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The relationship between financial disputes and financial literacy

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ABSTRACT

This study examines financial literacy and its relationship with financial disputes. We devised two special modules from the Third National Financial Literacy Survey conducted by Taiwan's Financial Supervisory Commission (FSC) in 2011. With this unique database, we examine topics that have rarely been discussed in other studies. Our empirical evidence suggests that people with a higher financial literacy are less likely to experience financial disputes. When the purchase of financial products and services leads to a financial dispute, people with a higher financial literacy will aggressively handle the problem. In addition, personal characteristics, such as gender, work status, and household income, are key factors affecting the chances of a financial dispute. Finally, our results are robust to potential selection bias when we include the results of the National Financial Literacy Survey conducted by the FSC in 2007, 2009, and 2011.

1. Introduction

In practice, the providers of financial products and services show a more in-depth understanding of a given product and service in comparison to purchasers. As a result, information asymmetry leads such consumers to be in a less favorable position toward providers. Taking the structured notes default during the 2007 subprime crisis as an example, with the relevant financial supervisory body not properly regulating the market, the damage caused to investors could not be fairly identified in loss claims. This example revealed the conflict of interests between banks and consumers. After the financial crisis in 2008, financial consumer protection became a critical concern for financial supervision agencies around the world.[1] For example, the creation of the Consumer Financial Protection Bureau (CFPB) was authorized by the Dodd–Frank Wall Street Reform and Consumer Protection Act, whose passage in 2010 was a legislative response to the financial crisis of 2007–2008. The CFPB is an independent agency of the United States government, responsible for consumer protection in the financial sector.

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[1] In November 2009, the Technical Committee of the International Organization of Securities Commission (IOSCO) issued the Principles on Point of Sale Disclosure Consultation Report. This report was meant to protect so-called retail investors by requiring key information disclosures relating to collective investment schemes prior to the point of sale. The purpose of the report was to help retail investors make correct investment decisions by providing access to key information. The report stressed the importance of providing investors correct, understandable, and meaningful information under the background of the continuing financial crisis.

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In Taiwan, the Financial Supervisory Commission (FSC) implemented the Financial Consumer Protection Act on December 30, 2011 and founded a financial ombudsman institution to provide a mechanism other than legal litigation as an alternative solution to financial disputes.[2]

The International Organization of Securities Commission (IOSCO, 2009) qualifies the problem of information efficiency as the inability of investors to accurately understand financial information. Some financial products are complex and difficult to grasp, particularly for financially unsophisticated investors. Thus, low financial literacy gives rise to more financial disputes. Furthermore, a low financial literacy leads consumers to generally lack confidence in making financial decisions, be incapable of understanding financial concepts, and ultimately be unable to effectively deal with contingencies. Gerardi et al. (2010) argue that one of the reasons for the financial turmoil in 2008 was the lack of financial literacy. Klapper et al. (2013) also find that people with a higher financial literacy are more equipped to deal with negative macroeconomic effects. This state of affairs is described as an obstacle that needs to be overcome. The World Bank (2009), the Organization for Economic Co-operation and Development (OECD, 2005, 2006, 2008, 2009), and the European Commission (2007) have all concluded that financial literacy programs must be initiated. The reports are unequivocal in their conclusions: the level of financial knowledge must be raised so that nonprofessional investors can act in a financially responsible manner.

This study investigates the relationship between financial literacy and financial disputes by using a unique database of the Third National Financial Literacy Survey (hereafter, the Literacy Survey) conducted by the FSC of Taiwan in 2011. To measure financial literacy and assess its relationship with financial disputes, we follow Lusardi and Mitchell (2006) and van Rooij et al. (2011a) to design two modules to measure and evaluate financial literacy. We designed an extensive list of questions aimed at measuring and differentiating among different levels of financial literacy and sophistication. These questions are linked to a rich set of data on demographic characteristics and wealth holdings. We refer to a factor analysis to construct a financial literacy index and apply an ordered logit model to examine the relationship between financial disputes and financial literacy. The main findings are as follows. First, financial literacy shows a significantly negative effect on financial disputes. Thus, people with a higher level of financial literacy are less likely to have financial disputes. Second, an individual's work status and household income are key factors affecting the chance of a financial dispute. We find that housewives are more likely to have financial disputes, whereas groups with a medium annual household income (NTD 1.23–2.15 million) are less likely to have financial disputes. Third, we examine the relationship between financial literacy and the aggressive handling of financial disputes, and find that financial literacy has a significantly positive effect on pushing people to aggressively handle their financial disputes. Hence, people with a higher financial literacy are inclined to aggressively handle financial disputes, even if it is not the optimal method for arriving at a solution. In addition, women and individuals with an annual household income between NTD 0.66–1.23 million are more likely to aggressively handle financial disputes through appropriate ways. However, housewives are more passive in resolving financial disputes. Finally, our results are robust when we consider potential selection biases.

This paper contributes to existing research in several ways. Our primary contribution to the financial literacy literature is to show that financial literacy has a significantly negative effect on financial disputes. To our knowledge, this study is the first to investigate the relationship between financial literacy and financial disputes. Second, we conduct a relatively complete method for questionnaire design, sampling methodology, and interview procedures. Previous studies on financial literacy (such as Bucher-Koenen and Lusardi, 2011; Lusardi and Mitchell, 2011a, 2011b; van Rooij et al., 2011a) address only interest rate compounding, inflation, diversification, stocks and bonds, and online questionnaire surveys. We develop two indices of financial literacy, which allow us to differentiate among different levels of financial sophistication. Adding this information to existing data sets can substantially enhance the research on financial disputes. Finally, our study has implications for financial supervision agencies. By fostering financial education, people could have a greater understanding of financial-related knowledge and better distinguish and mitigate financial risks. As a result, misunderstandings about financial services could be diminished and consumer risk awareness and confidence in financial products and services could be increased. This could further improve the reputations of financial institutions and enhance financial resource efficiency. In the end, this positive cycle could reveal progressive and profound influences for a stable, healthy, and sustainable financial industry.

The rest of this paper is organized as follows. Section 2 reviews the relevant literature. Section 3 introduces the empirical analysis, describes the data set, and discusses the empirical strategy. Section 4 presents the results from the baseline analysis and robustness checks. Section 5 concludes the study.

2. Literature review

2.1. Financial literacy

Previous empirical studies related to financial literacy mainly focus on three aspects (Allmenberg and Widmark, 2011).[3] The first aspect is to measure the level of financial literacy in a country (Lusardi and Mitchell, 2014). Typically, studies suggest that even in advanced countries, the general public is still lacking in financial literacy. For example, few people across several countries could correctly

[2] The Taiwanese government has recently devoted much attention to handling failure in financial institutions and financial disputes, and has fully compensated the loss of individuals. Although the protection from government works to stabilize the financial industry and improve social perceptions, it also induces adverse selection and moral hazard.

[3] Financial literacy means "having the knowledge, skills and confidence to make responsible financial decisions" (Altman, 2012).

answer three basic financial literacy questions.[4] In the United States, only 30% could do so (Lusardi and Mitchell, 2011c), with similarly low percentages in countries with well-developed financial markets (53.2% for Germany (Bucher-Koenen and Lusardi, 2011), 44.8% for the Netherlands (Alessie et al., 2011), 27.0% for Japan (Sekita, 2011), and 42.7% for Australia (Agnew et al., 2013)), as well as in nations where financial markets are changing rapidly (only 3.7% for Russia (Klapper and Panos, 2011) and 3.8% for Romania (Beckmann, 2013)). Hence, the low levels of financial literacy found in the United States are also prevalent elsewhere, rather than being specific to any given country or stage of economic development.

A second string of literature examines how financial literacy affects financial decisions (Lusardi, 2012), particularly in relation to wealth management, retirement planning, credit management, and stock market participation. For example, in the field of wealth management, Bernheim et al. (2001) and Bernheim and Garrett (2003) maintain that high school students with financial curriculum mandates and employers with financial education in the workplace enjoy higher savings. Financial literacy has also been found to have a significantly positive correlation with financial behaviors such as cash-flow management, credit management, saving, and investment (Hilgert et al., 2003). Data from Chile reveals that financial literacy and household wealth accumulation has a significantly positive relationship (Behrman et al., 2012). The research by Jappelli and Padula (2013) presents modeling and cross-country data to verify the positive correlation between financial literacy and savings.

Studies in retirement planning show that Americans with a lower financial literacy are less likely to plan their retirement and do not create a savings and wealth plan for retirement (Lusardi and Mitchell, 2007a, 2007b, 2008, 2011b; Dvorak and Hanley, 2010). Clark et al. (2012) present empirical evidence that shows that American workers with a higher financial literacy are more likely to engage in 401(k) retirement plans.[5] Aside from empirical studies in the United States, a study using data from the Netherlands argues that there is a significantly positive relationship between financial literacy and retirement planning (van Rooij et al., 2011b). Van Rooij et al. (2012) confirm that financial literacy increases the likelihood of investing in the stock market and is positively related to retirement planning; in addition, there is a strong, positive association between financial literacy and net worth. Russian data reveals similar findings and conclusions (Klapper and Panos, 2011). Hsiao et al. (2015a) collect data from Taiwan and find that people with a higher financial literacy tend to have more diversified fund sources for retirement planning.

