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FINANCIAL LITERACY, HOUSEHOLD INVESTMENT AND HOUSEHOLD DEBT: EVIDENCE FROM SWITZERLAND

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Financial Literacy, Household Investment and Household Debt: Evidence from Switzerland

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Abstract

We use a novel, representative survey to document the level of financial literacy among Swiss households and to examine how financial literacy is related to household investment and borrowing. We find that half of the respondents were able to answer three questions on basic financial concepts (compound interest, inflation and risk diversification) correctly. Financial literacy is lower among low-income and immigrant households as well as among women. Young households seem to be less familiar with the concept of inflation, while retirees are less familiar with the concepts of compound interest and risk diversification. We find that financial literacy is strongly correlated with financial market participation, voluntary retirement saving and mortgage borrowing.

Keywords: Financial literacy, Retirement planning, Financial market participation, Mortgage borrowing, Consumer loans.

JEL Classification: D14, D80, D91, G11, G13, H55, I21

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1. Introduction

Since the onset of the financial crisis financial literacy has come to the forefront of policy agendas aimed at enhancing financial sector stability. Heavy losses by retail investors during the crisis have led to renewed policies to protect these investors from making ill-informed financial decisions. Limited financial literacy is further viewed as one driver of delinquencies in the US (subprime) mortgage market (Gerardi et al., 2010). Even before the recent turmoil in asset and mortgage markets, policy makers in the United States and the European Union have shown a heightened interest in the relation between financial literacy, household investment and household debt. Individual responsibility for retirement planning and soaring levels of consumer debt have raised the question of whether households have sufficient financial knowledge to make adequate intertemporal consumption decisions and to manage their investments.

Mirroring the developments in the US and the EU, household finance in Switzerland is characterized by an increased individual responsibility for retirement planning, increased exposure of retail investors to complex assets, exposure of mortgage borrowers to interest rate and house price risk, as well as rising levels of consumer debt.[1] These developments are met by government policies to enhance the protection of retail investors[2] and borrowers.[3] In addition, several initiatives have been undertaken to promote financial literacy in Switzerland, especially among the youth.[4] Surprisingly though, no survey so far has documented the level of financial literacy in Switzerland with internationally comparable indicators for a representative sample of the population, and has documented how financial literacy is related

[1] Private indebtedness is especially considered a concern among the younger population in Switzerland. 38% of adult respondents between 18-24 years reported in an online survey to have outstanding monetary liabilities. (Streuli, 2007).

[2] In a report released in 2010 and a subsequent position paper published in 2012, the Swiss Financial Market Supervisory Authority (FINMA) announced new guidelines regarding information provisions and business conduct applicable to financial institutions. Those new guidelines intend to strengthen retail investor protection what is also the aim of currently ongoing revisions of the Federal Act on Collective Investment Schemes (KAG), which mirrors the revision of the MiFiD regulation in the European Union. (http://www.efd.admin.ch/dokumentation/gesetzgebung/00571/02278/index.html?lang=de)

[3] In 2001, Switzerland introduced a consumer credit law to protect households from overindebtedness through interest rate caps and mandatory information exchange between credit institutions. For details see http://www.admin.ch/ch/d/sr/22.html#221.214

[4] See Graf (2012) for an overview of financial literacy initiatives in Switzerland.

to the investment and borrowing behavior of households.[5] This paper takes a first step at filling that gap.

We examine whether households in Switzerland are equipped with the necessary financial knowledge to make well-informed investment and borrowing decisions. In a first step we provide an overview of financial literacy in Switzerland and how it is related to the socioeconomic characteristics of households. Following Lusardi and Mitchell (2011b) we measure financial literacy using questions that capture knowledge about three basic financial concepts: Compound interest, inflation and risk diversification. By employing these standard questions we can compare the level and socioeconomic determinants of financial literacy in Switzerland to that in other OECD countries. In a second step we relate financial literacy to household investment and household debt. Specifically, we examine whether households with higher financial literacy are more likely to have an investment related custody account, a voluntary retirement savings account, a mortgage loan, and a consumer loan.

We find that the level of financial literacy in Switzerland is comparable to that reported by Bucher and Lusardi (2011) for Germany and Alessie et al. (2011) for the Netherlands. Each individual financial literacy question was answered correctly by more than 70% of respondents, with half of the respondents answering all three questions correctly. We find a substantial income-gap, education-gap, nationality-gap and gender-gap in financial literacy: female respondents, respondents with low education, foreign nationals as well as respondents with low income and wealth have significantly lower levels of financial literacy. We further find a hump-shaped relationship between age and financial literacy which seems to be driven by two countervailing effects: Knowledge about inflation is positively correlated with age,

[5] Staeheli and Zobl (2008) examine financial literacy among predominantly young and well educated respondents, and do not use the "standardized" financial literacy questions employed in our survey. Birchler et al. (2011) examine a representative survey of stock-market participation of Swiss households. They relate stock market participation to self-assessed measures of financial literacy, and do not employ the "standardized" financial literacy questions employed in our survey.

while knowledge about compound interest and risk diversification is negatively correlated with age.

Financial literacy is positively related to investment behavior. Individuals who answer all three financial literacy questions correctly are more likely to have an investment related custody account and a voluntary retirement savings account. Financial literacy also relates positively to the incidence of a mortgage while we find no such relationship for consumer debt. Our results, suggest that the relation between financial literacy and investment behavior is at least partly driven by reverse causality. This does not seem to be the case for the relation between financial literacy and mortgage borrowing.

Our findings add to the growing literature that measures the extent of financial literacy around the world and examines which segments of the population are most/least financial literate. Our results confirm the findings of Alessie et al. (2011) for the Netherlands, Almenberg and Säve-Söderbergh (2011) for Sweden, Bucher and Lusardi (2011) for Germany and Sekita (2011) for Japan. All these studies document a significant income-gap and gender-gap in financial literacy. We further confirm the humped-shaped relationship between financial literacy and age documented by Crossan et al. (2011) for New Zealand, Fornero and Monticone (2011) for Italy, Klapper and Panos (2011) for Russia and Lusardi and Mitchell (2011a) for the US.

