealth)	Logarithm of the sum of deposits held in savings accounts, building savings contracts, bonds, stocks, stock mutual and real estate funds, life insurance contracts, private and employer-based pension wealth as well as other financial assets.

A.2: DESCRIPTIVE STATISTICS – WEST AND EAST GERMAN SAMPLE

	All	West	East	West vs. East
living in East Germany	0.361	-	-	-
	[0.480]			
female	0.524	0.488	0.588	***
	[0.500]	[0.500]	[0.493]	
age	52.104	51.459	53.247	
	[16.639]	[17.068]	[15.808]	
rural	0.161	0.148	0.184	
	[0.368]	[0.355]	[0.388]	
living with partner	0.629	0.648	0.597	
	[0.483]	[0.478]	[0.491]	
low secondary degree	0.379	0.433	0.283	***
	[0.485]	[0.496]	[0.451]	
intermediate secondary degree	0.356	0.302	0.452	****
	[0.479]	[0.460]	[0.498]	
high secondary degree	0.264	0.264	0.265	
	[0.441]	[0.441]	[0.442]	
university degree	0.154	0.124	0.207	***
	[0.361]	[0.329]	[0.406]	
educated in GDR	0.30	0.10	0.66	***
	[0.459]	[0.294]	[0.473]	
not employed	0.186	0.165	0.222	**
	[0.389]	[0.371]	[0.416]	
employed	0.446	0.476	0.392	**
	[0.497]	[0.500]	[0.489]	
self-employed	0.044	0.039	0.054	
	[0.206]	[0.193]	[0.227]	
retired	0.324	0.321	0.331	
	[0.468]	[0.467]	[0.471]	
household income (€/month)	2167.694	2428.786	1704.765	***
	[1497.699]	[1626.154]	[1095.913]	
financial wealth (€)	35148.880	41672.700	23581.820	***
	[78600.210]	[84316.490]	[65821.960]	
risk averse	0.732	0.712	0.767	**
	[0.443]	[0.453]	[0.424]	
risk neutral	0.184	0.190	0.174	
	[0.388]	[0.393]	[0.380]	
risk seeking	0.084	0.097	0.060	**
	[0.277]	[0.297]	[0.237]	
open to change	0.557	0.550	0.569	
	[0.497]	[0.498]	[0.496]	
N	973	620	353	-

Source: SAVE 2009. Own calculations. **Notes:** Standard deviation in brackets. Stars indicate significant differences between West and East. * p<0.1; ** p<0.05; *** p<0.01.

A.3: MEASURES OF FINANCIAL LITERACY IN SAVE 2009

Basic Literacy

1. Understanding of Interest Rate (Interest) *

   "Suppose you had 100€ in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than 102€, exactly 102€, less than 102€?" do not know / refuse to answer

2. Understanding of Inflation (Inflation) *

   "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. 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?" do not know / refuse to answer

3. Understanding of Compound Interest (Compound Interest)

   "Suppose you had €100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total: more than €200, exactly €200, less than €200?" do not know / refuse to answer

4. Understanding of Money Illusion (Money Illusion)

   "Suppose that in the year 2012, your income has doubled and prices of all goods have doubled too. In 2012, how much will you be able to buy with your income: more than today, the same, less than today?" do not know / refuse to answer

Advanced Literacy

1. Understanding of Risk and Diversification (Risk) *

   "Do you think that the following statement is true or false? Buying a single company stock usually provides a safer return than a stock mutual fund." do not know/ refuse to answer

2. Understanding Average Asset Fluctuations (Return Volatility)

   "Normally, which asset displays the highest fluctuations over time: Savings accounts, bonds, stocks?" Do not know / refuse to answer

3. Understanding of the Main Function of the Stock Market (Stock Market)

"Which of the following statements describes the main function of the stock market?" The stock market helps to predict stock earnings. / The stock market results in an increase in the price of stocks. / The stock market brings people who want to buy stocks together with those who want to sell stocks. / None of the above. / Do not know / refuse to answer

4. Understanding of Mutual Funds (Mutual Funds)

   "Which of the following statements is correct?" Once one invests in a mutual fund, one cannot withdraw the money in the first year. / Mutual funds can invest in several assets, for example invest in both stocks and bonds. / Mutual funds pay a guaranteed rate of return which depends on their past performance. / None of the above. / Do not know / refuse to answer

* Questions marked with an asterisk are also combined into the general financial literacy measure.