In the field of credit management, Scheriner (2004) introduces an empirical study using lending data from Bolivia and proves that experience in and knowledge about lending could reduce the risk of bad loans. Effective credit counseling has been found to decrease the default risk of mortgages (Hartarska and Gonzalez-Vega, 2005). People with a lower debt literacy are also found to use high-cost borrowing and have excessive debt (Lusardi and Tufano, 2009). McHugh et al. (2011) discover that people generally misunderstand the relationship between annual percentage rate (APR) and total cost (TC); although APR dominates credit decisions, this effect is moderated by TC information. Agarwal et al. (2009b) suggest that people with a lower financial literacy tend to borrow from costly payday loans. Scholnick et al. (2013) examine personal credit card data and find that people with lower incomes more frequently pay monthly credit card balances when sufficient funds become available. The reason for such behavior is accredited to a lower level of financial literacy. A set of U.K. household survey data reveals that borrowers with a poor financial literacy hold higher shares of high-cost credit (Disney and Gathergood, 2013). Similarly, Lusardi and de Bassa Scheresberg (2013) and Mottola (2013) argue that university students and women in the United States are prone to engage in high-cost borrowing and costly credit card behaviors such as incurring late and over-the-limit fees; this phenomenon is also attributed to a lower financial literacy. Schicks (2014) analyzes the overindebtedness of micro borrowers in Ghana and maintain that overindebtedness is lower for borrowers with a good debt literacy. Another case is found with mortgage equity withdrawals[6] (Duca and Kumar, 2014); people with a higher financial literacy are less likely to withdraw housing equity. Agarwal et al. (2015c) use a dataset from one of the leading subprime lenders in the United States and find that borrowers from the financial industry, who have a higher financial literacy, are less likely to default. Empirical evidence in Taiwan echoes these findings; people with a higher financial literacy are less likely to use high-cost credit cards or cash advances (Hsiao et al., 2015b) and are less likely to be overindebted (Shen et al., 2015).

Several studies distinguish the behaviors of people with different financial literacies. Older, younger adults and those with a lower financial literacy more easily make financial mistakes (Agarwal et al., 2009a). Calvet et al. (2007, 2009) construct an index of financial sophistication using comprehensive data on Swedish households. Their research shows that poorer, less educated, and immigrant households are less financially sophisticated; people with a lower financial sophistication are more likely to make improper financial decisions and engage in financial misconduct. Agarwal et al. (2015a) report findings about financial literacy and financial planning behavior on the basis of a financial advisory program in India. Their results show that literacy is higher among married respondents and respondents with a higher education. Financial literacy is also much lower in women than in men. However, Agarwal et al. do not find higher literacy measures among middle-aged respondents and do not find literacy to vary by income. A set of De Nederlandsche Bank household survey data illustrates that financial literacy has a significantly positive

[4] The three basic financial literacy questions, designed by Lusardi and Mitchell (2008, 2011a), were worded as follows. 1. (Compound 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? 2. (Inflation) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year, After 1 year, what would you be able to buy. 3. (Stock 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.

[5] The 401(k) is a tax-deferred pension account established in 1981 in the United States. Its related regulations are defined in subsection 401(k) of the Internal Revenue Code. When applied by the employer, employees can contribute a given portion of their monthly salary (usually 1–15%) into the personal retirement account. If an employee leaves the company, he or she can choose to transfer the balance into a 401(k) account in a financial institution, or into the 401(k) account of the new company.

[6] A mortgage equity withdrawal means that the loan from the mortgaged house is not used in financing the purchase of the house, but in household consumption. This type of mortgage behavior tends to be active when house prices rise, because a rising house value means that more money can be loaned through the mortgage. Because mortgages are typically the lowest cost debt an ordinary household can get (banks face lower risks while holding the collateral), mortgage equity withdrawals are a popular way of household financing in a booming housing market.

Box 1
Basic Literacy Questions.

【Part 1: Money management and saving】.
If people are suspicious of being scammed, how can they apply to retrieve the balance remaining in a "watch-listed account"? (select one).
☐ Call the police immediately.
☐ Call the 165 antifraud hotline.
☐ Consult the financial organization in charge of the transaction.
☐ All of the above.
When gas and electricity prices both rise, our living costs are reduced and our purchasing power is elevated.
☐ Agree ☐ Disagree
When the inflation rate is extremely high, fewer items can be purchased with NT$1000.
☐ Agree ☐ Disagree
【Part 2: Credit and loan management】.
Do you know how to maintain your personal credit rating? (select one).
☐ The more credit cards I apply for, the more favorable my personal credit rating will be.
☐ Pay the payments due for the current period on time.
☐ An application for a personal credit report will lower my credit rating.
☐ Unsure.
How may a bad credit record affect an individual? (select one).
☐ The individual may be rejected from obtaining a bank loan.
☐ The loan amount approved may be low, or the loan interest may be high.
☐ When applying for credit cards or cash cards, the individual may be rejected or only a low line of credit will be approved.
☐ All of the above.
Which of the following is correct regarding credit cards? (select one).
☐ A credit card is a payment instrument.
☐ Cash advances cannot be obtained from credit cards.
☐ Revolving credit is inevitable when using credit cards.
When purchasing a car through installments, the total payment will generally be higher than that of a lump sum payment.
☐ Agree ☐ Disagree ☐ Unsure
When people apply for credit cards, the issuing banks will consult the Joint Credit Information Center to inquire into the credit status of the applicants. Did you know that this inquiry requires permission from the applicant?
☐ Yes ☐ No.
【Part 3: Financial and investment planning】.
Which of the following investment options do you consider most likely to be associated with a capital loss? (select all options that apply).
☐ Demand deposits ☐ Time deposits ☐ Funds ☐ Stocks ☐ Bonds
☐ Rotating savings and credit associations ☐ Insurance ☐ Real estate
☐ Purchasing options or futures ☐ Foreign currency deposits
☐ Unsure.
What is your view on investment diversification in the stock market? (select all options that apply).
☐ The investment risk may be lowered.
☐ The more diversified an investment is, the higher is the return on investment.
☐ Even though diversifying investments in different industries can lower risks, the return on investment may also be reduced.
☐ I have heard of investment diversification, but am not familiar with it.
☐ I have never heard of investment diversification.
Regarding the relationship between the investment risk and the return on investment in the stock market, an investment associated with a high return is generally more risky.
☐ Yes ☐ No ☐ The two are not related ☐ Unsure
【Part 4: Insurance and retirement planning】
When an individual purchases life insurance, can such insurance be canceled if the purchaser considers it unnecessary?
☐ Yes, within the effective period ☐ No.

The risks associated with the birth, aging, illness, and death of an individual can be managed by purchasing insurance.
☐ Agree ☐ Disagree
The risks in life can be reduced by purchasing insurance; thus, the higher the insurance coverage is, the more favorable it is for mitigating risks.
☐ Agree ☐ Disagree
Insurance companies in Taiwan can be divided into two categories: life insurance and product insurance.
☐ Agree ☐ Disagree
Insurance companies are highly secure and are unlikely to go bankrupt.
☐ Agree ☐ Disagree
Because the National Health Insurance is available, purchasing additional medical insurance is not required.
☐ Agree ☐ Disagree
☐Numerous insurance products (e.g., investment, exponent, and liability types) can also be purchased for security and investment purposes; thus, financial risks exist and policy holders should be cautious.
☐ Agree ☐ Disagree

relationship with stock market participation. Similar results have been found in other studies applying data from different countries (Allmenberg and Dreber, 2011; Allmenberg and Widmark, 2011; Klapper et al., 2013; Hsiao et al., 2014). People with a higher financial literacy tend to invest in low-cost mutual funds (Hastings and Tejeda-Ashton, 2008; Hastings and Mitchell, 2011) and help increase social interaction (Bönte and Filipiak, 2012). Financial literacy increases the demand for bank accounts and debt receiving for low-income people (Cole et al., 2011), and affects the efficiency and outcomes of financial decisions (Carlin and Robinson, 2012). Karunarathne and Gibson (2014) argue that immigrants in Australia with a higher financial literacy choose lower cost ways to transfer money, to save on transaction costs.

Finally, other studies examine the relationship between financial education and financial literacy, in particular on whether the phenomenon of poor financial literacy could be improved (Bay et al., 2014; Fox et al., 2005; Lyons et al., 2006; Oehler and Werner, 2008; The World Bank, 2009; Willis, 2009). The findings suggest that financial education does have a significantly positive relationship with increased financial literacy. Recently, Drexler et al. (2014) conducted a randomized evaluation with a bank in the Dominican Republic to compare the effect of two distinct programs: standard accounting training and a simplified, rule-of-thumb training that taught basic

Table 1
Basic financial literacy.

Panel A. Basic financial literacy	Correct
Money management and saving	
When suspecting or suffering from a fraud, how does one apply to retrieve the remaining balance of warning "watch-listed account"?	60.35%
In the case of an excessively high inflation rate, the purchasing power of the same NTD 1000 is reduced.	92.43%
When gas and electricity prices rise, our cost of living is reduced and our purchasing power is elevated.	83.06%
Credit and loan management	
Do you know how to maintain your credit rating?	78.20%
How will a bad credit record affect an individual?	75.00%
With regard to credit cards, which of the following options is correct?	71.12%
When purchasing a car through installments, the total expenditure is usually higher than a lump-sum cash payment.	70.86%
When individuals apply for credit cards, the bank consults the Joint Credit Information Center to inquire into the applicants' credit status; did you know that the bank needed your approval to do this?	65.25%
Financial and investment Planning	
Which of the following investments are more likely to suffer from a capital loss?	71.72%
What is your view on diversified investments in the stock market?	60.35%
Regarding the relationship between risks and returns on the stock market, is an investment with a higher return generally more risky?	69.32%
Insurance and retirement planning	
After buying life insurance, is there any possibility for revocation if it is no longer needed?	81.40%
A person can cope with the risks of birth, senility, illness, and death by means of insurance.	75.60%
The risks in life can be reduced by purchasing insurance; thus, the higher the insurance coverage is, the more favorable it is for mitigating risks.	74.13%
Domestic insurance companies can be divided into two types: life insurance and product insurance.	88.78%
Insurance companies are the most secured, thus cannot go bankrupt.	84.68%
Because of the National Health Insurance, no other extra medical insurance is needed.	86.37%
Numerous insurance products (e.g., investment, exponent, and liability types) can also be purchased for security and investment purposes; thus, financial risks exist and policy holders should be cautious.	87.76%

Panel B. Summary of correct responses

	Less than 3	4–7	8–11	12–15	More than 16
Correct	0.08%	4.63%	19.28%	39.83%	36.18%

Note: See Table B1 for a definition of our variables.

