

Financial Awareness and Its Role in Financial Behavior

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Ning Tang¹

Associate Professor
Finance Department, Fowler College of Business
San Diego State University
San Diego, CA 92182-8236
Tel: 619.594.2082
Email: ntang@sdsu.edu

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Abstract

This paper develops a novel search-based financial awareness index based on the Search Volume Index (SVIs) from Google Trends. The index measures individuals' attention to specific financial topics, including education planning, credit management, and retirement planning, as well as their efforts to acquire relevant knowledge. The analysis reveals significant time-series and cross-sectional heterogeneity in financial awareness in the general population. Using the index, I find that a higher level of financial awareness correlates with higher balances in 529 saving plans, lower credit card delinquency rates, and more savings in individual retirement accounts. Moreover, the paper confirms the significant role of media-based public education in shaping financial awareness. By exploring the often-overlooked dimension of "financial awareness" in financial literacy, this paper emphasizes that a lack of attention to financial matters leads to irresponsible financial behavior. Furthermore, the study underscores the potential of utilizing search-based data as a valuable complement to traditional survey-based measures. The new approach provides high-frequency data that truthfully reflects the attention and attitudes in the general population.

Keywords: financial awareness; financial literacy; financial education; big data; financial behavior.

JEL classification: D14, G51, G53

Financial Awareness and Its Role in Financial Behavior

1. Introduction

The comprehensive definition of financial literacy, an indicator of one's competence to make efficient personal financial decisions, includes financial "awareness", "knowledge," "skills" and "behaviors" (OECD, 2013). To achieve efficient financial management, individuals must be aware of the necessity of wise financial decisions, motivated to acquire the required knowledge and develop relevant skills, and take responsible actions for their financial well-being. While there a growing body of research focusing on the "knowledge," "skills," or "behavioral" dimensions of financial literacy, the role of "financial awareness," which focuses on individual attention to financial affairs, recognition of financial matters, and efforts to acquire financial knowledge, is under-explored.

Financial awareness, indicating the extent to which individuals are aware of personal financial matters, is the initiative of their efforts to improve financial knowledge, capabilities, and behaviors. A lack of financial awareness can impede individuals from acquiring financial knowledge or skills. When presented with financial educational opportunities, low levels of financial awareness may result in passive learning, largely reducing the effectiveness of such programs. Even with adequate financial knowledge and skills, individuals unaware of the importance of responsible financial behavior may still make poor financial decisions. Indeed, raising financial awareness is a critical policy goal. For example, the Organization for Economic Cooperation and Development Council (OECD) defined financial literacy as a "combination of *financial awareness*, knowledge, skills, attitude, and behaviors necessary to make sound financial decisions and ultimately achieve financial well-being" (Atkinson and Messy, 2012). Many financial literacy programs and advocacy campaigns, such as National Financial Awareness Day, aim not only to convey financial knowledge to the population, but also to increase awareness regarding personal finances. Understanding the role of financial awareness in influencing financial behavior is a crucial yet underexplored topic.

A lack of easily measured metrics to quantify financial awareness could be one reason for the gap in the literature. We have witnessed significant progress in quantifying financial knowledge and skills, led by pioneering work such as Lusardi and Mitchell (2008, 2011), along with further efforts to measure financial capability (e.g., the National Financial Capability Study and the TIAA Institute-

GFLEC P-Fin Index). These studies have developed well-designed survey-based financial literacy measures that allow policymakers to benchmark the financial knowledge, skills, and behaviors of the U.S. population. However, financial awareness has not been the primary focus of these surveys.

Indeed, quantifying individual financial awareness levels among the general population is challenging. Unlike other dimensions of financial literacy, financial awareness is more about individual attitudes and perceptions. It is hard, if not impossible, to directly observe individual awareness and derive an objective measure. Even when specifically asking respondents about their financial awareness level in a survey, it remains challenging to construct metrics that truthfully measure one's subjective attitudes and perceptions. Additionally, there may be potential measurement errors, particularly when respondents lack incentives to answer survey questions carefully (Singer, 2002).

Search-based data, based on the search behavior of millions of households, could offer an effective solution. Internet search data reveals attention and attitude, providing a direct and unambiguous measure of people's awareness and attention (Da et al., 2011). For example, if someone searches for "IRA contribution limit" through a search engine, he or she is undoubtedly aware of retirement savings via IRAs, paying attention to the topic and willing to make efforts to acquire relevant knowledge.