Our analysis contributes to the recent evidence on the relation between financial literacy and household finance. We confirm the positive relationship between financial literacy and retirement planning documented by Bucher and Lusardi (2011), Almenberg and Säve-Söderbergh (2011) and Sekita (2011). We also confirm that financial literate households are more likely to participate in financial markets as shown by Van Rooij et al. (2011) for the Netherlands and Yoong (2010) for the United States. We confirm the results of Fornero and Monticone (2011) who find that households with a mortgage display a higher level financial

literacy. Contrary to the findings of Lusardi and Tufano (2009), McCarthy (2011) and Gathergood (2012) we do not find that financially literate households are less likely to have consumer debt. However, this result is likely driven by the undersampling of consumer borrowers, i.e. households with an immigration background, in our survey. In line with McCarthy (2011) and Gathergood (2012) as well as with the evidence of Meier and Sprenger (2010) we do find that the incidence of consumer debt is related to present-biased preferences.

2. Data

Our analysis is based on survey-data which covers 1'500 individuals aged 20-74 years from the German speaking part of Switzerland. The data was elicited by GfK Switzerland in April 2011 on behalf of the University of St. Gallen. The survey was implemented with telephone interviews which lasted, on average, 15 minutes. Respondents were not remunerated for their participation in the survey, but were told that their responses would only be used for research purposes.

The survey is representative of the underlying population in terms of age, gender and geographic location. Self-employed respondents were screened out as the aim of the survey was to gather information on financial behavior of employed households only. Respondents with insufficient knowledge of the German-language were screened out by the survey administrators. As a result the survey is not representative of the underlying population in terms of nationality and income: The survey undersamples the non-German speaking immigrant population and by doing so undersamples the low-income population and oversamples the home-owning population.

A. Financial Literacy

The survey questionnaire includes three questions on financial literacy which were first developed for the 2004 American Health and Retirement Survey (see Lusardi and Mitchell, 2011b). The exact wording of the questions is as follows:[6]

1. *Compound interest*

   Suppose you have CHF 100 in a savings account, the interest rate is 2% per year and there are no account management fees. After 5 years, how much do you think you would have in the account if you left the money on the account: a) more than CHF 102, b) exactly CHF 102, c) less than CHF 102, or d) Don't know/ no answer.

2. *Inflation*

   Imagine that the interest rate on your savings account is 1% per year and inflation is 2% per year. After 1 year, would you be able to buy a) more than, b) exactly the same as, c) less than today with the money in this account?, or d) Don't know/ no answer.

3. *Diversification of risk*

   Which of the following investments do you consider to be less risky? a) an investment in stocks of a single company, b) an investment in a mutual fund, or c) Don't know/ no answer.

Table 1 here

Table 1 displays the answers to the financial literacy questions. The question about compound interest was answered correctly by 79% of survey respondents, while the question on inflation was answered correctly by 78% of respondents. For the interest and inflation

[6] The questions have been translated from English to German as the survey was conducted in German only.

questions the share of incorrect answers (18% and 17% respectively) was substantially higher than the share of non-responses (3% and 4% respectively). Correct answers to the question on risk diversification were slightly lower at 73%. This question displays a higher share of non-responses (13%) compared to the first two questions, but similar levels of incorrect answers.

Exactly 50% of the respondents in our sample answered all three financial literacy questions correctly, while only 3% were unable to answer any of the three questions correctly. The share of the respondents which could answer all three questions is in the range of the values recently document by Bucher and Lusardi (2011) for Germany (53%) or by Alessie et al. (2011) for the Netherlands (45%). This is surprising given that our survey was implemented through telephone interviews in contrast to the survey for Germany (paper and pen) or the Netherlands (internet). Previous telephone based surveys in OECD countries have been characterized by substantially lower shares of respondents which answer all questions correctly, e.g. 30% as documented for the United States by Lusardi and Mitchell (2011a).

B. Socio-economic characteristics and behavioral traits

In the first step of our analysis we relate financial literacy to an array of socioeconomic characteristics as well as behavioral traits of respondents, which were also elicited within the survey. The appendix provides definitions of all variables included in the analysis. In terms of demographics we control for *Gender, Age, Nationality* and *Marital status* of the respondent as well as *Household size*. In terms of economic characteristics we include indicators of *Education* and *Labor market status* of the respondent as well as the level of household *Income* and *Financial wealth*.

Following up on the studies by Gatherwood (2012) and McCarthy (2011) we elicit self-assessed measures of behavioral traits which may affect the investment and borrowing behavior of households, and which also may be correlated with financial literacy. The variable

Risk averse is a dummy variable which takes the value one for households who report a low willingness to take risk in their financial investments as indicated by a self-assessment of 1 or 2 on a scale of 1 (no risk) to 6 (high risk). The variable *Myopic* is a dummy variable which takes the value one if the household fully or partially agrees to the statement "I live for the present and don't think about my financial future". The variable *Impulsive* is a dummy variable which is one if the household fully or partially agrees to the statement "I am impulsive and tend to buy things that I cannot afford".

C. Household investment and debt

In the second step of our analysis we relate financial behavior of the households to financial literacy, controlling for socioeconomic characteristics and behavioral traits of the households. We employ four indicators of household investment and borrowing which are again elicited from the survey. The variable *Investment account* captures financial market participation and is a dummy variable which takes the value one for households which report having a custody account with a bank for financial market investment purposes. The variable *Retirement account* captures retirement planning and is a dummy variable which takes the value one for households which report having a tax-exempted retirement savings account under the third pillar of the Swiss pension system. The variables *Mortgage* and *Consumer loan* capture the incidence of secured and unsecured household borrowing, i.e. they are dummy variables which take the value one for households which report that they have either type of loan.

Our data shows a relatively high level of financial market participation and voluntary retirement planning: 36% of the respondents have an investment account, while 41% have a retirement account. By comparison, evidence from the 2007 US Consumer Finance Survey suggests that 18% of US households invest in stocks, 16% in mutual funds and 35% have a

retirement savings account (see Bucks et al. 2009). Our data also documents a similar level of mortgage borrowing compared to US or EU households, but a much lower level of consumer debt. In our sample 46% of households report having a mortgage, compared to 45% in the US, 40% in the UK or 43% in the Netherlands (see Crook, 2006). This incidence of mortgage borrowing confirms that we are oversampling home-owners in our survey, as in Switzerland only 40% of households own their own home.[7] By contrast only 5% of our respondents report having a consumer loan compared to 49% in the US, 34% in the UK and 26% in the Netherlands. The very low incidence of consumer loans in our sample confirms that we are undersampling the low-income population with an immigration background due to the screening out of respondents with limited German language skills.[8]

3. Household characteristics and financial literacy

In this section we examine the correlation between socioeconomic characteristics of respondents and their financial literacy. Table 2 presents univariate comparisons, while Table 3 presents our multivariate analysis. The dependent variables analyzed in Table 3 are dummy variables. The table reports marginal effects based on probit estimates. All regressions include fixed-effects for the region (canton) in which the household is located.