Box 2
Advanced Literacy Questions.

【Part 1: Money management and saving】.
According to the Deposit Insurance Act, what is the maximum insurance coverage allowed for each person?
☐ NT$1.5 million ☐ NT$2 million
☐ NT$3 million ☐ No limit
When the interest rate declines, which of the following should be selected for managing time deposits? (select one).
☐ Floating interest rate.
☐ Fixed interest rate.
☐ They are all similar.
☐ Fixed interest rate regardless of whether the interest rate rises or declines.
☐ Unsure.
☐ Never heard of this.
According to current banking practices, which of the following deposits pay no interest? (select one).
☐ Demand deposits ☐ Time deposits ☐ Round-amount savings
☐ Check deposits ☐ Unsure
【Part 2: Credit and loan management】
In which of the following organizations can you apply for a personal credit report? (select one).
☐ The Financial Supervisory Commission.
☐ The Joint Credit Information Center/Post Office.
☐ The police department.
☐ The Household Registration Office.
☐ The corresponding bank.
☐ Unsure.
Under typical circumstances, an extended loan period is associated with high interest.
☐ Agree ☐ Disagree ☐ Unsure
In the term "adjustable rate mortgages" for owner-occupied dwellings, the "adjustable rate" refers to the Taiwan Capitalization Weighted Stock Index.
☐ Agree ☐ Disagree ☐ Unsure
The principal and interest that a borrower must pay per month is called the monthly payment. Which of the following factors determines the monthly payment? (select one).
☐ Loan amount ☐ Annual percentage rate ☐ Loan period
☐ All of the above ☐ Unsure
According to the regulations of the Financial Supervisory Commission, the unsecured debt for an individual debtor shall not exceed how many times the average monthly salary of the debtor?
☐ 10 ☐ 20 ☐ 22 ☐ 30.
Regarding a revolving loan within the margin purchasing limit, which of the following periods concerning the disposable capital is used to calculate the interest?
☐ Day ☐ Week ☐ Month ☐ Year.
When managing mortgage loans, can banks request the borrower to provide a surety? (select one).
☐ Yes, each mortgage loan requires a surety.
☐ It depends, if the borrower has a spouse, the spouse must serve as the surety.
☐ It depends, if the bank obtained a sufficient guarantee, the bank cannot, for any reason, request the borrower to provide a surety.
【Part 3: Financial and investment planning】
Office workers have in recent years allowed investment amounts to be deducted periodically from their personal salary as a form of financial planning. Which of the following statements is correct? (select one).
☐ A fixed investment involves grasping the timing for diversifying the investment to average the investment cost and reduce the investment risk.
☐ People should reduce (increase) the investment amount when the prices of the fixed investment are favorable (unfavorable).
☐ All of the above are correct.
When the interest rate increases, how will the bond price change?
☐ Increases ☐ Decreases ☐ The two are not related ☐ Depends on the issuer

☐ Unsure.
The return on investment (investment risk) of overseas funds is higher (lower) than that of domestic funds.
☐ Agree ☐ Disagree ☐ Unsure
A monetary fund is mainly associated with investments in the currencies of various countries.
☐ Agree ☐ Disagree ☐ Unsure
An open-end fund is purchased from the issuing investment trust company; however, a closed-end fund must be purchased and sold in the concentrated market through securities brokers.
☐ Agree ☐ Disagree ☐ Unsure
【Part 4: Insurance and retirement planning】
Which of the following factors prompt people to be extra prepared for retirement? (select one).
☐ Return on assets ☐ Inflation rate ☐ Salary growth rate ☐ All of the above
If you are about to retire, which of the following methods are appropriate for you to accumulate your pension fund? (select all options that apply).
☐ Time deposits ☐ Purchasing mutual funds ☐ Purchasing deposit insurance ☐ Purchasing transactions or bonds ☐ Investing in domestic and international stocks ☐ Purchasing derivative products, such as options or futures ☐ Unsure
According to the National Pension Act, which of the following statements is correct? (select one).
☐ Everyone aged between 25 and 65 must participate in the National Pension Insurance, regardless of whether the person has Public Employee Insurance, Labor Insurance, or Farmers Insurance.
☐ Insured persons must cover their own insurance premium, which is not subsidized by the government.
☐ If the insurant failed to pay the insurance premium on time, no delinquency charge will be imposed, but additional interest will be charged.
☐ None of the above.
Which of the following items does the National Pension cover? (select one).
☐ Elderly pensions ☐ Funeral expenses ☐ Pensions to the relatives of the deceased ☐ Pensions for people with disabilities ☐ All of the above.

Table 2
Advanced financial literacy.

Panel A. Advanced financial literacy	Correct
Money management and saving	
According to the Deposit Insurance Act, what is the maximum insured sum per person for deposit protection?	43.15%
When the interest rate declines, what should be chosen when handling fixed deposits?	56.93%
According to current banking practices, which of the following deposits are not covered by interest?	55.12%
Credit and loan management	
Which institute should you apply to for a personal credit report?	52.64%
Under normal circumstances, the longer the loan period, the higher the borrowing rate.	46.35%
In the term "adjustable rate mortgages" for owner-occupied dwellings, the "adjustable rate" refers to the Taiwan Capitalization Weighted Stock Index.	28.46%
The principal and interest that a borrower must pay is referred to as the monthly payment, with the amount depending on what factors?	56.85%
According to the regulations of the Financial Supervisory Commission, the unsecured debt for an individual debtor shall not exceed how many times of the average monthly salary of the debtor?	16.11%
On what period basis is the interest accounted for in revolving loans within the margin purchasing limit?	33.47%
When managing mortgage loans, are banks allowed to require the borrower to provide a surety?	46.72%
Financial and investment Planning	
Office workers have in recent years allowed investment amounts to be deducted periodically from their personal salary as a form of financial planning. Which of the following statements is correct?	50.11%
What changes occur to bond prices when interest rates rise?	39.34%
Overseas funds result in higher returns than domestic funds, and are accompanied with lower risks.	50.30%
Monetary funds mainly refer to investments in the currencies of various countries.	20.11%
Open-end funds can be purchased from the issuing investment firm, but closed-end funds need to be purchased or sold in the concentrated market through a securities broker.	44.31%
Insurance and retirement planning	
What factors prompt individuals to be prepared for retirement?	35.50%
If you are about to retire, which of the following are appropriate to accumulate your pension?	63.82%
According to the current national pension system, which of the following is correct?	15.78%
Which of the following items do national pension benefits include?	64.68%

Panel B. Summary of correct responses

	Less than 3	4–7	8–11	12–15	More than 16
Correct	5.94%	37.43%	41.60%	13.18%	1.85%

Note: See Table B1 for a definition of our variables.

Table 3
Basic and advanced financial literacy across demographics.

	Low	Medium	High	Number
Panel A. Basic financial literacy across demographics				
Age				
20–29 *years*	24.2%	39.8%	36.0%	570
30–39 *years*	24.1%	39.2%	36.7%	765
40–49 *years*	28.7%	40.3%	31.0%	509
50–59 *years*	39.1%	40.2%	20.7%	430
60 *years and older*	48.6%	40.6%	10.8%	249
	Pearson Chi^2 (8) = 117.41			
Gender				
Male	29.4%	39.5%	31.2%	940
Female	30.4%	40.1%	29.5%	1583
	Pearson Chi^2 (2) = 0.813			
Education				
Below junior high school	54.0%	36.8%	9.1%	372
Senior high school	42.0%	38.9%	19.1%	643
Vocational School	27.2%	40.4%	32.5%	456
University	17.0%	42.9%	40.1%	760
Above graduate school	11.3%	37.3%	51.4%	292
Panel B. Advanced financial literacy across demographics				
Age				
20–29 *years*	32.3%	37.2%	30.5%	570
30–39 *years*	27.6%	40.8%	31.6%	765
40–49 *years*	27.1%	44.6%	28.3%	509
50–59 *years*	30.2%	39.5%	30.2%	430
60 *years and older*	37.8%	35.3%	26.9%	249
	Pearson Chi^2 (8) = 16.223			
Gender				
Male	27.9%	40.0%	32.1%	940
Female	31.3%	40.0%	28.7%	1583
	Pearson Chi^2 (2) = 4.521			
Education				
Below junior high school	41.4%	34.7%	23.9%	372
Senior high school	39.3%	43.2%	17.4%	643
Vocational School	26.1%	43.2%	30.7%	456
University	23.4%	39.9%	36.7%	760
Above graduate school	18.2%	34.9%	46.9%	292
	Pearson Chi^2 (8) = 146.974			

Note: See Table B1 for a definition of our variables.

financial heuristics. Their results show that simplifying training programs might improve their effectiveness for less sophisticated individuals. In addition, an analysis of a mandatory counseling program for mortgage applicants by Agarwal et al. (2015b) found the educational value of the program to be rather limited. Instead, they found that counseling programs that were broad based (based on more than a single financial decision) and longer term were more effective (Agarwal et al., 2010).