This paper develops a novel and direct measure of financial awareness utilizing big data on the search behavior of millions of households. Specifically, by using the aggregate search volume of search terms from Google Trends, I construct financial awareness indexes in different financial planning areas. Then, I investigate how financial awareness evolves over time and varies across different geographic locations. The analysis reveals significant time-series and cross-sectional heterogeneity in financial awareness in the general population. Using the index, I find that a higher level of financial awareness correlates with higher balances in 529 saving plans, lower credit card delinquency rates, and more savings in individual retirement accounts. Finally, I find that media-based public education could be a crucial influencer of the population's financial awareness.

This study contributes to the literature in several ways. First, it complements existing research on financial literacy, which predominately focuses on knowledge and skills, by highlighting the "awareness" dimension. Current methodologies for collecting financial literacy data primarily rely on survey questions examining respondents' understanding of financial concepts and their skills to process information and make financial decisions; these measures do not directly capture respondents'

awareness of and attitudes toward personal financial management, thus overlooking a crucial element of financial literacy. As a result, little is known about the level of financial awareness in the general population and how it influences financial behavior and outcomes. This paper fills the gap by developing a novel measure of financial awareness using search-based data. By utilizing this direct measure of financial awareness, it confirms the significant impact of this overlooked factor on individual financial behavior. Additionally, the paper highlights the significant heterogeneity of financial awareness across geographic locations and through time, indicating the need and potential to improve financial awareness in targeted populations. These findings call for a more comprehensive definition of financial literacy in future studies.

Furthermore, taking advantage of accessible data on millions of households, this innovative search-based financial awareness measure provides a novel approach to measuring financial literacy among the general population. Traditional survey-based measures are limited in that they are only available at low frequencies, conducted among selected samples with relatively high data collection costs, and are subject to measurement errors when respondents lack incentive to answer survey questions carefully or truthfully (Lusardi and Mitchell, 2014; Singer, 2002). In contrast, search-based measures offer several advantages: they are available at high frequencies, are more transparent than the alternatives, and harness “the collective intelligence of millions of users,” thus truthfully reflecting their attention and attitudes (Da et al., 2015; Ginsberg et al., 2009). Although internet search data is widely recognized as one of the most timely and broad-reaching monitoring systems to predict home sales, automotive sales, tourism, and flu outbreaks, it has not been extensively adopted in the household finance area (Choi and Varian, 2012; Ginsberg et al., 2009). Importantly, this methodology can be readily extended to include various other financial areas. Thus, the search-based approach could serve as an effective complement to existing financial literacy data collection methods. While traditional survey-based measures target specific topics of interest with detailed respondent information, search-based measures add information from the general population at a higher frequency with lower data collection costs.

Finally, quantifying financial awareness and understanding its influence on financial outcomes will enable educators and policymakers to better benchmark the population’s financial literacy and understand the challenges it faces. The understanding could potentially help account for suboptimal financial decisions that remain unexplained by measures of financial knowledge, interpret mixed results regarding the effectiveness of financial education programs (McCormick, 2009), and

explain differences in individual investment in financial knowledge acquisitions (Lusardi, Michaud and Mitchell, 2017). Varied levels of awareness of financial topics should lead to various financial behavior and outcomes, even among individuals with similar levels of financial knowledge. It warrants consideration of financial awareness in policy and financial education program designs to enhance their effectiveness. Understanding how financial awareness varies across different financial areas and geographic locations, as well as how it evolves over time will also assist policymakers in allocating limited resources more effectively to improve financial literacy among targeted populations.

The rest of this paper is organized as follows. Section 2 introduces the development of search-based financial awareness measures and other main variables utilized in this study. Section 3 outlines the trends and heterogeneity observed in the financial awareness index. In Section 4, I present empirical methodologies and the main findings regarding the relationship between financial awareness and financial behavior. Section 5 reports evidence on the determinations of financial awareness. Section 6 provides conclusions.