A.4: ANSWERING BEHAVIOUR FOR FINANCIAL LITERACY QUESTIONS (DETAILS)

Question	Interest			Inflation			Risk			Compund interest		
	All	West	East	All	West	East	All	West	East	All	West	East
incorrect	7%	7%	7%	5%	4%	5%	6%	6%	5%	24%	25%	23%
correct	79%	82%	76%	75%	79%	70%	59%	63%	52%	61%	62%	58%
dk/refuse	11%	9%	15%	17%	14%	22%	33%	28%	41%	13%	10%	17%
missing	3%	3%	3%	3%	3%	3%	2%	3%	2%	2%	3%	2%
N	1,076	690	386	1,076	690	386	1,076	690	386	1,076	690	386

Question	Money illusion			Return volatility			Stock market			Mutual funds		
	All	West	East	All	West	East	All	West	East	All	West	East
incorrect	81%	82%	78%	10%	11%	9%	17%	16%	20%	8%	8%	7%
correct	4%	4%	3%	66%	69%	62%	47%	52%	38%	40%	44%	32%
dk/refuse	13%	11%	16%	20%	17%	25%	32%	29%	39%	49%	44%	58%
missing	3%	3%	3%	3%	3%	4%	3%	3%	4%	4%	5%	3%
N	1,076	690	386	1,076	690	386	1,076	690	386	1,076	690	386

Source: SAVE 2009. Own calculations.

A.5: DETERMINANTS OF FINANCIAL LITERACY – FULL RESULTS AFTER OLS REGRESSIONS

dep. var.	3 Questions				
East	-0.115	-0.147	-0.114	-0.116	-0.100
	[0.033]***	[0.032]***	[0.033]***	[0.033]***	[0.032]***
female		-0.111	-0.115	-0.116	-0.113
		[0.030]***	[0.030]***	[0.030]***	[0.030]***
age <35		ref.	ref.	ref.	ref.
age 36-50		0.108	0.060	0.060	0.049
		[0.050]**	[0.051]	[0.052]	[0.051]
age 51-65		0.062	0.015	0.015	-0.008
		[0.051]	[0.054]	[0.055]	[0.054]
age 66 +		0.015	-0.046	-0.045	-0.093
		[0.051]	[0.074]	[0.074]	[0.073]
living in rural area		-0.015	-0.020	-0.021	-0.027
		[0.041]	[0.041]	[0.041]	[0.041]
low sec. degree		ref.	ref.	ref.	ref.
intermediate sec. degree		0.235	0.218	0.217	0.200
		[0.037]***	[0.037]***	[0.037]***	[0.037]***
high sec. degree		0.377	0.362	0.362	0.320
		[0.047]***	[0.048]***	[0.048]***	[0.048]***
university degree		0.064	0.043	0.043	0.033
		[0.051]	[0.051]	[0.051]	[0.050]
not employed			ref.	ref.	ref.
employed			0.067	0.068	0.034
			[0.046]	[0.046]	[0.045]
self-employed			-0.016	-0.016	-0.067
			[0.083]	[0.084]	[0.083]
retired			0.072	0.072	0.044
			[0.063]	[0.063]	[0.062]
log(income)			0.064	0.063	0.025
			[0.021]***	[0.021]***	[0.022]
risk averse				0.010	0.006
				[0.040]	[0.039]
risk neutral				ref.	ref.
risk loving				-0.028	-0.041
				[0.063]	[0.062]
open to change				0.015	0.015
				[0.030]	[0.029]
log(financial wealth)					0.024
					[0.004]***
constant	0.574	0.403	-0.083	-0.088	0.079
	[0.020]***	[0.052]***	[0.152]	[0.158]	[0.157]
R2	0.01	0.15	0.16	0.16	0.20
N	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.5b: DETERMINANTS OF FINANCIAL LITERACY – FULL RESULTS AFTER OLS REGRESSIONS