2.2. Financial disputes

A financial dispute is a complaint about a financial services provider. With the general public possessing only improper and insufficient financial literacy and risk awareness, combined with the existing information asymmetry between financial institutions and the public, fraud cases involving credit cards, online banking, automated teller machines, investment advice, and illegal fundraising occur frequently, incurring substantial suffering and losses to the general public. Financial dispute resolution is an essential aspect of investor protection. However, research addressing this topic is limited. In the context of insurance markets, Gravelle (1993) captures the activity of insurance brokers with respect to unsophisticated customers through an upward shift in demand. Gravelle (1994) also analyzes the compensation structure of brokers and finds that upfront payments reduce the number of customers who become informed, whereas commission charges reduce the number of informed customers who purchase the insurance product. In a similar vein, Stoughton et al. (2011) analyze how intermediaries can be incentivized to market investment products more aggressively to unsophisticated investors. In their analysis of delegated investment management, kickbacks paid by portfolio managers to intermediaries enable investment fund managers to price discriminate across investors with more or less wealth. Inderst and Ottaviani (2012) investigate the determinants of the compensation structure for brokers who advise customers regarding the suitability of financial products. Their model explains why brokers are commonly compensated indirectly through contingent commissions paid by product providers, even though this compensation structure could lead to biased advice. Regarding the fledgling literature on consumer financial protection, our investigation fills the gap by empirically examining the effect of financial literacy on financial disputes.

Table 4
Financial disputes across demographics.

	Never	Medium	High	Number
Basic financial literacy				
Low	74.8%	21.8%	3.4%	757
Medium	79.3%	18.4%	2.3%	1009
High	82.9%	15.9%	1.2%	757
Advanced financial literacy				
Low	80.1%	16.9%	3.0%	757
Medium	73.9%	22.6%	3.5%	1009
High	84.8%	15.2%	0.0%	757
Age				
20–29 *years*	78.25%	18.42%	3.33%	570
30–39 *years*	74.77%	21.70%	3.53%	765
40–49 *years*	74.46%	20.43%	5.11%	509
50–59 *years*	81.86%	15.58%	2.56%	430
60 *years and older*	86.75%	11.24%	2.01%	249
Gender				
Male	77.34%	18.83%	3.83%	940
Female	78.21%	18.51%	3.28%	1583
Marital status				
Unmarried	76.54%	19.86%	3.60%	972
Married	78.72%	17.86%	3.42%	1551
Education				
Below junior high school	83.33%	14.25%	2.42%	372
Senior high school	78.23%	17.57%	4.20%	643
Vocational School	74.78%	20.61%	4.61%	456
University	76.32%	20.39%	3.29%	760
Above graduate school	79.11%	18.84%	2.05%	292
Living Area				
Urban	78.53%	18.26%	3.21%	1807
Rural	76.26%	19.55%	4.19%	716
Profession				
Full-time student	83.62%	14.12%	2.26%	177
Full-time job	76.25%	19.98%	3.77%	1617
Domestic homemaker	76.88%	19.60%	3.52%	398
Retired servant	86.82%	11.63%	1.55%	129
Other	82.18%	14.36%	3.47%	202
Personal annual average income				
Below NTD 370,000	79.36%	17.51%	3.13%	1245
>*NTD* 370,000	75.62%	20.28%	4.10%	853
>*NTD* 680,000	77.59%	18.97%	3.45%	348
>*NTD* 1,240,000	80.52%	16.88%	2.60%	77
Household annual average income				
Below NTD 660,000	77.25%	18.76%	4.00%	901
>*NTD* 660,000	75.78%	20.44%	3.78%	1086
>*NTD* 1,230,000	85.00%	12.50%	2.50%	400
>*NTD* 2,150,000	77.94%	21.32%	0.74%	136

Note: See Table B1 for a definition of our variables. Unmarried respondents included those who were divorced or cohabitating; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work.

3. Data and variable definition

3.1. Data

Our data was collected from the Literacy Survey conducted by Taiwan's FSC in 2011. The survey was conducted according to nationwide proportionate stratified sampling. The reference population is from a 2010 demographic report of 22 counties and cities in Taiwan issued by the Department of Statistics of the Ministry of the Interior, as well as census data on the age, gender, and educational background of the Taiwanese population. Samples gathered from every county and city were allocated using the population ratio relative to the entire nation, and samples of each stratum were determined by the relative ratios of gender, age, and educational background. Thus, the samples of this survey reflect the characteristics of age, gender, and educational background in each county and city.[7] The respondents are at least 20 years of age, and the number of effective samples is 2523.

In the Literacy Survey, financial literacy is defined as financial-related activities in daily life, and financial literacy is divided into nine indicators according to the questions of the questionnaire. Those nine indicators are cash management, savings, credit management, financial planning, insurance and risk prevention, debt management, pension planning, investment management, and financial

[7] The samples use the annual income distribution in Taiwan issued by the Directorate-General of Budget, Accounting and Statistics as a reference, to fit the samples into the Taiwanese population characteristics distribution.

Table 5
Ordered logit regression analysis of financial literacy and financial disputes.

	Model 1			Model 2			Model 3		
Basic financial literacy	−0.232***	(0.042)	[0.793]				−0.224***	(0.049)	[0.799]
Advanced financial literacy				−0.153***	(0.048)	[0.858]	−0.0178	(0.057)	[0.982]
Age (base group: 60 years and older)									
20–29 *years*	0.458*	(0.274)	[1.581]	0.399	(0.274)	[1.490]	0.453*	(0.274)	[1.572]
30–39 *years*	0.578**	(0.248)	[1.782]	0.524**	(0.248)	[1.688]	0.575**	(0.248)	[1.777]
40–49 *years*	0.601**	(0.246)	[1.824]	0.564**	(0.246)	[1.758]	0.601**	(0.246)	[1.823]
50–59 *years*	0.215	(0.242)	[1.240]	0.201	(0.242)	[1.223]	0.216	(0.242)	[1.241]
Male	0.104	(0.112)	[1.110]	0.141	(0.111)	[1.151]	0.106	(0.112)	[1.112]
Married	−0.150	(0.126)	[0.861]	−0.146	(0.126)	[0.864]	−0.150	(0.126)	[0.861]
Education (base group: below junior high school)									
Senior high school	0.202	(0.186)	[1.224]	0.110	(0.184)	[1.116]	0.199	(0.186)	[1.220]
Vocational school	0.429**	(0.206)	[1.535]	0.301	(0.203)	[1.351]	0.428**	(0.206)	[1.534]
University	0.457**	(0.211)	[1.579]	0.288	(0.206)	[1.334]	0.458**	(0.211)	[1.580]
Above graduate school	0.194	(0.256)	[1.214]	0.013	(0.252)	[1.013]	0.197	(0.256)	[1.218]
Urban	−0.060	(0.109)	[0.941]	−0.071	(0.109)	[0.931]	−0.060	(0.109)	[0.942]
Profession (base group: other)									
Full-time student	−0.226	(0.303)	[0.798]	−0.264	(0.302)	[0.768]	−0.222	(0.303)	[0.801]
Full-time job	0.145	(0.214)	[1.156]	0.106	(0.213)	[1.112]	0.144	(0.214)	[1.155]
Domestic homemaker	0.438*	(0.233)	[1.549]	0.406*	(0.232)	[1.501]	0.437*	(0.233)	[1.548]
Retired servant	−0.210	(0.342)	[0.811]	−0.240	(0.341)	[0.786]	−0.214	(0.342)	[0.807]
Personal annual average income (base group: below NTD 370,000)									
NTD 370,000 < *wealth* ≦ *NTD* 680,000	0.135	(0.134)	[1.145]	0.114	(0.134)	[1.121]	0.137	(0.135)	[1.146]
NTD 680,000 < *wealth* ≦ *NTD* 1,240,000	0.195	(0.192)	[1.215]	0.195	(0.192)	[1.215]	0.199	(0.192)	[1.220]
Above NTD 1,240,000	0.241	(0.338)	[1.272]	0.241	(0.339)	[1.272]	0.244	(0.338)	[1.276]
Household annual average income (base group: below NTD 660,000)									
NTD 660,000 < *wealth* ≦ *NTD* 1,230,000	−0.060	(0.122)	[0.942]	−0.083	(0.121)	[0.921]	−0.059	(0.122)	[0.943]
NTD 1,230,000 < *wealth* ≦ *NTD* 2,150,000	−0.545***	(0.189)	[0.580]	−0.596***	(0.189)	[0.551]	−0.543***	(0.190)	[0.581]
Above NTD 2,150,000	−0.130	(0.252)	[0.878]	−0.122	(0.252)	[0.885]	−0.127	(0.252)	[0.881]
Observations	2523			2523			2523		
Pseudo R^2	2.79%			2.10%			2.79%		

Note: The dependent variable of this table is financial disputes. See Table B1 for a definition of our variables. Unmarried respondents included those who were divorced or cohabitating; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

information. To increase the recovery rate and accuracy of the survey, respondents were mainly surveyed through interviews, with only a few respondents answering the questionnaire by mail.

3.2. Measurement of financial literacy

Thus far, there is no standard measurement for financial literacy. For example, in their financial literacy questionnaire, Lusardi and Mitchell (2007a, 2008) designed three questions, but Stango and Zinman (2009) formulated only one. Other studies employed a factor analysis to further divide financial literacy into basic and advanced (van Rooij et al., 2011b); these questionnaires included questions on compound interest rates, inflation, diversification, and the features of stocks and bonds. Lusardi and Mitchell (2007b) conclude on the way of measuring financial literacy in different countries. A study reviewing papers in the last decade (Huston, 2010) argues that surveys on financial literacy should cover basic knowledge (e.g., the time value of money), knowledge of credit loans, knowledge of savings and investments, and knowledge of insurance. In this research, we follow Lusardi and Mitchell (2006) and van Rooij et al. (2011a) to design two modules to measure and evaluate financial literacy. The first set of questions aims to assess basic financial literacy and covers basic topics in four categories: money management and savings, credit and loan management, financial and investment planning, and insurance and pension planning. The second set of questions aims to measure advanced financial knowledge and covers the same four categories. However, a few questions are unique to our module of financial literacy.