Table 2 here

Table 3 here

[7] http://drs.srf.ch/www/de/drs/nachrichten/schweiz/334700.quote-der-eigenheimbesitzer-auf-rekordniveau.html

[8] In addition, Swiss households may be particularly reluctant to report the incidence of consumer loans, as borrowing for consumption purposes is frowned upon in the Swiss society. Karlan and Zinman (2008) report that US households strongly underreport their use of consumer loans in surveys. Aggregate data from the Swiss consumer credit bureau suggests that consumer borrowing is much higher in Switzerland than the 5% reported in our survey. The bureau reports that at the end of 2011 454'576 consumer loans and 497'011 leasing contracts were outstanding compared to an adult population of 6.4 million inhabitants.

The results in Table 2 and 3 show a significant *Gender* gap in financial literacy with men outperforming women on all three questions. We find that 62% of men answered all three questions correctly compared to only 39% of women. The multivariate regression analysis suggests that women are 19 percentage points less likely to know all three questions compared to men. In line with previous evidence (Lusardi and Mitchell, 2011a) we find that the gender-gap in financial literacy is not only driven by a higher frequency of incorrect answers. The share of women who "don't know or refuse" to answer at least one question (22%) is almost double that of men (12%).

Our univariate comparisons show a strong hump-shaped relationship between age and financial literacy. Respondents between 41-50 years have the highest level of financial literacy, with 59% answering all questions correct. By contrast, in the age group 20-30 years (61-74 years) only 45% (41%) of respondents answer all questions correctly. The multivariate estimates in Table 3 confirm the humped shaped relationship between financial literacy and age. A closer look at the three financial literacy questions reveals that the humped shaped relation between financial literacy and age is actually driven by two countervailing relationships: Age is positively associated with knowledge about inflation, while it is negatively associated with knowledge about risk diversification. The youngest age group (20-30 years) displays a similar share of correct answers to the compound interest and risk-diversification questions as middle-age respondents, but they are least likely to answer the inflation question correctly (64%). By contrast the oldest age group (61-74 years) displays similar shares of correct answers to the inflation question (84%) as middle-age respondents, but is least likely to answer the risk and interest questions correctly (61%, resp. 73%).

We find a strong nationality-gap and language-gap in financial literacy. Only 34% of foreign citizens answered all three questions correctly while 28% did not know or refused to

answer at least one question. By comparison, 52% of Swiss citizens answered all questions correctly and only 16% did not answer all questions. One obvious reason for the difference between Swiss and foreign citizens lies in German language skills. While households with insufficient language knowledge were screened out of our telephone survey, language skills may still vary substantially across the sample. Table 2 shows that those respondents who do not speak German as their mother tongue are much less likely to answer all financial literacy questions correctly. Our multivariate analysis in Table 3 shows that controlling for language skills[9] foreign citizens still have substantially lower levels of financial literacy than Swiss citizens: They are 17 percentage points less likely to answer all three questions correctly.

Financial literacy increases with *Education*: Only 27% of respondents in possession of a primary or secondary school certificate as their highest degree answer all questions correctly compared to 69% of respondents with a university degree. These results mirror the findings for the Netherlands by Alessie et al. (2011). Financial literacy is strongly increasing in *Income* and *Financial wealth*. Only 39% (43%) of respondents in the lowest income (wealth) bracket were able to answer all three questions correctly compared to 72% (69%) of respondents in the highest bracket.[10] The estimates reported in Table 3 show that the economic magnitude of the relations between income, wealth and financial literacy are robust to controlling for other socioeconomic characteristics.

[9] A substantial share of immigrants to Switzerland is from neighboring Germany and Austria where German is the national language. This, together with within-country migration from French and Italian speaking areas of Switzerland to German speaking areas allows us to disentangle nationality from language skills.

[10] Both differences are statistically significant at a 1% confidence level in univariate statistics (t-value of 8.14 resp. 5.57).

4. Financial Literacy, Investment and Debt

In this section we relate household investment and borrowing to financial literacy, controlling for socioeconomic characteristics of respondents, their behavioral traits. We further control for the geographic distance of households to the nearest bank branches. Table 4 reports univariate comparisons and Table 5 multivariate regressions. Our indicators of household investment (*Investment account, Retirement account)* and debt (*Mortgage, Consumer loan)* are all dummy variables. The reported coefficients in Table 5 are marginal effects based on probit estimates. As a measure of financial literacy we employ the indicator *FL – All correct*. In unreported robustness tests we employ the number of financial literacy questions answered correctly by respondents, yielding similar results.

Table 4 here

Table 5 here

The Table 4 and 5 results reveal a significant positive relationship between the financial literacy of respondents, their investment behavior and their use of mortgage debt. The univariate comparisons in Table 4 show that a respondent who is able to answer all three financial literacy questions correctly is 20 percentage points more likely to have an investment account, 16 percentage points more likely to have a retirement account and 12 percentage points more likely to have a mortgage loan. The Table 5 results show that after controlling for differences in socioeconomic characteristics of households the relation between financial literacy and financial behavior remains economically and statistically significant. The estimates for *FL – All correct* reported in columns (1-3) suggest that a person who is able to answer all three financial literacy questions correctly is 14 percentage points more likely to have an investment account, 6 percentage points more likely to have a

retirement account and 9 percentage points more likely to have a mortgage loan. By contrast, we find no significant relation between financial literacy and the incidence of consumer debt.

Considering our socioeconomic control variables we find a strong relationship between *Financial wealth* and the incidence of an investment account and a voluntary retirement account. Households with higher current *Income* are also more likely to have a retirement account and a mortgage loan (but not an investment account). We find that the level of *Education* is hardly correlated with our indicators of household investment and debt. Larger households (i.e. with children) are more likely to have an investment account and a mortgage, but less likely to have a consumer loan.