dep. var.	Basic financial literacy				
East	-0.119	-0.156	-0.125	-0.122	-0.108
	[0.032]***	[0.032]***	[0.033]***	[0.033]***	[0.033]***
female		-0.050	-0.057	-0.059	-0.056
		[0.031]	[0.031]*	[0.031]*	[0.030]*
age <35		ref.	ref.	ref.	ref.
age 36-50		0.000	-0.036	-0.043	-0.052
		[0.051]	[0.052]	[0.052]	[0.052]
age 51-65		-0.001	-0.017	-0.026	-0.047
		[0.052]	[0.055]	[0.055]	[0.055]
age 66 +		0.028	0.049	0.036	-0.006
		[0.052]	[0.075]	[0.075]	[0.075]
living in rural area		-0.013	-0.012	-0.010	-0.015
		[0.042]	[0.042]	[0.042]	[0.041]
low sec. degree		ref.	ref.	ref.	ref.
intermediate sec. degree		0.206	0.191	0.192	0.176
		[0.038]***	[0.038]***	[0.038]***	[0.037]***
high sec. degree		0.213	0.197	0.197	0.159
		[0.048]***	[0.049]***	[0.049]***	[0.049]***
university degree		0.135	0.117	0.116	0.107
		[0.051]***	[0.051]**	[0.051]**	[0.051]**
not employed			ref.	ref.	ref.
employed			-0.019	-0.023	-0.053
			[0.046]	[0.046]	[0.046]
self-employed			-0.125	-0.124	-0.168
			[0.085]	[0.085]	[0.084]**
retired			-0.071	-0.070	-0.094
			[0.064]	[0.064]	[0.063]
log(income)			0.076	0.079	0.045
			[0.021]***	[0.021]***	[0.022]**
risk averse				0.050	0.046
				[0.041]	[0.040]
risk neutral				ref.	ref.
risk loving				0.105	0.094
				[0.064]*	[0.063]
open to change				-0.002	-0.002
				[0.030]	[0.030]
log(financial wealth)					0.021
					[0.004]***
constant	0.434	0.317	-0.196	-0.255	-0.108
	[0.019]***	[0.053]***	[0.154]	[0.160]	[0.160]
R2	0.01	0.08	0.10	0.10	0.13
N	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.5c: DETERMINANTS OF FINANCIAL LITERACY – FULL RESULTS AFTER OLS REGRESSIONS

dep. var.	Advanced financial literacy				
East	-0.133	-0.151	-0.125	-0.123	-0.108
	[0.030]***	[0.029]***	[0.030]***	[0.030]***	[0.030]***
female		-0.106	-0.110	-0.106	-0.103
		[0.028]***	[0.028]***	[0.028]***	[0.027]***
age <35		ref.	ref.	ref.	ref.
age 36-50		0.098	0.062	0.066	0.057
		[0.046]**	[0.047]	[0.047]	[0.046]
age 51-65		0.095	0.068	0.077	0.056
		[0.047]**	[0.050]	[0.050]	[0.049]
age 66 +		-0.001	-0.003	0.005	-0.038
		[0.047]	[0.068]	[0.068]	[0.067]
living in rural area		-0.031	-0.030	-0.030	-0.035
		[0.038]	[0.038]	[0.038]	[0.037]
low sec. degree		ref.	ref.	ref.	ref.
intermediate sec. degree		0.144	0.130	0.133	0.117
		[0.034]***	[0.034]***	[0.034]***	[0.034]***
high sec. degree		0.271	0.249	0.248	0.210
		[0.043]***	[0.044]***	[0.044]***	[0.044]***
university degree		0.025	0.007	0.008	-0.001
		[0.046]	[0.046]	[0.046]	[0.046]
not employed			ref.	ref.	ref.
employed			0.002	0.001	-0.030
			[0.042]	[0.042]	[0.041]
self-employed			0.029	0.026	-0.018
			[0.076]	[0.077]	[0.076]
retired			-0.023	-0.023	-0.048
			[0.057]	[0.057]	[0.057]
log(income)			0.063	0.062	0.028
			[0.019]***	[0.019]***	[0.020]
risk averse				-0.061	-0.064
				[0.037]*	[0.036]*
risk neutral				ref.	ref.
risk loving				-0.010	-0.021
				[0.057]	[0.056]
open to change				-0.025	-0.025
				[0.027]	[0.027]
log(financial wealth)					0.021
					[0.004]***
constant	0.326	0.214	-0.224	-0.171	-0.023
	[0.018]***	[0.048]***	[0.139]	[0.144]	[0.144]
R2	0.02	0.12	0.13	0.13	0.16
N	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.6: IV APPROACH