The exact wording of the questions measuring basic financial literacy is reported in Box 1. Responses to these questions are reported in Panel A of Table 1. Most respondents answered the inflation question correctly; the percentage of correct responses for this question was 92.43%. However, the percentage of correct answers decreases considerably, to slightly more than 60% for questions related to diversification and stock market risks. Notably, although many respondents answered some individual questions correctly, the percentage of respondents who answered all the basic literacy questions correctly was only 36.18% (Panel B of Table 1). Thus, although many respondents are equipped with some knowledge of financial concepts, basic financial literacy is not widespread.

To be able to classify respondents according to different levels of financial sophistication, we added several other questions to the module. The exact wording of these questions is provided in Box 2. The purpose of these questions was to measure advanced financial knowledge; thus, these questions were much more complicated than those of the previous set. Responses to these questions are reported in Table 2 (Panel A). The percentage of correctly answered questions was much lower than in the first set; only a quarter

Table 6
Robustness checks: Regression analysis of financial literacy and financial disputes, controlling for risk aversion.

	Model 1: Ordered logit		Model 2: Logit	
Basic financial literacy	−0.225***	(0.050)	−0.232***	(0.050)
Advanced financial literacy	−0.018	(0.057)	−0.002	(0.057)
Risk aversion attitude	−0.018	(0.118)	−0.026	(0.118)
Age (Base group: 60 years and older)				
20–29 *years*	0.451	(0.274)	0.447	(0.275)
30–39 *years*	0.574**	(0.248)	0.575**	(0.249)
40–49 *years*	0.600**	(0.246)	0.590**	(0.247)
50–59 *years*	0.215	(0.242)	0.219	(0.242)
Male	0.107	(0.112)	0.109	(0.112)
Married	−0.151	(0.126)	−0.144	(0.127)
Education (base group: below junior high school)				
Senior high school	0.198	(0.186)	0.194	(0.186)
Vocational school	0.427**	(0.206)	0.431**	(0.207)
University	0.457**	(0.211)	0.454**	(0.211)
Above graduate school	0.196	(0.256)	0.190	(0.257)
Urban	−0.060	(0.109)	−0.061	(0.110)
Profession (base group: other)				
Full-time student	−0.220	(0.304)	−0.206	(0.304)
Full-time job	0.144	(0.214)	0.175	(0.214)
Domestic homemaker	0.437*	(0.233)	0.436*	(0.233)
Retired servant	−0.213	(0.342)	−0.177	(0.342)
Personal annual average income (Base group: Below NTD 370,000)				
NTD 370,000 < *wealth* ≦ *NTD* 680,000	0.136	(0.135)	0.111	(0.135)
NTD 680,000 < *wealth*≦ *NTD* 1,240,000	0.198	(0.192)	0.170	(0.193)
Above NTD 1,240,000	0.242	(0.338)	0.210	(0.339)
Household annual average income (Base group: Below NTD 660,000)				
NTD 660,000 < *wealth* ≦ *NTD* 1,230,000	−0.059	(0.122)	−0.039	(0.122)
NTD 1,230,000 < *wealth* ≦ *NTD* 2,150,000	−0.544***	(0.190)	−0.527***	(0.190)
Above NTD 2,150,000	−0.128	(0.252)	−0.077	(0.254)
Observations	2523		2523	
Pseudo R^2 (%)	2.79%		3.11%	

Note: The dependent variable of Model 1 is financial disputes. See Table B1 for a definition of our variables. In Model 2, we create a dummy variable equals one if the respondent ever had a financial dispute (if the answer is: (1) When the salesman promoted this product, I bought it immediately but later regretted the decision or (2) I bought this product through telephone marketing or mail marketing, but later regretted the decision or both). Then we use a logit model to investigate the relationship between financial disputes and financial literacy. Unmarried respondents included those who were divorced or cohabitating; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

of the respondents knew the meaning of a capitalization-weighted stock index and only 20% knew how monetary funds work. Respondents also exhibited difficulty in grasping the concept of the current national pension system. Panel B of Table 2 shows that only a tiny portion of the respondents (1.85%) was able to correctly answer more than 16 of the advanced literacy questions. This is a major finding because most models of portfolio choice assume that investors are knowledgeable and well-informed. Instead, the findings in Tables 1 and 2 show that financial literacy should not be taken for granted. These findings echo the results found in U.S. surveys such as the Health and Retirement Study and the Survey of Consumers (Lusardi and Mitchell, 2006; Hilgert and Hogarth, 2002).[8]

We constructed a financial literacy index based on these two sets of questions. We first conducted a preliminary factor analysis using all (i.e., 37) questions in the financial literacy module. Consistent with the way we devised the questions, the preliminary factor analysis suggested that there were two main factors with different loadings on two types of questions: the simple literacy questions (18 questions) and the advanced literacy questions (19 questions). We further split the questions into two subgroups and again performed a factor analysis on the two sets separately. In this way, we constructed two literacy indices: a first index potentially related to basic knowledge and a second index measuring advanced financial knowledge. The detailed factor analysis regarding our two sets of questions is reported in Appendix A, Table A.1.

To confirm the validity of these two indices and their features, we report the distribution of the financial literacy indices across demographic variables such as age, gender, and education in Table 3. Basic literacy is the highest among the respondents aged below 40 years (particularly those between 30 and 39 years), and declines slightly at an older age (61 years or older). Table 3 also shows that there are no gender differences in basic literacy, which differs from the finding reported by Lusardi and Mitchell (2008). Our findings are also different from those in the literature and other literacy surveys (Lusardi and Mitchell, 2007b). As expected, basic financial literacy increased strongly with the number of years of education. Those with the lowest level of basic financial literacy were concentrated in the lowest educational categories: below junior high school, and senior high school. Furthermore, those with a higher university education fell in the highest quartile of the basic literacy index.

[8] Finding true level of financial knowledge is a difficult task. Especially, using survey questions to form measures of financial literacy are often surrounded with noises and measurement errors (see van Rooij et al., 2011a). One way to overcome this weakness is to ask respondents to reply questions on self-reported understanding of economics. However, it is pity that our survey does not ask respondents to report their understanding of economics. We leave this in the future study and hope that future survey may take this measurement error issue into account in their estimation of financial literacy. We thank the referee to point this out for us.

Table 7
Regression analysis of financial literacy and aggression in handling financial disputes.

	Model 1: Full sample			Model 2: Subsample		
Basic financial literacy	0.461***	(0.039)	[1.585]	0.463***	(0.075)	[1.588]
Advanced financial literacy	0.242***	(0.041)	[1.273]	0.166	(0.107)	[1.181]
Age (base group: 60 years and older)						
20–29 *years*	−0.014	(0.188)	[0.986]	−0.074	(0.474)	[0.929]
30–39 *years*	−0.175	(0.166)	[0.839]	−0.364	(0.428)	[0.695]
40–49 *years*	−0.061	(0.165)	[0.941]	−0.071	(0.430)	[0.931]
50–59 *years*	−0.055	(0.155)	[0.946]	−0.078	(0.418)	[0.925]
Male	−0.175**	(0.081)	[0.840]	−0.394**	(0.184)	[0.683]
Married	0.046	(0.093)	[1.047]	−0.054	(0.211)	[0.947]
Education (base group: below junior high school)						
Senior high school	0.223*	(0.129)	[1.249]	0.683**	(0.326)	[1.979]
Vocational school	0.229	(0.146)	[1.258]	1.268***	(0.353)	[3.552]
University	0.234	(0.148)	[1.263]	1.124***	(0.369)	[3.078]
Above graduate school	0.138	(0.176)	[1.148]	0.851**	(0.429)	[2.342]
Urban	0.086	(0.081)	[1.090]	0.055	(0.176)	[1.056]
Profession (base group: others)						
Full-time student	0.011	(0.209)	[1.011]	0.323	(0.496)	[1.381]
Full-time job	−0.349**	(0.151)	[0.706]	0.220	(0.349)	[1.246]
Domestic homemaker	−0.705***	(0.162)	[0.494]	0.349	(0.398)	[1.417]
Retired servant	−0.575***	(0.215)	[0.563]	0.511	(0.606)	[1.666]
Personal annual average income (Base group: Below NTD 370,000)						
NTD 370,000 < *wealth* ≦ *NTD* 680,000	−0.156	(0.100)	[0.855]	−0.465**	(0.217)	[0.628]
NTD 680,000 < *wealth* ≦ *NTD* 1,240,000	0.053	(0.138)	[1.054]	−0.077	(0.304)	[0.925]
Above NTD 1,240,000	0.232	(0.239)	[1.261]	−0.127	(0.539)	[0.881]
Household annual average income (Base group: Below NTD 660,000)						
NTD 660,000 < *wealth* ≦ *NTD* 1,230,000	0.254***	(0.090)	[1.289]	0.318	(0.205)	[1.375]
NTD 1,*230,000* < *wealth* ≦ *NTD* 2,150,000	0.123	(0.124)	[1.131]	0.427	(0.315)	[1.532]
Above NTD 2,150,000	−0.105	(0.184)	[0.901]	0.087	(0.412)	[1.090]
Observations	2523			529		
Pseudo R^2	6.37%			6.96%		

Note: The dependent variable of this table is aggression in handling financial disputes. See Table B1 for a definition of our variables. Unmarried respondents included those who were divorced or cohabitating; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Considering the responses of the advanced financial knowledge questions in Table 3 (Panel B), advanced literacy was again high among those aged below 40 years (particularly those between 30 and 39 years), and declined slightly at an older age (61 years or older). Gender differences were more significant than age differences when considering advanced literacy. A large percentage of women exhibited lower advanced literacy than men: 31.3% and 28.7% of women were in the first (lowest) and third quartiles of the literacy distribution, respectively, whereas the corresponding figures for men were 27.9% and 32.1%, respectively. Furthermore, we again found a strong relationship between education and advanced literacy. A large fraction (41.4%) of respondents with only a primary school education had the lowest level of literacy (first quartile). As we moved to higher levels of education, respondents exhibited higher levels of literacy.