2. Data and Methodology

2.1 Constructing financial awareness index

I construct financial awareness measures based on search-based data. Specifically, I compile a list of search terms and calculate the average Search Volume Index (SVI) from Google Trends of these search terms, thereby indicating the level of financial awareness in selected financial planning areas in the population. Following the methodology by Da et al. (2015), I begin by creating a “primitive” word list for each of the three financial planning areas: education planning (529 savings), credit management (credit card delinquency), and retirement planning (IRA savings). As primitive words may not be the exact words people use to search on Google Trends, I utilize the Google Trends “related queries” feature to identify top search terms related to the input words, thereby collecting a list of search terms most likely used to search for specific financial topics.

Next, I delete duplicates and words deemed either irrelevant or overly broad. For example, “esa service dog,” mistakenly included as related query to “esa” (education saving account) is irrelevant to education savings. “Interest rate,” while relevant to credit management, is too broad to accurately reflect individual attention towards managing credit card debt.

Then I download the monthly SVIs from January 2004 to December 2022 for each keyword. I delete search terms with insufficient observations, defined as those with more than 5% missing values, and compute the quarterly SVI change in search term j as:

$$\Delta SVI_{j,t} = \ln(SVI_{j,t}) - \ln(SVI_{j,t-1}) \quad (1)$$

where $SVI_{j,t}$ is the quarterly sum of SVIs for search term j during quarter t . I also eliminate seasonality from $\Delta SVI_{j,t}$.

The final step involves identifying the most influential search terms for predicting financial behavior. Following Da et al. (2015), I run expanding backward rolling regressions of seasonal-adjusted $\Delta SVI_{j,t}$ on financial behavior every year. I keep the search terms with the 20 highest positive t-statistics each year for the education and retirement planning awareness index. Conversely, for credit management, where financial behavior is measure by the “credit card delinquency rate,” I select the 20 terms with the lowest negative t-statistics, as a negative relationship with financial awareness is expected. For example, to identify the most influential search terms for retirement planning in 2009, I regress retirement planning behavior measure (i.e., the share of IRA assets of total financial assets) on seasonal-adjusted ΔSVI of each retirement planning keyword during the period of 2007-2008. Then, I rank the t-statistics of the keywords from the backward rolling regressions and select the top 20 to construct the retirement planning financial awareness index in 2009. Similarly, I run the regression using data during 2007-2009 and select the 20 keywords with the highest t-statistics as the components of retirement planning financial awareness index in 2010.

The average seasonal-adjusted $\Delta SVI_{j,t}$, of these 20 search terms, denoted as $\Delta ASVI_{j,t}$, serves as the financial awareness index. That is, the financial awareness index on topic p in quarter t is defined as the average of ΔSVI of the 20 terms most significantly related to the financial behavior in area p , as determined by backward rolling regressions:

$$\Delta ASVI_t^p = \frac{\sum_{j=1}^{20} R^p(\Delta SVI_{j,t})}{20} \quad (2)$$

2.2 Financial behavior and outcomes measures

To measure the financial behavior and outcomes in the areas of education planning, credit management, and retirement planning, I select variables that represent major financial topics within

each area, likely reflecting decisions made by individuals rather than other external factors. For example, while savings in 401(k) plans is a key indicator in retirement planning, factors such as eligibility to participate, employer match, and available investment options can also influence 401(K) plan balance. Thus, it may not be an ideal measure to reflect individual financial decisions. Specifically, I use savings in 529 plans as the measure in the education planning area, credit card debt delinquency rates in the credit management area, and IRA/Roth IRA savings in the retirement planning area.

I obtain measures at both national and state levels from various sources. Firstly, I utilize data from the Enhanced Financial Accounts (EFAs) database by the Board of Governors of the Federal Reserve System to collect information on education savings in 529 plans¹. I adopt the measure of total 529 plan assets, including assets in both 529 prepaid plans and 529 saving plans. EFAs provide data on total 529 plan assets at both national and state levels. The data is available quarterly from 2003 to 2008, annually in 2009 and 2017, and semiannually from 2010 to 2022 except for 2017.

Data on credit management are derived from the Federal Reserve Bank of New York and the Equifax Consumer Credit Panel (Federal Reserve Bank of New York, 2023). I utilize measures on the percentage of credit card debt balances with 90+ days delinquency as a negative financial outcome in credit management. Quarterly data are available at the national level, while annual data are available at the state level.