The Table 5 results show that *Foreign* citizens are less likely to have an investment account (9 percentage points), a mortgage (11 percentage points) and a retirement account (8 percentage points), although the latter effect is not significant. These substantial differences in financial behavior across nationalities are surprising given that we control for household education, income and wealth and language skills. Households with German as their mother tongue are more likely to have an investment account (9 percentage points), a mortgage (16 percentage points) and a retirement account (10 percentage points). Moreover, these households are less likely to have a consumer loan (6 percentage points). Together these results point to strong cultural differences in the use of financial products.

Our results confirm that household investment is strongly related to risk attitudes and present-biased preferences. *Risk averse* and *Mypoic* households are substantially less likely to invest in financial markets and to have a retirement account. In line with evidence by Meier and Sprenger (2010) we find that *Impulsive* households are more likely to have a consumer loan.

5. Policy implications

Our results suggest a significant positive correlation between financial literacy on the one hand and financial market participation, retirement saving and mortgage borrowing on the other hand. This finding has important implications for the design of consumer protection measures targeted at retail investors and borrowers. Consumer protection policies should take into account that retail investors and mortgage borrowers are likely to have knowledge of the basic financial concepts (interest, inflation, diversification) which affect the risk and return of financial assets and liabilities. This finding supports recent consumer protection policies (the MiFID II framework of the EU or the Dodd-Frank Act in the US) which aim at improving transparency about the costs and risks of specific investment and loan products. Our findings suggest that the targeted households should have sufficient basic financial knowledge to benefit from enhanced product transparency.[11]

The implications of our findings for initiatives to promote financial literacy are far from clear. Only half of the surveyed individuals were able to answer all three questions on basic financial concepts. Thus further initiatives to promote basic financial literacy seem advisable. Our results suggest that financial literacy is lowest among low-income households, the immigrant population as well as among women and pensioners. By contrast, while knowledge about inflation is low among the young population financial literacy in general is not. These findings suggest first and foremost that financial literacy initiatives should not be exclusively targeted towards the youth. Our results confirm recent findings suggesting that - on average - the young population in Switzerland are just as able to make sound financial decisions as the rest of the population (BFS 2012, Henchoz and Wernli 2012). Instead, financial literacy initiatives should be targeted towards the low-income population and towards the immigrant

[11] This conclusion is supported by experience on the Truth in Lending Act implemented in the US in 1969. Bertaut and Haliassos (2006) show that by the year 2000 90% of US households with revolving credit card balances were aware of the exact lending conditions (APR) as compared to 27% in 1970.

population. Specific initiatives to promote the knowledge about financial risk among pensioners may also be warranted.

Should specific initiatives be designed to tackle the gender gap in financial literacy? Obviously, the answer to this question depends on what the drivers behind this gender gap may be. Within households, the division of labor may imply that still today women are less involved in financial decision making than men and are thus less familiar with the basic financial concepts captured by our financial literacy questions. Alternatively, women may be simply less interested in financial matters than men.

Table 6 here

In Table 6 we assess to what extent exposure to financial decision making and interest in financial topics may be responsible for the gender gap in financial literacy. To this end we replicate our baseline regression in columns 1 (*FL – All correct*) and 3 (*FL - At least one DK*) of Table 3 for various sub-samples. First, we estimate the gender-effect separately by marital status (single vs. not single) and household size (1 person vs. multiple person). The column (1-4) results in Panel A of Table 6 suggest that the gender-gap in financial literacy is stronger among single respondents and 1-person households than among married or divorced respondents and respondents who do not live alone. These findings contradict the hypotheses that low involvement of women in household financial decision making is responsible for observed differences in financial literacy.

Second, we estimate the gender-effect separately for respondents who are more (vs. less) interested in financial topics. Our indicator of *Financial interest* is a dummy variable which takes one if the respondent reports that he/she followed the financial crisis very closely or closely and takes the value 0 if he/she followed the crisis less closely or not at all. We find

substantial gender differences in this indicator of financial interest: While 45% of male respondents report that they followed the financial crisis closely only 23% of female respondents did so. Not surprisingly, the column (5-6) results show that the gender-gap in financial literacy is much weaker for respondents which are interested in financial topics (15 percentage points) than for respondents that are less interested in financial topics (26 percentage points). The Panel B results suggest that within the sample of respondents with high financial interest half of the observed gender-gap in financial literacy (8 percentage points) is driven by higher levels of non-responses by women. By contrast, among the respondents with low-financial interest only a small part of the gender-gap (4 percentage points) is driven by non-responses. Thus while a lack of interest in financial matters does explain some of the gender-gap in financial literacy, specific measures to promote financial literacy among women may still be warranted.

Should policy makers invest public funds in promoting financial literacy or should financial institutions be primarily responsible for efforts to promote financial literacy? From an economic viewpoint public investment in financial literacy initiatives is advisable if (i) there is a causal relationship between financial literacy and improved financial decisions by households and (ii) better financial decisions at the household-level entail positive externalities for society, e.g. through lower social welfare costs or improved financial stability. Our data does not allow us to assess whether the second condition holds, but evidence from the recent financial crisis suggests that the social costs of ill-informed financial decisions at the household level may be high. In the following we therefore attempt to assess whether the first condition holds, i.e. to what extent there is a causal relationship between the financial literacy and financial behavior among households in Switzerland.

Financial literacy may be endogenous to household investment and borrowing as people become more financially literate through investment or credit experience. The ownership of

an investment portfolio or retirement account may result in a better understanding of interest, inflation and risk diversification due to the exposure to information about products, financial advice from bank employees or discussions with friends and family about potential investment decisions. Similarly, discussing the choice between a fix-rate or adjustable rate mortgage with bank staff, family or friends may result in a better understanding of interest and inflation for a household which already decided to take a mortgage.