3.3. Measurement of financial disputes

Our study adopted the answer to multiple-choice Question 10.9 of the Literacy Survey to measure whether people had experience in financial disputes. The question was: "Have you ever encountered the following situations while purchasing financial products?" The proposed three choices were: (1) When the salesman promoted this product, I bought it immediately but later regretted the decision; (2) I bought this product through telephone marketing or mail marketing, but later regretted the decision; and (3) I do not have such an experience. If the respondent chose both (1) and (2), then he or she was defined as having high financial dispute experience. If (1) or (2) was chosen, then the respondent was defined as having medium financial dispute experience. If only (3) was chosen, then the respondent had no financial dispute experience.

3.4. Measurement of aggression in handling financial disputes

The Literacy Survey also provided a multiple-choice question for investors facing financial disputes.[9] It asks, "what kind of relieving action will you take when you encounter a dispute in purchasing a financial product?" The five proposed choices were: (1) Discuss with or complain to the financial institution that sold the product; (2) Complain through the government's antifraud hotline[10]; (3) Complain through the consumer service hotline of the Consumer Protection Committee, Executive Yuan[11]; (4) Discuss with friends and

[9] See Question 10.10 of the Literacy Survey.
[10] The hotline number is 165.
[11] The hotline number is 1950.

Table 8
Subsample analysis by restricting the pre-retirement sample.

Dependent Variables	Model 1: Financial disputes			Model 2: Aggression in resolving financial disputes		
Basic financial literacy	−0.222***	(0.051)	[0.801]	0.463***	(0.040)	[1.588]
Advanced financial literacy	−0.040	(0.058)	[0.960]	0.232***	(0.042)	[1.261]
Risk aversion attitude	0.016	(0.120)	[1.017]			
Age (base group: 60 years and older)						
20–29 *years*	0.639**	(0.303)	[1.895]	−0.067	(0.199)	[0.935]
30–39 *years*	0.766***	(0.279)	[2.150]	−0.214	(0.179)	[0.808]
40–49 *years*	0.826***	(0.277)	[2.283]	−0.089	(0.177)	[0.915]
50–59 *years*	0.474*	(0.278)	[1.606]	−0.030	(0.174)	[0.970]
Male	0.128	(0.114)	[1.137]	−0.163**	(0.083)	[0.849]
Married	−0.177	(0.129)	[0.838]	−0.033	(0.096)	[1.033]
Education (base group: below junior high school)						
Senior high school	0.083	(0.193)	[1.086]	0.222	(0.136)	[1.248]
Vocational school	0.430**	(0.213)	[1.537]	0.251	(0.153)	[1.286]
University	0.416*	(0.217)	[1.516]	0.275*	(0.155)	[1.317]
Above graduate school	0.192	(0.261)	[1.211]	0.179	(0.181)	[1.196]
Urban	−0.088	(0.111)	[0.916]	0.061	(0.083)	[1.063]
Profession (Base group: others)						
Full-time student	−0.233	(0.304)	[0.792]	0.002	(0.209)	[1.002]
Full-time job	0.140	(0.215)	[1.151]	−0.335**	(0.153)	[0.715]
Domestic homemaker	0.449*	(0.234)	[1.566]	−0.706***	(0.161)	[0.494]
Personal annual average income (Base group: Below NTD 370,000)						
NTD 370,000 < *wealth* ≦ *NTD* 680,000	0.127	(0.137)	[1.135]	−0.201**	(0.103)	[0.818]
NTD 680,000 < *wealth* ≦ *NTD* 1,240,000	0.206	(0.196)	[1.228]	0.061	(0.142)	[1.063]
Above NTD 1,240,000	0.160	(0.357)	[1.173]	0.097	(0.248)	[1.102]
Household annual average income (Base group: Below NTD 660,000)						
NTD 660,000 < *wealth* ≦ *NTD* 1,230,000	−0.079	(0.124)	[0.924]	0.266***	(0.093)	[1.304]
NTD 1,230,000 < *wealth* ≦ *NTD* 2,150,000	−0.513***	(0.192)	[0.599]	0.128	(0.127)	[1.137]
Above NTD 2,150,000	−0.230	(0.261)	[0.794]	−0.125	(0.189)	[0.882]
Observations	2394			2394		
Pseudo R^2	2.84%			6.21%		

Note: The dependent variable of Model 1 is financial disputes and dependent variable of Model 2 is aggression in handling financial disputes. See Table B1 for a definition of our variables. Unmarried respondents included those who were divorced or cohabitating; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

relatives; and (5) Complain to the Bankers Association of the R.O.C., the Taiwan Insurance Institute, and the Securities and Futures Investors Protection Center.[12] Respondents were allowed to make more than one choice. The more alternatives they chose, the more their attitude toward handling financial disputes was considered aggressive. The scale of this response ranged from 0 to 5.

To facilitate a quick overview of our explanatory variables, we provide the definitions of the dependent and independent variables examined in our study in Appendix B, Table B1.

4. Empirical analysis

4.1. Empirical strategy

We concentrate on the relation between financial literacy and financial disputes. Table 4 presents the levels of financial dispute experience across different levels of financial literacy. The level of financial disputes decreased sharply with literacy. Even when considering basic literacy, which measures basic knowledge and the ability to do simple calculations, we find that those with a low level of basic financial literacy were more likely to have high or medium levels of financial dispute experience (25.2%).[13] By contrast, people with a high basic financial literacy had the lowest rates of high and medium levels of financial dispute experience (17.1%), and the highest possibility of not encountering any financial dispute at all (82.9%). However, the relationship becomes much weaker when we consider the advanced literacy index. High and medium levels of financial dispute experience are concentrated among those with a medium advanced literacy; only 19.9% and 15.2% of respondents of low and high advanced literacy, respectively, encountered any financial dispute. The results also show that elderly people had the highest percentage of those who had not experienced any financial dispute (86.75%). A large percentage of retired respondents had no financial dispute experience (86.82%), and they had the lowest numbers

[12] Three other alternatives were also available in the original question: 1. No idea what to do and did not take any action; 2. It would be too troublesome and I just let it go; 3. Have no clue at all.

[13] In this study, the scores for financial literacy were sorted in descending order, and the level of financial literacy was categorized into high, medium, and low groups according to the top 30%, middle 40%, and bottom 30% of people.

Table 9
Robustness checks: Regression analysis of financial literacy and financial disputes using survey data from 2007, 2009, and 2011.

	Ordered logit		Ordered probit	
Financial literacy	−0.0402**	(0.0171)	−0.0246**	(0.0096)
Age (base group: 60 years and older)				
20–29 *years*	0.6956***	(0.1695)	0.3889***	(0.0918)
30–39 *years*	0.8800***	(0.1548)	0.4816***	(0.0834)
40–49 *years*	0.6188***	(0.1523)	0.3521***	(0.0816)
50–59 *years*	0.3414**	(0.1485)	0.1726**	(0.0792)
Male	0.1658**	(0.0668)	0.0987***	(0.0374)
Married	0.0040	(0.0801)	−0.0056	(0.0452)
Education (base group: below junior high school)				
Senior high school	0.1557	(0.1037)	0.0881	(0.0569)
Vocational school	0.3861***	(0.1189)	0.2106***	(0.0660)
University	0.2140*	(0.1216)	0.0998	(0.0673)
Above graduate school	0.1147	(0.1613)	0.0384	(0.0896)
Urban	−0.2138***	(0.0682)	−0.1185***	(0.0384)
Profession (base group: other)				
Full-time student	−0.1295	(0.1830)	−0.0661	(0.1007)
Full-time job	0.0743	(0.1215)	0.0486	(0.0674)
Domestic homemaker	0.3188**	(0.1448)	0.1869**	(0.0803)
Retired servant	0.1032	(0.1900)	0.0764	(0.1029)
Personal annual average income (base group: Below NTD 370,000)				
NTD 370,000 < *wealth* ≦ *NTD* 680,000	0.2949***	(0.0843)	0.1748***	(0.0474)
NTD 680,000 < *wealth* ≦ *NTD* 1,240,000	0.2087*	(0.1246)	0.1351	(0.0693)
Above NTD 1,240,000	0.1203	(0.2532)	0.0797	(0.1391)
Household annual average income (base group: below NTD 660,000)				
NTD 660,000 < *wealth* ≦ *NTD* 1,230,000	−0.1522	(0.1748)	−0.0949	(0.0419)
NTD 1,230,000 < *wealth* ≦ *NTD* 2,150,000	−0.5397***	(0.1191)	−0.3169***	(0.0653)
Above NTD 2,150,000	−0.1945	(0.1699)	−0.1217	(0.0952)
Year 2009 dummy	0.1304	(0.0842)	0.0644	(0.0466)
Year 2011 dummy	0.3167***	(0.0828)	0.1799***	(0.0461)
Observations	6570		6570	
Pseudo R^2	2.23%		2.27%	

Note: The dependent variable of this table is financial disputes. See Table B1 for a definition of our variables. Unmarried respondents included those who were divorced or cohabitation; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

for high (1.55%) and medium (11.63%) levels of financial dispute experience, respectively. Finally, other personal features such as gender, marital status, education, living area, and average annual personal or household income showed insignificant relationships in relation to financial dispute experience. We further investigated whether this finding was confirmed by a multivariate analysis.

We used the following ordered logit model with the sample selection[14]:

$$P(A_i = 1) = \Phi(-\beta' X_i)$$

$$P(A_i = 2) = \Phi(k_1 - \beta' X_i) - \Phi(-\beta' X_i) \quad (1)$$

$$P(A_i = 3) = 1 - \Phi_2(k_1 - \beta' X_i)$$

where A_i presents the level of financial dispute experience (i.e., $A_i = 1$ for no experience, $A_i = 2$ for medium experience, $A_i = 3$ for high experience). Φ is the probability density function for the logistic distribution. β is a vector of parameters and k_1 is the threshold parameter. X_i is a vector of explanatory variables that includes financial literacy and sociodemographic controls (age, gender, marital status, educational background, living area, work status, average annual personal income, and average annual household income).