As explained in 4.3, we might run into trouble when including financial wealth as an explanatory variable. Therefore, we propose two instruments for financial wealth arguing that the household composition, i.e. whether the respondent is living with a partner, as well as a dummy indicating if the respondent has received one-time income in the previous year fulfil both exclusion restrictions.[27] The instruments must satisfy two requirements: They must be correlated with the endogenous explanatory variable (financial wealth), and they must be uncorrelated with the error term. For household composition, the first assumption requires that respondents living with a partner should be able to accumulate more financial wealth due to economies of scale in wealth accumulation. The second crucial assumption is that the living with a partner is not correlated with the level of financial literacy of the respondent. It can be argued that if the respondent is the household head, he has to manage more assets the more people live in the household and therefore requires more financial knowledge. However, in this line of argument, the pathway to more financial expertise is again wealth and that is what we want to control for. We expect a positive relationship between living with a partner and financial wealth. The rationale for one-time income gains is that part of the additional income from the previous year was not consumed immediately but translated into financial wealth. Thus, we again expect a positive relationship between one-time income and financial wealth. 11% of the West and 6% of the East German sample have experienced a one-time income gain over 500 € in 2008 – the year previous to the survey. These income gains should not be correlated with financial literacy as they are considered as an income shock, which could only be partially (if at all) anticipated by the respondent.

We use a Two Stage Least Squares estimator. The results of the first stage are reported below (appendix A.6a).[28] They confirm that both, the household composition and having experienced a one-time income gain are significantly and positively correlated with (the logarithm of) financial wealth. IV estimates can have large standard errors, especially if the instruments and the endogenous variable are only weakly correlated. In that case, the IV estimator can even have a large asymptotic bias (Wooldridge, 2002). We use the first stage

[27] As one-time income gains we consider income from an inheritance, gifts, lottery winnings, as well as other gains. For each category only income gains above a threshold of 500€ are reported.

[28] As we use the same instruments irrespective whether we want to explain the three-question task, basic financial literacy or advanced financial literacy the first stage is only reported once.

F-statistic for detecting weak instruments. Generally, an F statistic over 10 is required to suggest instruments are sufficiently strong. Our F statistic is above this threshold (21.9). Moreover, as we have two instruments for financial wealth we can test the overidentifying restrictions. The test assumes that one instrument is valid and then tests for the validity of all other instruments (i.e. whether the instruments are uncorrelated with the error term in the second stage). Based on our test statistics we do not reject the Nullhypothesis. For each of the three financial literacy measures appendix A.6b displays the OLS and the IV results next to it. In comparison to the OLS results, we find that the effect of financial wealth becomes insignificant. The East-West gap remains almost unchanged.

A.6a: FIRST STAGE REGRESSION RESULTS

dep. var. log(financial wealth)	
female	-0.093
	[0.237]
age < 35	ref.
age 36-50	0.201
	[0.406]
age 51-65	0.529
	[0.430]
age 66 +	1.742
	[0.584]***
living in rural area	0.186
	[0.326]
low secondary degree	ref.
intermediate secondary degree	0.420
	[0.288]
high secondary degree	1.598
	[0.378]***
university degree	0.294
	[0.395]
not employed	ref.
employed	1.594
	[0.361]***
self-employed	2.035
	[0.661]***
retired	1.289
	[0.495]***
log(income)	1.234
	[0.181]***
risk averse	0.098
	[0.315]
risk neutral	ref.
risk loving	0.417
	[0.493]
open to change	-0.080
	[0.236]
one-time income gain	1.810
	[0.408]***
living with partner	1.340
	[0.285]***
constant	-5.076
	[1.285]***
R2	0.26
N	973

Source: SAVE 2009. Own calculations.