Table 7 here

In Table 7 we investigate to what extent financial literacy is endogenous to financial behavior. Our empirical strategy is to examine the differential relation between our three questions on financial literacy and household investment and borrowing. Our first hypothesis is that households which invest in financial markets or open a retirement account are likely to learn more about risk-diversification through this process than about inflation and compound interest. Indeed, compliance regulations and good business practices require banks to inform retail investors about the basic risk and return profiles of the various investment possibilities. Thus if the correlation between financial literacy and investment or retirement saving is driven by reverse causality we should find a stronger relation for knowledge about risk-diversification than for knowledge about interest or inflation. By contrast, households which decide to take out a mortgage are likely to learn more about interest and inflation through this process than about diversification of investment risk. Thus if the correlation between financial literacy and mortgage borrowing is driven by reverse causality we should find a stronger relation for knowledge about interest or inflation than for knowledge about risk-diversification.

In Table 7 we replicate the multivariate regression analysis from Table 5 for the dependent variables *Investment account* (column 1) *Retirement account* (column 2) and *Mortgage* (column 3) replacing our indicator of financial literacy *FL – All correct* with two of its components: *FL – Diversification* is a dummy variable taking the value of 1 for correct answers to the risk diversification question. *FL – Interest & Inflation* is a score variable reflecting the number of correct answers (0, 1 or 2) given to the interest rates and inflation questions. If the correlation between financial literacy and financial behavior is driven by reverse causality we expect a larger coefficient on *FL – Diversification* than on *FL – Interest and Inflation* in columns (1-2) and the opposite result in column (3). This is exactly what we find.

The Table 7 results suggest that the incidence of an investment account or retirement account is stronger correlated with knowledge on risk diversification than with knowledge on inflation or compound interest. The coefficients for the question on risk in column 1 and 2 indicate that a person who answers the risk diversification question correctly is 15 (8) percentage points more likely to have an investment (retirement) account. These point estimates are twice as high as those for a 1 unit increase in the score of *FL – Interest and Inflation*. An F-test of equality of the coefficients for *FL - Diversification* and *FL- Interest and Inflation* reveals that the null hypothesis can be rejected at the 10% confidence level in column (1), but cannot be rejected in column (2). The column (3) estimates show that the incidence of a mortgage loan is not stronger correlated with knowledge on inflation or compound interest than with knowledge on risk diversification. Together, the results displayed in Table 7 suggest that the correlation between financial literacy and investment behavior may be at least partly driven by reverse causality, while this does not seem to be the case for mortgage borrowing.

6. Conclusion

In this paper we use survey data covering a representative sample of 1’500 households to document the level of financial literacy among Swiss households and to examine how financial literacy is related to household investment and borrowing. We find that - compared to levels documented for other OECD countries - financial literacy in Switzerland is relatively high. That said, only half of the respondents were able to answer three questions on basic financial concepts correctly. Financial literacy is substantially lower among low-income and immigrant households as well as among women suggesting that general initiatives to enhance financial literacy in Switzerland should be targeted towards these groups. Young respondents are not overall less financial literate and thus initiatives targeted towards this group should focus on specific financial concepts, e.g. inflation.

We find that financial literacy is strongly correlated with financial market participation, voluntary retirement saving and mortgage borrowing. While the correlation between financial literacy and investment behavior seems at least partly be driven by reverse causality, this does not seem to be the case for mortgage borrowing. These findings suggest that the potential impact of financial literacy initiatives on investment behavior may be limited.

Our findings do lend support to recent regulation aimed at protecting retail investors and borrowers by enhancing product transparency. As retail investors and borrowers have above-average knowledge of basic financial concepts they should be in a position to benefit from enhanced product transparency.

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Table 1: Financial literacy - Summary statistics

This table reports summary statistics for the three financial literacy questions.

	Observations	in %
Question 1: Interest		
More than CHF 102 *(correct answer)*	1'189	79.3
Exactly CHF 102	166	11.1
Less than CHF 102	103	6.9
Don’t know/ refuse to answer	42	2.8
Question 2: Inflation		
More	94	6.3
Exactly the same	167	11.1
Less *(correct answer)*	1'176	78.4
Don’t know/ refuse to answer	63	4.2
Question 3: Diversification		
Investment in single stock	203	13.5
Investment in mutual fund *(correct answer)*	1'102	73.5
Don’t know/ refuse to answer	195	13.0
Overall performance		
All answers correct	752	50.1
No correct answer	51	3.4
At least one 'don't know'/'refuse to answer'	254	16.9

Table 2: Financial literacy - Univariate comparisons

This table presents the answers to the three financial literacy questions by socio-economic characteristics and behavioral traits of respondents. *DK*: Indicates that respondents refused to answer the question or didn't know the answer. See the appendix for definitions of all variables.

		Overall			Interest		Inflation		Diversification	
Characteristics	Observations	All correct (%)	Score (0-3)	At least one DK (%)	Correct (%)	No answer (%)	Correct (%)	No answer (%)	Correct (%)	No answer (%)
Whole sample	1'500	50.1	2.31	16.9	79.3	2.8	78.4	4.2	73.5	13.0
Gender										
Male	714	62.0	2.49	11.8	85.6	1.4	84.9	2.8	78.6	9.1
Female	786	39.3	2.15	21.6	73.5	4.1	72.5	5.5	68.8	16.5
Age										
20 - 30 years	169	45.0	2.20	19.5	78.7	3.6	63.9	9.5	77.5	11.8
31 - 40 years	498	52.4	2.34	12.7	82.1	2.2	73.9	3.6	78.1	8.6
41 - 50 years	284	58.5	2.42	15.1	80.3	1.8	84.9	3.9	77.1	11.6
51 - 60 years	283	49.1	2.33	17.0	79.2	2.1	83.0	3.2	70.7	14.5
61 - 74 years	257	41.6	2.18	24.9	72.8	5.4	84.0	3.5	61.5	21.4
Nationality										
Swiss	1'357	51.9	2.34	15.8	79.4	2.7	79.5	3.9	75.2	12.1
Foreign	143	33.6	2.03	28.0	78.3	4.2	67.8	7.0	56.6	21.7
Language										
German	1'345	51.7	2.34	15.5	79.1	2.6	79.5	3.9	75.5	11.7
Other	155	36.8	2.05	29.0	80.6	4.5	69.0	6.5	55.5	23.9
Education										
Primary or secondary school	124	26.6	1.81	34.7	62.9	10.5	64.5	0.1	53.2	29.0
Professional education	761	43.1	2.22	17.2	76.7	2.8	73.2	5.1	72.4	12.2
Grammar school	136	44.9	2.24	22.8	79.4	2.9	78.7	4.4	66.2	18.4
University	479	68.9	2.60	10.2	87.5	0.0	90.2	1.7	82.5	8.6
Income										
Low income	534	38.8	2.11	20.0	73.4	3.0	71.5	4.9	65.7	15.9
Middle income	603	54.7	2.41	14.3	81.8	1.8	82.1	3.2	77.5	10.8
High income	215	71.6	2.67	9.3	91.6	0.0	90.7	0.9	84.2	8.4
DK	148	41.2	2.12	27.7	72.3	10.1	70.3	10.8	69.6	18.2
Financial wealth										
Low wealth	620	43.2	2.19	17.1	75.8	2.4	73.4	4.5	69.8	13.9
Middle wealth	562	56.2	2.41	14.8	83.3	1.4	82.0	3.0	75.8	11.7
High wealth	140	69.3	2.66	8.6	87.9	2.1	94.3	0.0	84.3	6.4
DK	178	39.9	2.14	29.8	71.9	9.0	71.9	10.1	70.2	19.1