4.2. Baseline results

Table 5 presents the estimates using three different specifications: Model 1, in which we added our measure of basic financial literacy; Model 2, in which we added our measure of advanced financial literacy; and Model 3, in which we added both basic and advanced financial literacy.

[14] See Greene (2003) for a description and discussion of the ordered logit model. We also estimated our model by using ordered probit and ordinary least squares regressions and the findings proved to be qualitatively similar. We do not report the results for the sake of brevity; they are available from the authors upon request.

Table 10
Robustness checks: Regression analysis of financial literacy and aggression in handling financial disputes, using survey data from 2007, 2009, and 2011.

	Ordered logit		Ordered probit	
Financial literacy	0.2219***	(0.0127)	0.1259***	(0.0074)
Age (base group: 60 years and older)				
20–29 *years*	0.4130***	(0.1144)	0.2449***	(0.0666)
30–39 *years*	0.3122***	(0.1032)	0.2002***	(0.0599)
40–49 *years*	0.2531**	(0.0993)	0.1790***	(0.0578)
50–59 *years*	0.3287***	(0.0946)	0.2078***	(0.0553)
Male	−0.0471	(0.0484)	−0.0272**	(0.0282)
Married	0.0643	(0.0599)	0.0234	(0.0349)
Education (base group: below junior high school)				
Senior high school	0.5367***	(0.0719)	0.3098***	(0.0420)
Vocational school	0.5822***	(0.0859)	0.3327***	(0.0501)
University	0.6465***	(0.0861)	0.3710***	(0.0501)
Above graduate school	0.5894***	(0.1149)	0.3305***	(0.0666)
Urban	0.0545	(0.0503)	0.0304	(0.0294)
Profession (base group: other)				
Full-time student	0.1254	(0.1268)	0.0678	(0.0732)
Full-time job	−0.2260***	(0.0864)	−0.1416***	(0.0498)
Domestic homemaker	−0.4393***	(0.1019)	−0.2525***	(0.0589)
Retired servant	−0.3607***	(0.1233)	−0.2370***	(0.0720)
Personal annual average income (base group: below NTD 370,000)				
NTD 370,000 < *wealth* ≦ *NTD* 680,000	−0.0233	(0.0621)	−0.0232	(0.0361)
NTD 680,000 < *wealth* ≦ *NTD* 1,240,000	−0.0261	(0.0881)	−0.0312	(0.0516)
Above NTD 1,240,000	0.0155	(0.1691)	0.0143	(0.0989)
Household annual average income (base group: below NTD 660,000)				
NTD 660,000 < *wealth* ≦ *NTD* 1,230,000	0.2420***	(0.0544)	0.1302***	(0.0317)
NTD 1,230,000 < *wealth* ≦ *NTD* 2,150,000	0.2363***	(0.0804)	0.1319***	(0.0468)
Above NTD 2,150,000	0.1821	(0.1214)	0.0915	(0.0707)
Year 2009 dummy	−0.4459***	(0.0597)	−0.2518***	(0.0348)
Year 2011 dummy	−0.2604***	(0.0598)	−0.1642***	(0.0349)
Observations	6570		6570	
Pseudo R^2	4.68%		4.41%	

Note: The dependent variable of this table is aggression in handling financial dispute. See Table B1 for a definition of our variables. Unmarried respondents included those who were divorced or cohabitating; married respondents included those who were separated or widowed. Other professions included temporary workers, the unemployed, and patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

According to Model 1, the coefficient of basic financial literacy was significantly negative, suggesting that people with a higher level of basic financial literacy are less likely to experience financial disputes. The estimates are sizable: when the level of basic financial literacy increased by one unit, the probability of experiencing financial disputes decreased by 20.7%.[15] Hence, it suggests that educating the public can reduce financial disputes. The coefficients for the control variables were also consistent with our intuition. People aged 30–49 years, university graduates, and housewives were most likely to have experienced financial disputes. By contrast, those with a medium average annual household income (NTD 1.23–2.15 million) showed the lowest level of financial dispute experience. Notably, people with a higher advanced financial literacy were also less likely to experience financial disputes, according to Model 2. However, after accounting for basic literacy, the estimate of advanced financial literacy changed much. A notable finding is that the effect of advanced financial literacy was not statistically significant.

Notably, one of the variables that is missing from our empirical specification is a measure of risk aversion. If financially sophisticated consumers are relatively more risk averse and do not purchase financial products that they are not familiar with, we expect them to incur fewer financial disputes. To control for risk attitudes, we created a dummy variable, *risk aversion attitude*, which equals one for risk-averse respondents that only invest in deposits and zero otherwise.[16] When risk aversion was included in the model we found that both the ordered logit (Model 1) and logit model (Model 2) estimates of the basic financial literacy index remained significantly negative (Table 6). Thus, the inclusion of risk aversion still supports our argument that financial literacy is negatively related to financial disputes.

4.3. Financial literacy and the level of aggression in handling financial disputes

We examined the responses of investors after experiencing a financial dispute. According to Model 1 in Table 7, the positive coefficients for the two types of financial literacy suggests that both basic and advanced financial literacy played a significantly

[15] When the level of financial literacy increased by one unit, the probability of financial dispute experience decreased by $(0.793–1) * 100\% = -20.7\%$.
[16] The Literacy Survey also provides multiple-choice Question 9.1 for investors, which asks, "Do you have the following investments." The proposed choices are: (1) Current deposits; (2) Time deposits; (3) Funds; (4) Stocks; (5) Bonds; (6) Investments in the private financial sector; (7) Insurance; (8) Real estate; (9) Options and futures; and (10) Currency.

positive role in the level of aggression in handling a financial dispute. People with a higher financial literacy were inclined to aggressively handle financial disputes, even if it may not have been the optimal method of solving the dispute. Moreover, when the level of basic (advanced) financial literacy increased by one unit, the probability of the level of aggression in handling financial disputes increased by 58.5% (27.3%). Basic financial literacy still played a larger role than advanced financial literacy. In addition, men were relatively less positive than women in handling financial disputes. Finally, those whose average annual household income fell into lower categories (NTD 0.66–1.23 million) were more likely to aggressively handle financial disputes than other income groups.

However, testing on handling financial disputes should be conditional on having disputes *ex ante*. In Model 2 (Table 7), we only applied the ordered logit model for those with financial dispute experience, and the results supported the empirical evidence in Model 1. Now, to examine the robustness of our estimated results, we consider two different estimations. First, we estimated our model with the Heckman two-stage selection model. The first step is the estimation of the selection equation, of which the predicted inverse Mills ratio is inserted into the second equation of outcome. To avoid the multicollinearity between the predicted inverse Mills ratio term and the remaining covariates in the outcome equation, we consider one additional dummy variable of *initiative to collect financial Information* to impose the "exclusion restriction." Also, to avoid endogeneity in the selection equation, we further employed the instrumental variable (IV) of *financial information main provided by conversations with family members and friends*. The selection equation is estimated by the two-stage regression for verification,[17] see Hsiao et al. (2014, 2015b) for detailed method in IV approach. Our empirical results are presented in Appendix C, Panel A and Panel B in Table C1 still verified the findings presented in Table 7.

Our second method for examining robustness is the consideration of the treatment effect model. The estimated results remain qualitatively similar. We report these results in Appendix C, Panel C in Table C1.

4.4. Robustness test

4.4.1. Subsample analysis by restricting the pre-retirement sample

Previous literatures (like, Gupta and Murray, 2003) has shown that consumers who have retired have quite different characteristics concerns and preferences. A key difference between pre-retirement and post-retirement decisions is that the post-retirement decisions have an immediate impact. Another key difference is the capacity to recover from a poor outcome. Therefore, we consider the subsample analysis for not retired people.

According to Model 1 in Table 8, we show that basic financial literacy retains a significantly negative influence on the experience financial disputes, suggesting that not retired people with a higher level of basic financial literacy are less likely to experience financial disputes. In addition, Model 2 in Table 8, the positive coefficients for the two types of financial literacy suggest that both basic and advanced financial literacy still played a significantly positive role in the level of aggression in handling a financial dispute. In other words, the results of robustness test in Table 8 remain supportive to the empirical evidence in Tables 6 and 7.

4.4.2. Survey data obtained from the 2007, 2009, and 2011 National Financial Literacy Survey

To test the reliability and validity of the empirical results and prove that the samples were selected randomly, we integrated the survey data obtained from the 2007, 2009, and 2011 National Financial Literacy Survey and targeted respondents aged 20 or older to analyze the effects of financial literacy on financial dispute experience. A total of 6,570 samples were obtained. However, because the survey questions varied over the three years, we could only select the questions that were identical to redevelop the indices for financial literacy before conducting the ordered logit regression analysis; these were Questions 4, 11, 13, 14, 15, 16, 17, 20, 22, and 30 (see Appendix A for more details).[18]

The results in Table 9 show that financial literacy demonstrated a significantly negative influence on the level of financial dispute experience. They confirm the findings of Table 5, which showed that housewives had higher chances of encountering financial disputes, but respondents with a medium average annual household income (NTD 1.23–2.15 million) had lower chances of encountering financial disputes. The results of the robustness test in Table 9 support the empirical evidence in Table 5. Table 9 further confirms that men had a higher possibility, relative to women, of encountering financial disputes.

We employed the same data in the robustness test to examine the robustness of the relationship between financial literacy and aggression in handling financial disputes. Table 10 confirms the results of Table 7, that financial literacy had a significantly positive relationship with aggression in handling financial disputes.