Lastly, I calculate the quarterly percentage of IRA assets out of total financial assets based on “The U.S. Retirement Market” data published by the Investment Company Institute (Investment Company Institute, 2022). The national data are available quarterly from 2007 to 2022. To calculate the measure on IRA savings at the state level, I utilize annual data on households’ ownership of IRA or Roth IRA accounts from the “Survey of Household Economics and Decision Making” provided by the Board of Governors of the Federal Reserve System².

2.3 Financial knowledge measure

I obtain financial knowledge measures from the National Financial Capability Study (NFCS) State-by-State Survey provided by the Financial Industry Regulatory Authority (FINRA) Investor

¹ <https://www.federalreserve.gov/releases/efa/efa-project-section-529-college-plans.htm>

² https://www.federalreserve.gov/consumerscommunities/shed_data.htm

Education Foundation. The purpose of the State-by-State survey, conducted with a nationally representative sample of Americans aged 18 and older, is to assess the financial capability of the national population. Similar to other traditional survey-based dataset, the NFCS data has limitations due to its low frequency of data collection; it is conducted every three years from 2009 to 2021.

The evaluation of respondents' basic financial knowledge involves the following five questions: 1. "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. "Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?" 3. "If interest rates rise, what will typically happen to bond prices?" 4. "A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less" and 5. "Buying a single company's stock usually provides a safer return than a stock mutual fund." The total number of correct answers is used as the individual financial knowledge score: $FK_{j,i,t}$, where j indicates individual in state i ($i=1-51$ for each state, $i=0$ for the US) in survey wave t ($t=2009, 2012, 2015, 2018$ and 2021). Then the average US and state financial knowledge scores are calculated by averaging individual scores in each wave.

$$FK_{i,t} = \sum_j FK_{j,i,t} / N_i, \quad (3)$$

Last, the change in financial knowledge is obtained by taking the difference in average financial knowledge between survey waves:

$$\Delta FK_{i,t} = \ln(FK_{i,t}) - \ln(\Delta FK_{i,t-3}), \quad (4)$$

For example, I calculate the three-year financial knowledge difference between 2018 and 2021 using Equation (4). The difference score will serve to indicate the average changes in financial knowledge levels during the period of 2019 to 2021 in the main analysis.

2.4 Media coverage

To measure media coverage of the three financial planning areas, I conduct textual analysis using the ProQuest News Database, which covers U.S. historical newspapers. I include the top five newspapers in the U.S., as well as within each state. For example, the Wall Street Journal, the Washington Post, the New York Times, USA Today, and the Los Angeles Times are five newspapers used to calculate national news coverage. At the state level, newspapers such as the Florida Times Union, the Orlando Sentinel, the Palm Beach Post, the South Florida Sun-Sentinel, and the Tampa Bay Times represent the top five local newspapers in Florida. I exclude states with data on fewer than three top available newspapers. Consequently, 29 states are included in the state-level news sample.

I calculate the news coverage as follows:

$$News_{k,t}^p = \sum N^p(Article_{k,t}) \quad (5)$$

where $News_{p,t}^k$ refers to news coverage in quarter t on topic p ($p=1$ for education planning, $p=2$ for credit management, and $p=3$ for retirement planning). $N^p(Article_t)$ indicates the number of news articles in top newspapers that mention the keywords on topic p during quarter t . Topic p keywords are those used to calculate the financial awareness index in Equation (2); $k = 1 - 29$ indicates the 29 states kept in the sample; while $k = 0$ refers to national newspapers. In addition, the total number of articles in the top newspapers during quarter t is denoted as $TotalNews_{k,t}$.

2.5 Other variables

To construct national and state level control variables, I use personal income data from the Bureau of Economic Analysis, population data from the Federal Reserve Economic Data provided by the Federal Reserve Bank of St. Louis, and employment data from U.S. Department of Commerce / Bureau of Economic Analysis / Regional Economic Accounts.

3. Financial Awareness Index

3.1 Financial awareness index in three financial planning areas

I plot the original Search Volume Index (SVI) and the calculated financial awareness index ($\Delta ASVI$) for each of the three financial planning areas: education planning, credit management, and retirement planning. The plotted SVIs are the average quarterly SVIs of the 20 terms included in the

financial awareness index. The methodology to derive the financial awareness index ($\Delta ASVI$) for each financial topic is defined in Section 2.1.