Table 3: Financial literacy - Multivariate analysis

This table reports marginal effects of probit estimations with financial literacy indicators as dependent variables. Omitted categories for the displayed explanatory variables are Gender: Male, Age: 20-30 years, Nationality: Swiss, Language: Other, Education: Primary or Secondary School, Income: Low, Wealth: Low. All regressions include the household control variables *Maritial status*, *Household size* and *Labor market status* as well as fixed effects per canton. DK: Don't know or no answer. Standard errors are reported in brackets. ***, **, *: significant at 1%, 5%, 10% confidence level. See the appendix for definitions of all variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	FL - All correct	FL- Score	FL - At least one DK	FL - Interest	FL - Inflation	FL - Diversification
Gender: Female	-0.185***	-0.226***	0.0744***	-0.0822***	-0.0918***	-0.0677***
	[0.0292]	[0.0432]	[0.0200]	[0.0223]	[0.0220]	[0.0251]
Age: 31 - 40 years	0.0386	0.0897	-0.0514*	0.0347	0.0645**	-0.03
	[0.0485]	[0.0698]	[0.0298]	[0.0352]	[0.0303]	[0.0432]
Age: 41 - 50 years	0.128**	0.188**	-0.03	0.02	0.159***	-0.05
	[0.0524]	[0.0777]	[0.0326]	[0.0389]	[0.0230]	[0.0497]
Age: 51 - 60 years	0.00	0.09	-0.00	0.01	0.144***	-0.136**
	[0.0560]	[0.0802]	[0.0367]	[0.0407]	[0.0253]	[0.0542]
Age: 61 - 74 years	-0.09	0.02	0.07	-0.01	0.155***	-0.217***
	[0.0665]	[0.0957]	[0.0514]	[0.0496]	[0.0283]	[0.0663]
Nationality: Foreigner	-0.172***	-0.226***	0.0691*	-0.04	-0.07	-0.119**
	[0.0511]	[0.0764]	[0.0410]	[0.0437]	[0.0448]	[0.0497]
Language: German	0.08	0.145**	-0.109**	-0.05	0.04	0.170***
	[0.0515]	[0.0738]	[0.0425]	[0.0338]	[0.0407]	[0.0490]
Education: Professional education	0.122**	0.318***	-0.0963***	0.0861**	0.0862**	0.0910**
	[0.0542]	[0.0753]	[0.0312]	[0.0358]	[0.0349]	[0.0408]
Education: Grammar school	0.134**	0.332***	-0.05	0.0872**	0.103***	0.03
	[0.0655]	[0.0960]	[0.0317]	[0.0343]	[0.0299]	[0.0492]
Education: University	0.285***	0.520***	-0.114***	0.122***	0.202***	0.129***
	[0.0539]	[0.0824]	[0.0283]	[0.0341]	[0.0291]	[0.0402]
Income: Middle	0.0781**	0.156***	-0.01	0.04	0.0594**	0.0514*
	[0.0341]	[0.0497]	[0.0229]	[0.0247]	[0.0239]	[0.0279]
Income: High	0.184***	0.276***	-0.04	0.108***	0.102***	0.0864**
	[0.0455]	[0.0688]	[0.0297]	[0.0284]	[0.0277]	[0.0355]
Income: DK	0.06	0.02	-0.01	0.02	-0.02	0.02
	[0.0646]	[0.0945]	[0.0390]	[0.0434]	[0.0480]	[0.0517]
Financial wealth: Middle	0.0790**	0.0965**	-0.00	0.0557**	-0.00	0.0460*
	[0.0327]	[0.0472]	[0.0224]	[0.0236]	[0.0243]	[0.0268]
Financial wealth: High	0.182***	0.302***	-0.0801***	0.0994***	0.104***	0.137***
	[0.0519]	[0.0788]	[0.0277]	[0.0307]	[0.0345]	[0.0339]
Financial wealth: DK	-0.05	-0.02	0.106**	-0.02	-0.02	0.02
	[0.0595]	[0.0868]	[0.0485]	[0.0452]	[0.0448]	[0.0472]
Method	Probit	OLS	Probit	Probit	Probit	Probit
Household control variables	Yes	Yes	Yes	Yes	Yes	Yes
Canton-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	1'494	1'494	1'490	1'494	1'494	1'494
(Pseudo) R^2	0.12	0.17	0.10	0.08	0.13	0.09

Table 4: Financial behavior - Univariate comparisons

This table displays the share of respondents with an *Investment account*, *Retirement account*, *Mortgage* and *Consumer loan* by socio-economic characteristics and behavioral traits of respondents. DK indicates that respondents refused to answer the question or didn't know the answer. See the appendix for definitions of all variables.