5. Conclusion

The influence of financial literacy on financial disputes is critical for supervisors. Our results demonstrate that financial literacy can reduce financial disputes. Hence, the government should actively educate people to gain more financial knowledge to reduce financial disputes. We also find that people aged 30–49 years, university graduates, and housewives are most likely to have experienced a financial

[17] The challenge to the application of the instrument approach is to find suitable instruments variable (van Rooij et al., 2012). It is for this reason that we consider using a treatment effect model that directly estimates the selection process (Heckman, 1997; Greene, 2003).

[18] Respondent scores were calculated according to the answers provided, where a correct answer was scored one and an incorrect answer was scored zero; thus, the highest attainable score was ten and the lowest was zero.

dispute. By contrast, those with a medium average annual household income (NTD 1.23–2.15 million) showed the lowest levels of financial dispute experience.

We also examined the responses of people encountering financial disputes. We find that people with more financial literacy tended to exhibit more positive attitudes toward resolving financial disputes. Our results show that financial literacy encouraged people to engage in dialog with the sellers of financial products rather than using other methods, such as violence. In addition, women and people with a lower average annual household income (NTD 0.66–1.23 million) were prone to be more positive in resolving financial disputes. Thus, not only the level of financial literacy, but also personal features such as gender, work status, and average annual household income, were key factors affecting the chances of financial disputes arising and the resolution of such disputes.

Our conclusions are useful for the government, practitioners, and the public. If the public equips itself with financial literacy and correctly leverages financial tools, we can preemptively reduce financial disputes and facilitate positive methods and attitudes for resolving such disputes.

Appendix A

Table A.1
Constructing indices of financial literacy.

Panel A. Basic financial literacy questions	Factor loadings
1.When suspecting or suffering from a fraud, how does one apply to retrieve the remaining balance of a "watch-listed account"?	0.2688
2. When gas and electricity prices rise, our cost of living is reduced and our purchasing power is elevated.	0.2774
3. In the case of an excessively high inflation rate, the purchasing power of the same NTD 1000 is reduced.	0.3366
4. Do you know how to maintain your credit rating?	0.5053
5. How will a bad credit record affect an individual?	0.3471
6. With regard to credit cards, which of the following options is correct?	0.3033
7. When purchasing a car through installments, the total expenditure is usually higher than a lump-sum cash payment.	0.5309
8. When individuals apply for credit cards, the bank consults the Joint Credit Information Center to inquire into the applicants' credit status; did you know that the bank needed your approval to do this?	0.3937
9. Which of the following investments are more likely to suffer from a capital loss?	0.5796
10. What is your view on diversified investments in the stock market?	0.3827
11. Regarding the relationship between risks and returns on the stock market, is an investment with a higher return generally more risky?	0.5339
12. After buying life insurance, is there any possibility for revocation if it is no longer needed?	0.2917
13. A person can cope with the risks of birth, senility, illness, and death by means of insurance.	0.1712
14. The risks in life can be reduced by purchasing insurance; thus, the higher the insurance coverage is, the more favorable it is for mitigating risks.	0.2592
15. Domestic insurance companies can be divided into two types: life insurance and product insurance.	0.3060
16. Insurance companies are the most secured, thus cannot go bankrupt.	0.3268
17. Because of the National Health Insurance, no other extra medical insurance is needed.	0.4080
18. Numerous insurance products (e.g., investment, exponent, and liability types) can also be purchased for security and investment purposes; thus, financial risks exist and policy holders should be cautious.	0.4215
Panel B. Advanced financial literacy questions	**Factor loadings**
19. According to the Deposit Insurance Act, what is the maximum insured sum per person for deposit protection?	0.2763
20. When the interest rate declines, what should be chosen when handling fixed deposits?	0.4358
21. According to current banking practices, which of the following deposits are not covered by interest?	0.4368
22. Which institute should you apply to for a personal credit report?	0.1867
23. Under normal circumstances, the longer the loan period, the higher the borrowing rate.	0.1465
24. In the term "adjustable rate mortgages" for owner-occupied dwellings, the "adjustable rate" refers to the Taiwan Capitalization Weighted Stock Index.	0.4216
25. The principal and interest that a borrower must pay is referred to as the monthly payment, with the amount depending on what factors?	0.4741
26. According to the regulations of the Financial Supervisory Commission, the unsecured debt for an individual debtor shall not exceed how many times of the average monthly salary of the debtor?	0.3503
27. On what period basis is the interest accounted for in revolving loans within the margin purchasing limit?	0.1463
28. When managing mortgage loans, are banks allowed to require the borrower to provide a surety?	0.3781
29. Office workers have in recent years allowed investment amounts to be deducted periodically from their personal salary as a form of financial planning. Which of the following statements is correct?	0.0237
30. What changes occur to bond prices when interest rates rise?	0.4441
31. Overseas funds result in higher returns than domestic funds, and are accompanied with lower risks.	0.5382
32. Monetary funds mainly refer to investments in the currencies of various countries.	0.2725
33. Open-end funds can be purchased from the issuing investment firm, but closed-end funds need to be purchased or sold in the concentrated market through a securities broker.	0.3931
34. What factors prompt individuals to be prepared for retirement?	0.1494
35. If you are about to retire, which of the following are appropriate to accumulate your pension?	0.0661
36. According to the current national pension system, which of the following is correct?	0.1656
37. Which of the following items do national pension benefits include?	0.0577

Appendix B

Table B1
Definitions of the main variables.

Variable name	Definition
Dependent variables	
Financial dispute	Our study adopts the answer to Question 10.9 of the Literacy Survey to measure whether people had experience in financial disputes. The question was: "Have you ever encountered the following situations while purchasing financial products?" The proposed three choices were: (1) When the salesman promoted this product, I bought it immediately but later regretted the decision; (2) I bought this product through telephone marketing or mail marketing, but later regretted the decision; and (3) I do not have such an experience. If the respondent chose both (1) and (2), then he or she was defined as having high financial dispute experience. If (1) or (2) was chosen, then the respondent was defined as having medium financial dispute experience. If only (3) was chosen, then the respondent had no financial dispute experience.
Aggression in handling financial disputes	Our study adopts the answer to Question 10.10 of the Literacy Survey to measure the aggression in handling financial disputes. The question asks, "what kind of relieving action will you take when you encounter a dispute in purchasing a financial product?" The five proposed choices were: (1) Discuss with or complain to the financial institution that sold the product; (2) Complain through the government's antifraud hotline; (3) Complain through the consumer service hotline of the Consumer Protection Committee, Executive Yuan; (4) Discuss with friends and relatives; and (5) Complain to the Bankers Association of the R.O.C., the Taiwan Insurance Institute, and the Securities and Futures Investors Protection Center. Respondents were allowed to make more than one choice. The more alternatives they chose, the more their attitude toward handling financial disputes was considered aggressive. The scale of this response ranged from 0 to 5.
Independent variables	
Basic financial literacy	This was measured using questions covering the basic topics of money management and savings, credit and loan management, financial and investment planning, and insurance and pension planning. The exact wording of the questions is reported in Box 1 and details about the factor analysis are reported in Appendix A.
Advanced financial literacy	This was measured using questions covering advanced financial knowledge in the topics of money management and savings, credit and loan management, financial and investment planning, and insurance and pension planning. The exact wording of the questions is reported in Box 2 and details about the factor analysis are reported in Appendix A.
Financial literacy	This was measured using questions from the 2007, 2009, and 2011 National Financial Literacy Survey. Because the questions for the three years varied, we selected only the questions that were identical in the three questionnaires to develop the indices for financial literacy; these were Questions 4, 11, 13, 14, 15, 16, 17, 20, 22, and 30 (see Appendix A for more details). Respondent scores were calculated according to the answers provided, where a correct answer was scored one and an incorrect answer was scored zero; thus, the highest attainable score was ten and the lowest was zero.
Risk aversion attitude	A dummy variable that equals one for risk-averse respondents who only invest in deposits.

Appendix C

Table C1
Robustness Test.

Panel A Heckman two-stage regression model	First stage		Second stage	
Constant	−0.591***	(0.195)	0.672***	(0.730)
Basic financial literacy	−0.136***	(0.029)	0.320***	(0.069)
Advanced financial literacy	−0.036	(0.034)	0.096	(0.062)
Initiative to collect financial Information	0.251***	(0.062)		
Demographics control variables	Yes		Yes	
Mills Lambda	−0.733	(0.529)		
Observations	2523			
Panel B Instrument variable regression model	First stage		Second stage	
Constant	0.368***	(0.060)	−2.248**	(1.137)
Basic financial literacy	−0.048***	(0.010)	0.563***	(0.143)
Advanced financial literacy	−0.005	(0.011)	0.208***	(0.079)
Financial disputes			6.751**	(2.931)
Instrument variable	0.049**	(0.021)		
Demographics control variables	Yes		Yes	
Observations	2523			

Table C1 (*continued*)

Panel C Treatment effect regression model-MLE	First stage		Second stage	
Constant	−0.715***	(0.184)	−0.442**	(0.181)
Basic financial literacy	−0.134***	(0.028)	0.357***	(0.029)
Advanced financial literacy	−0.003	(0.032)	0.144***	(0.032)
Financial disputes			2.052***	(0.110)
Demographics control variables	Yes		Yes	
Mills Lambda	−1.095	(0.058)		
Observations	2523			

Note: The dependent variable of the first-stage is financial dispute and dependent variable of the second-stage is aggressiveness of resolving financial dispute. Please see Table B1 for definition of our variables. The instrumental variable in Panel B is *financial information main provided by conversations with family members and friends.* Unmarried included: Divorce and Cohabitation; Married included: Separated and Widowed. Others in profession included: temporary workers, Unemployment and for some reason or patients unable to work. Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.

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