[Insert Figure 1 here]

The original SVIs (grey line) in Figure 1 illustrate seasonality in the search terms over time. For example, the search volume of education planning and retirement planning related terms surges around the first and last quarter of each year, consistent with increasing attention to tax-advantaged saving plans around the tax filing period or contribution deadline. Searching for information regarding credit card management is significantly higher after the 2008 financial crisis.

After adjusting for seasonality, the financial awareness index $\Delta ASVI$ demonstrates significant variations in individual attention and efforts to collect information regarding a specific financial planning topic over time. As shown in Table 1, Panel A, the time-series standard deviation of financial awareness is 0.06 for education planning, 0.09 for credit management and 0.10 for retirement planning. Regarding retirement planning, for example, the awareness index reaches its peak in 2020 Q3 with a value of 0.26; the index is at the lowest level in 2016 Q1 with a value of -0.21. The difference between the highest and lowest awareness index is 0.47, 755 times of the mean. The difference between the maximum and minimum index through time is 0.29 (102 times of the mean) for the education planning index and 0.48 (342 times of the mean) for credit card management.

[Insert Table 1 here]

3.2 Heterogeneity of financial awareness among states

The summary statistics also reveal significant heterogeneity of financial awareness among states. In Figure 2, I plot the maximum, minimum, and average financial awareness index across 51 states in each quarter from 2006 to 2022. In all three financial planning areas, there is substantial variation in the financial awareness index across states over time, especially in the earlier years. For example, in 2006 Q2, Alaska has the highest $\Delta ASVI$ for education planning of 3.73; in the same quarter, North Dakota has the lowest $\Delta ASVI$ for education planning of -2.41. The difference between the highest and lowest states is 6.15. For comparison, the average of education planning financial awareness index across 51 states is 0.09 in that quarter.

[Insert Figure 2 here]

Cross-state heterogeneity is also confirmed in Table 1, Panel B, where I calculate the mean, standard deviation, and difference between the maximum and minimum financial awareness index across states in each quarter during 2006-2022 (2009-2022) for education planning and credit management (retirement planning). Then, I take the average of these statistics over time. The average state-level quarterly financial awareness index is -0.005 for education planning, -0.002 for credit management and 0.007 for retirement planning. The average cross-sectional standard deviation is 0.34 for education planning, 0.32 for credit management and 0.44 for retirement planning. Thus, the standard deviation adjusted by the mean is 66 for education planning, 212 for credit management and 59 for retirement planning. The average difference between the highest and lowest state index in a quarter is as high as 1.99 for education planning, 1.68 for credit management, and 2.38 for retirement planning. The cross-state variation is large compared to the average state-level financial awareness index.

3.3. Relationship between Financial Awareness and Other Main Variables

In Table 2 Panel A, I calculate the correlations between main financial behavior measures and the financial awareness index at the US level. Financial awareness index in each of the three financial planning areas is significantly correlated with the corresponding financial behavior. For example, the correlation coefficient between the education planning financial awareness index and 529 plan assets is 0.42, significant at the 1% level. The behavior measure on credit management is credit card debt balances with 90+ days delinquency, indicating a negative financial outcome; consequently, the correlation between the credit management financial awareness index and delinquency rate is negative: -0.25, significant at the 5% level.

[Insert Table 2 here]

Table 2 Panel B exhibits the correlations between the financial awareness index and financial behavior at the state level. The correlation between the education planning financial awareness index and 529 assets remains significantly positive (coefficient=0.33, significant at the 1% level); the credit

management financial awareness index is negatively correlated with the credit card debt delinquency rate (coefficient=-0.12, significant at the 1% level); and the retirement planning financial awareness index is positively related to IRS savings (coefficient=0.15, significant at the 5% level).

As a measure of financial literacy, can financial awareness simply be a proxy for financial knowledge---the other dimension of financial literacy, or is it a new financial literacy measure capturing information not contained by the financial knowledge measure? In Table 2 Panels C and D, I calculate the correlations between the financial awareness index and the traditional financial knowledge measure. Panel C, based on US-level data, indicates that the traditional financial knowledge measure has no significant correlation with the financial awareness index in the areas of education planning, credit management, or retirement planning. In Table 2 Panel D, based on state-level data, the financial knowledge measure is not significantly correlated with the financial awareness index either. On the other hand, financial awareness indexes are correlated across different areas. The financial awareness index in education planning is significantly correlated with the financial awareness index in credit management (coefficient=0.56, significant at the 1% level) and retirement planning (coefficient=0.27, significant at the 5%); the financial awareness index in credit management is significantly correlated with the index in retirement planning (coefficient=0.26, significant at the 1%). Thus, the developed financial awareness index measures a new dimension of financial literacy, capturing information not reflected by the traditional financial knowledge measure.