Characteristics	Observations	Investment account (%)	Retirement account (%)	Mortgage (%)	Consumer loan (%)
Whole Sample	1'500	35.7	40.7	45.8	4.7
Financial Literacy					
All correct	752	45.8	48.5	51.8	4.2
Not all correct	748	25.5	32.7	39.7	5.2
Gender					
Male	714	41.6	43.6	45.0	6.0
Female	786	30.4	38.0	46.6	3.6
Age					
20 - 30 years	169	0.2	0.3	0.1	0.1
31 - 40 years	498	0.3	0.4	0.4	0.1
41 - 50 years	284	0.3	0.5	0.6	0.0
51 - 60 years	283	0.4	0.5	0.6	0.0
61 - 74 years	257	0.5	0.3	0.5	0.0
Nationality					
Swiss	1'357	37.6	42.2	48.1	3.5
Foreigners	143	18.2	26.6	23.8	16.1
Language					
German	1'345	37.7	42.5	48.2	3.3
Other	155	18.7	24.5	25.2	17.4
Education					
Primary or secondary school	124	23.4	25.0	42.7	4.0
Professional education	761	30.6	36.3	45.2	5.7
Grammar school	136	39.0	42.7	45.6	4.4
University	479	46.1	51.2	47.6	3.6
Income					
Low income	534	27.5	25.7	32.4	5.1
Middle income	603	38.0	47.8	53.1	5.8
High income	215	53.0	61.9	56.7	2.3
DK	148	31.1	35.1	48.7	4.7
Financial wealth					
Low wealth	620	15.2	28.7	36.8	8.9
Middle wealth	562	49.3	52.0	51.4	1.8
High wealth	140	77.1	53.6	58.6	1.4
DK	178	32.0	36.5	49.4	2.3
Risk averse					
Yes	994	30.8	38.9	47.3	4.4
No	475	47.6	45.7	44.2	4.8
Myopic					
Yes	409	31.3	31.8	43.8	4.9
No	1'077	37.7	44.5	47.1	4.6
Impulsive					
Yes	105	30.5	36.2	32.4	14.3
No	1'390	36.3	41.1	47.0	4.0

Table 5: Financial behavior - Multivariate analysis

This table reports marginal effects of probit estimations with the incidence of *Investment account, Retirement account, Mortgage* and *Consumer loan* as dependent variables. Standard errors are reported in brackets. Omitted categories for the displayed explanatory variables are Gender: Male, Age: 20-30 years, Nationality: Swiss, Language: Other, Education: Primary or Secondary School, Income: Low, Financial wealth: Low. All regressions include the household control variables *Maritial status*, *Household size* and *Labor market status, Bank branch, Large bank branch,* as well as fixed effects per canton. DK: Don't know or no answer. ***, **, *: significant at 1%, 5%, 10% confidence level. See the appendix for definitions of all variables.

	(1)	(2)	(3)	(4)
	Investment	Retirement		Consumer
Dependent variable	account	account	Mortgage	loan
Financial Literacy: All correct	0.142***	0.0641**	0.0902***	-0.00
	[0.0286]	[0.0295]	[0.0316]	[0.00609]
Gender: Female	-0.0528*	0.04	0.0353	-0.0162**
	[0.0305]	[0.0309]	[0.0334]	[0.00748]
Age: 31 - 40 years	0.0411	0.0839*	0.301***	0.000755
	[0.0524]	[0.0504]	[0.0604]	[0.00894]
Age: 41 - 50 years	0.05	0.109*	0.521***	-0.01
	[0.0589]	[0.0568]	[0.0454]	[0.00776]
Age: 51 - 60 years	0.07	0.07	0.498***	-0.01
	[0.0611]	[0.0585]	[0.0491]	[0.00782]
Age: 61 - 74 years	0.173**	-0.09	0.537***	-0.0277***
	[0.0739]	[0.0657]	[0.0498]	[0.00698]
Nationality: Foreigner	-0.0945*	-0.08	-0.114*	0.01
	[0.0526]	[0.0531]	[0.0581]	[0.0140]
Language: German	0.0877*	0.101**	0.163***	-0.0568**
	[0.0502]	[0.0508]	[0.0531]	[0.0260]
Education: Professional education	0.07	0.01	-0.01	0.02
	[0.0566]	[0.0573]	[0.0573]	[0.0141]
Education: Grammar school	0.10	0.05	-0.01	0.03
	[0.0746]	[0.0727]	[0.0736]	[0.0328]
Education: University	0.10	0.07	0.03	0.01
	[0.0631]	[0.0625]	[0.0639]	[0.0154]
Income: Middle	0.04	0.109***	0.131***	0.0144*
	[0.0356]	[0.0351]	[0.0371]	[0.00830]
Income: High	0.07	0.204***	0.237***	-0.00
	[0.0491]	[0.0487]	[0.0503]	[0.00992]
Income: DK	0.01	0.06	0.10	0.02
	[0.0662]	[0.0710]	[0.0727]	[0.0302]
Financial wealth: Middle	0.335***	0.218***	0.04	-0.0258***
	[0.0322]	[0.0327]	[0.0358]	[0.00748]
Financial wealth: High	0.532***	0.274***	0.06	-0.01
	[0.0418]	[0.0537]	[0.0593]	[0.00811]
Financial wealth: DK	0.232***	0.123*	0.07	-0.0154**
	[0.0644]	[0.0646]	[0.0661]	[0.00688]
Risk averse	-0.134***	-0.0527*	0.04	-0.00
	[0.0301]	[0.0302]	[0.0319]	[0.00660]
Myopic	-0.0612**	-0.0867***	-0.0750**	-0.00
	[0.0307]	[0.0309]	[0.0331]	[0.00647]
Impulsive	0.08	0.01	-0.04	0.0389*
	[0.0598]	[0.0563]	[0.0615]	[0.0220]
Method	Probit	Probit	Probit	Probit
Household control variables	Yes	Yes	Yes	Yes
Canton-fixed effects	Yes	Yes	Yes	Yes
No. of observations	1'453	1'453	1'453	1'392
Pseudo R^2	0.20	0.14	0.24	0.25

Table 6: Gender-gap: Subsample analysis

This table replicates the regression analysis presented in column 1 of Table 3 for varying subsamples. The dependent variable for specifications in Panel A is *FL - All correct and in Panel B it is FL - At least one DK.* DK indicates that respondents refused to answer the question or didn't know the answer.All regressions include the full set of socioeconomic explanatory variables, household control variables as well as fixed effects per canton. Standard errors are reported in brackets. ***, **, *: significant at 1%, 5%, 10% confidence level. See the appendix for definitions of all variables.