Notes: Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.6b: DETERMINANTS OF FINANCIAL LITERACY – RESULTS AFTER OLS AND 2SLS REGRESSIONS

dep. var.	3 Questions		Basic financial literacy		Advanced financial literacy	
	OLS	IV	OLS	IV	OLS	IV
east	-0.100	-0.113	-0.108	-0.098	-0.108	-0.111
	[0.032]***	[0.035]**	[0.033]***	[0.035]**	[0.030]***	[0.032]***
female	-0.113	-0.115	-0.056	-0.054	-0.103	-0.103
	[0.030]***	[0.030]***	[0.030]*	[0.030]	[0.027]***	[0.027]***
age <35	ref.		ref.		ref.	
age 36-50	0.049	0.058	-0.052	-0.058	0.057	0.059
	[0.051]	[0.052]	[0.052]	[0.052]	[0.046]	[0.047]
age 51-65	-0.008	0.010	-0.047	-0.060	0.056	0.061
	[0.054]	[0.057]	[0.055]	[0.058]	[0.049]	[0.051]
age 66 +	-0.093	-0.056	-0.006	-0.035	-0.038	-0.029
	[0.073]	[0.082]	[0.075]	[0.084]	[0.067]	[0.075]
living in rural area	-0.027	-0.022	-0.015	-0.019	-0.035	-0.034
	[0.041]	[0.041]	[0.041]	[0.042]	[0.037]	[0.037]
low secondary degree	ref.		ref.		ref.	
intermediate sec. degree	0.200	0.214	0.176	0.166	0.117	0.121
	[0.037]***	[0.039]***	[0.037]***	[0.040]***	[0.034]***	[0.035]***
high secondary degree	0.320	0.353	0.159	0.134	0.210	0.218
	[0.048]***	[0.058]***	[0.049]***	[0.059]*	[0.044]***	[0.053]***
university degree	0.033	0.041	0.107	0.101	-0.001	0.101
	[0.050]	[0.051]	[0.051]**	[0.051]*	[0.046]	[0.051]*
not employed	ref.		ref.		ref.	
employed	0.034	0.061	-0.053	-0.074	-0.030	-0.023
	[0.045]	[0.053]	[0.046]	[0.053]	[0.041]	[0.048]
self-employed	-0.067	-0.027	-0.168	-0.199	-0.018	-0.009
	[0.083]	[0.092]	[0.084]**	[0.093]*	[0.076]	[0.083]
retired	0.044	0.066	-0.094	-0.111	-0.048	-0.043
	[0.062]	[0.065]	[0.063]	[0.066]	[0.057]	[0.059]
log(income)	0.025	0.055	0.045	0.022	0.028	0.035
	[0.022]	[0.037]	[0.022]**	[0.037]	[0.020]	[0.033]
risk averse	0.006	0.009	0.046	0.044	-0.064	-0.063
	[0.039]	[0.040]	[0.040]	[0.040]	[0.036]*	[0.036]
risk neutral	ref.		ref.		ref.	
risk loving	-0.041	-0.031	0.094	0.087	-0.021	-0.019
	[0.062]	[0.063]	[0.063]	[0.063]	[0.056]	[0.057]
open to change	0.015	-0.015	-0.002	0.002	-0.025	-0.025
	[0.029]	[0.029]	[0.030]	[0.030]	[0.027]	[0.027]
log(financial wealth)	0.024	0.005	0.021	0.036	0.021	0.017
	[0.004]***	[0.019]	[0.004]***	[0.019]	[0.004]***	[0.017]
constant	0.079	-0.052	-0.108	-0.008	-0.023	-0.054
	[0.157]	[0.203]	[0.160]	[0.206]	[0.144]	[0.184]
	0.20	0.16	0.13	0.11	0.16	0.17
N	973	973	973	973	973	973

Source: SAVE 2009. Own calculations. **Notes:** Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.

A.7: DECOMPOSITION OF THE FINANCIAL LITERACY GAP

dep. var.	3 Questions	Basic financial literacy	Advanced financial literacy
East	0.458	0.314	0.192
	[0.026]***	[0.025]***	[0.021]***
West	0.574	0.434	0.326
	[0.020]***	[0.020]***	[0.019]***
difference	-0.116	-0.120	-0.134
	[0.033]***	[0.032]***	[0.028]***
endowments	-0.001	-0.005	-0.024
	[0.020]	[0.020]	[0.020]
coefficients	-0.118	-0.122	-0.138
	[0.038]***	[0.038]***	[0.032]***
interaction	0.004	0.007	0.028
	[0.028]	[0.029]	[0.027]
N	973	973	973

Source: SAVE 2009. Own calculations.

Notes: East Germans are the reference group. Standard errors in brackets. * p<0.1; ** p<0.05; *** p<0.01.