4. Financial Awareness and Financial Behavior

In this section, I first examine how changes in financial awareness are associated with financial behavior and outcomes in three financial planning areas at the national level. Then, I further explore how variations in financial awareness are related to difference in state-level financial behavior.

4.1 The U.S. level data

To explore the relationship between financial awareness and various financial behavior, I run the following regressions:

$$\Delta y_t^p = \beta \Delta ASVI_t^p + \gamma \Delta X_t + \varepsilon \quad (6)$$

where Δy_t^p indicates changes in financial behavior and outcome measures in the areas of education planning ($p=1$), credit management ($p=2$), and retirement planning ($p=3$). In particular, I use the change in the natural logarithm of 529 plan assets as the education planning behavior measure, the change in the percentage of credit card debt balances with 90+ days delinquency as the behavior measure of credit management, and the change in the share of IRA assets of total financial assets as the retirement planning behavior measure. $\Delta ASVI_t^p$ is the financial awareness index on topic p derived from the adjusted search volume index. ΔX_t includes the change in the natural logarithm of national personal income, change in the natural logarithm of national population, and change in the natural logarithm of employment. Because the behavioral measures are available during different time periods and at different frequencies (i.e., quarterly, semiannually, and annually), the number of observations varies across the three financial planning areas.

As shown in Table 3, Panel A on education planning, there is a positive relationship between the change in the financial awareness index and the change in 529 plan assets. If financial awareness index increases by one unit from the last period, the natural logarithm of 529 plan assets would be predicted to increase by 0.10 without controls and 0.11 with controls; both effects are significant at the 1% level. It implies that when people are more aware of education planning, the assets saved under the 529 plan are higher.

In column (3) in Panel A, I also include the change in three-year financial knowledge score $\Delta FK_{i,t}$ derived from Equation (4). For example, the change in natural logarithm of financial knowledge score between 2018 and 2021 will be used to control for the population's financial knowledge changes for years 2019, 2020 and 2021. After controlling for the financial knowledge level, the relationship between financial awareness and 529 plan assets remains significantly positive. That is, the derived financial awareness index is not a proxy for the traditional financial knowledge measure; instead, it captures additional information that influences financial behavior. The significant relationship between financial awareness and financial behavior is not driven by the effect of financial knowledge.

In Panel B on credit management, I confirm that people more aware of credit management issues are less likely to end up with credit card debt delinquency. A one-unit increase in the financial awareness index of credit management predicts 1.09 percent decrease in credit card delinquency rate

with controls. Even after I control for the effect of financial knowledge, the coefficient on financial awareness index remains significantly negative (-1.27%) in column (3).

Table 3, Panel C on retirement planning shows that when financial awareness regarding IRA saving is higher, savings in IRA as percentage of total financial assets increase. A one-unit increase in retirement planning awareness index predicts a 0.6% increase in the IRA share (significant at the 10% level). The coefficient on financial awareness index is 0.9% (significant at the 5% level) after I control for the three-year change of financial knowledge.

[Insert Table 3 here]

4.2 State level data

In this section, I explore the relationship between financial awareness and financial behavior at the state level, allowing for cross-sectional differences. Specifically, I run the following regression:

$$\Delta y_{i,t}^p = \beta \Delta ASVI_{i,t}^p + \gamma \Delta X_{i,t} + \varepsilon, \quad (7)$$

where $\Delta y_{i,t}^p$ indicates changes in financial behavior measures in education planning ($p=1$), credit management ($p=2$), and retirement planning ($p=3$) in state i . In particular, I use the change in the natural logarithm of 529 plan assets to measure financial behavior in education planning, the change in the percentage of credit card debt balances with 90+ day delinquency for credit management, and the change in IRA ownership for retirement planning. $\Delta ASVI_{i,t}^p$ is the change in the financial awareness index on topic p in state i derived from the adjusted search volume index. Additionally, $\Delta X_{i,t}$ includes the change in the natural logarithm of state-level personal income, the change in the natural logarithm of state-level population, and the change in the natural logarithm of state-level employment. Due to variations in the availability and frequency of behavior measures across the three financial planning areas, the number of observations varies.