Panel A. Financial Literacy - All correct

Dependent variable	Financial Literacy: All correct					
Subsample split	Maritial status: Single		Household size		Financial interest	
	Yes	No	1 person	> 1 person	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Gender: Female	-0.298***	-0.155***	-0.263***	-0.176***	-0.146***	-0.260***
	[0.0650]	[0.0339]	[0.0782]	[0.0325]	[0.0381]	[0.0545]
Method	Probit	Probit	Probit	Probit	Probit	Probit
Socioeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Canton-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	309	1'179	236	1'249	925	479
Pseudo R^2	0.24	0.12	0.19	0.12	0.12	0.14

Panel B. Financial Literacy - At least 1 DK

Dependent variable	Financial Literacy: At least one DK					
Subsample split	Maritial status: Single		Household size		Financial interest	
	Yes	No	1 person	> 1 person	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
Gender: Female	0.142***	0.0519**	0.119**	0.0661***	0.0805***	0.04
	[0.0476]	[0.0233]	[0.0583]	[0.0219]	[0.0243]	[0.0430]
Method	Probit	Probit	Probit	Probit	Probit	Probit
Socioeconomic controls	Yes	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Canton-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	281	1'175	233	1'235	917	471
Pseudo R^2	0.25	0.10	0.23	0.10	0.13	0.09

Table 7: Endogeneity of financial literacy

This table reports marginal effects of probit estimations with the incidence of *Investment account*, *Retirement account* and *Mortgage* as dependent variables. *FL- Diversification* is a dummy which is 1 for respondents which answered the question on risk diversification correctly. *FL Interest & Inflation* takes values between 0 and 2 depending on the amount of correct answers of respondents to the interest and inflation questions. Standard errors are reported in brackets. All regressions control for canton–fixed effects. ***, **, *: significant at 1%, 5%, 10% confidence level. See the appendix for definitions of all variables.

	(1)	(2)	(3)
Dependent variable	Investment account	Retirement account	Mortgage
FL - Diversification	0.151***	0.0833**	0.04
	[0.0300]	[0.0326]	[0.0352]
FL- Interest & inflation	0.0816***	0.04	0.0441*
	[0.0255]	[0.0250]	[0.0267]
Method	Probit	Probit	Probit
Socioeconomic explanatory variables	Yes	Yes	Yes
Household control variables			
Canton-fixed effects	Yes	Yes	Yes
No. of observations	1'453	1'453	1'453
Pseudo R^2	0.21	0.14	0.24
Chi^2 Test: FL - Diversification = FL - Interest & inflation (p-value)	0.08	0.29	0.99

Appendix: Variable descriptions

	Variable	Description
Financial literacy (FL)		
	All correct	1= answered all three financial literacy questions correctly.
	Score	Score of correct answers to all three questions (value: 0-3).
	At least 1 DK	1= At least 1 question was not answered, or respondent replied "don't know".
	Interest	1= answered question on compound interest correctly.
	Inflation	1= answered question on inflation correctly.
	Diversification	1= answered question on risk diversification correctly.
	Interest & Inflation	Score of correct answers to FL - Interest and FL - Inflation questions (values: 0,1,2).
Financial behavior		
	Investment account	1= houshehold has at least 1 investment account with a bank.
	Retirement account	1= houshehold has at least 1 tax-exempted voluntary retirement account with a bank.
	Mortgage	1= houshehold has at least 1 mortgage.
	Consumer loan	1= houshehold has at least 1 consumer loan with a bank.
Gender		
	Male	1= male respondent.
	Female	1= female respondent.
Age		
	"X" - "Y" years	1= respondent age between "X" and "Y" years.
Nationality		
	Swiss	1= respondent with Swiss citizenship.
	Foreigner	1= respondents without Swiss nationality.
Language		
	German	1= respondent with German as mother tongue.
	Other	1= respondent with German not as mother tongue.
Education		
	Primary or secondary school	1= respondent who attended only primary or secondary school.
	Professional education	1= respondent with apprenticeship.
	Grammar school	1= respondent who attended grammar school (Mittelschule, Gymnasium, Seminar).
	University	1= respondent with tertiary (university, FH) education.
Income		
	Low income	1= monthly household income below CHF 7'000.
	Middle income	1= monthly household income betweeen CHF 7'000 and CHF 12'000.
	High income	1= monthly household income above CHF 12'000.
	DK	1= respondents who refused to answer or said that they did not know the correct answer.
Financial wealth		
	Low wealth	1= total financial wealth < CHF 50'000.
	Middle wealth	1= total financial wealth between CHF 50'000 and CHF 250'000.
	High wealth	1= total financial wealth between CHF 250'000 CHF 1Mio.
	DK	1= respondents who refused to answer or said that they did not know the correct answer.
Risk aversion		
	Risk averse	1= amount of risk the respondent is willing to take with his/her financial wealth on scale of 1(no risk) to 6 (high risk) = 1 or 2.
	Not risk averse	1= amount of risk the respondent is willing to take with his/her financial wealth on scale of 1(no risk) to 6 (high risk) = 3, 4, 5 or 6.
Myopia		
	Myopic	Agree partially or fully to the statement “I live for the present and don’t think about my financial future”.
	Not myopic	Do not agree to the above statement.
Impulsive		
	Impulsive	Agree partially or fully to the statement “I am impulsive and tend to by things that I cannot afford”.
	Not impulsive	Do not agree to the above statement.
Marital status		
	Single	1= respondents is single.
	Relationship	1= respondent is married or in a permanent relationship.
	Widowed or divorced	1= repsondent is widowed or divorced.
Household size		
	1-2 people	1= respondent lives in single or two-person households.
	>2 people	1= respondent lives in household with at least 3 people.
Labor market status		
	Non-employed	1= housekeeper, student, pensioner, or unemployed.
	Employed	1= respondent in wage employment.
Location		
	Bank branch	1= respondent lives in village/town with a bank branch.
	No bank branch	1= respondent does not live in village/town with a bank branch.
	Large bank branch	1= respondent lives in village/town with a UBS or Credit Suisse bank branch.
	No large bank branch	1= respondent does not live in village/town with a UBS or Credit Suisse bank branch.
Financial interest		
	High	1= respondent reports following the financial crisis closely or very closely.
	Low	1= respondent reports following the financial crisisless closely or not at all.