As shown in Table 4, Panel A on education planning, there is a positive relationship between financial awareness and 529 plan assets. A one-unit increase in individual financial awareness regarding education planning correlates with a 0.07 increase in the natural logarithm of 529 plan assets without controls, and 0.08 with state-level controls. The effects in both Columns (1) and (2)

are statistically significant at the 1% level. Incorporating changes in the three-year state-level financial knowledge level ($\Delta FK_{i,t}$) into the regression, as shown in Column (3) of Panel A, further confirms the positive relationship. A one-unit increase in financial awareness predicts 0.08 unit increase in natural logarithm of 529 plan assets (significant at the 1%).

Panel B confirms the negative relationship between financial awareness and credit card delinquency, although the negative coefficients lose significance after controlling for variables such as change in income, population, employment, and three-year state-level financial knowledge. Panel C shows that increasing awareness of retirement planning correlates with a significant increase in IRA ownership.

[Insert Table 4 here]

5. Financial Awareness and Public Education

In Section 4, the significant relationship between financial awareness and financial behavior underscores the pivotal role of financial awareness in determining financial behavior. In this section, I examine the determinants of financial awareness as an effort to understand how we can improve the financial awareness among the general population. I focus on the role of media in enhancing financial awareness. I investigate whether greater media coverage helps the population become more aware of financial issues, leading to proactive actions.

Figure 3 illustrates the media coverage among national newspapers on topic p in quarter t relative to the total number of news articles published during the same period, denoted as $News_{k,t}^p / TotalNews_{k,t}$. It is found that there exists a significant difference in media coverage across financial planning topics. For example, media coverage on education planning and credit management is higher than that of retirement planning (specifically, IRA savings). The mean coverage ratios stand at 0.24% and 0.08% for education planning and credit management, respectively, compared to 0.005% for retirement planning. Moreover, the data demonstrates substantial variation in media coverage over time. For example, regarding the education planning topic, the coverage ratio fluctuates from a high of 0.79% in 2015 Q1 to a low of 0.02% in 2008 Q3.

[Insert Figure 3 here]

Significant heterogeneity is also evident across states. Figure 4 highlights the substantial difference between states with the highest coverage ratio and those with the lowest coverage ratio, particularly when compared with the mean value. For example, in education planning, the average difference between the maximum and minimum value is 0.73%, significantly larger than the mean of 0.17%. The standard deviation across states averages 0.16% for the same topic. Therefore, the extent to which the media covers financial planning topics varies considerably by geographic location, topic, and over time.

[Insert Figure 4 here]

Next, I explore whether the variation in media coverage can explain the difference in financial awareness levels. First, I run the following regression at the national level:

$$\Delta ASVI_t^p = \beta \Delta News_t^p + \gamma \Delta News_{t-1}^p + \theta \Delta TotalNews_t + \theta \Delta X_t + \varepsilon, \quad (8)$$

where $\Delta ASVI_t^p$ is the change in U.S. financial awareness index on topic p ($p = 1$ for education planning; $p = 2$ for credit management; $p = 3$ for retirement planning) in quarter t ; $\Delta News_t^p$ and $\Delta News_{t-1}^p$ are the changes in news coverage on topic p in the current quarter and the last quarter $\Delta TotalNews_t$ is the change in the total number of news articles. X_t includes national level controls, such as $\Delta \ln(\text{income})$, $\Delta \ln(\text{population})$ and $\Delta \ln(\text{employment})$.

Table 5 shows that changes in news coverage in the current period are positively associated with changes in financial awareness as indicated by $\Delta ASVI$ for retirement planning. The coefficients on $\Delta News_t^p$ in retirement planning are significantly positive, as shown in Columns (5) and (6). A one-unit increase in media coverage leads to 4.3% increase in IRA shares in the same quarter, significant at the 5% level. However, these coefficients are not significant for education planning, as shown in Columns (1) and (2,) or credit management, as shown in Columns (3) and (4).

[Insert Table 5 here]

In Table 6, I rerun Equation 6 using state-level data to allow for cross-sectional differences. Here, the changes in the financial awareness index, news coverage, total news articles, and control variables are all at the state level. I also add the state fixed effects to the regression. Results also indicate a positive impact of the current period's change in news coverage on the change in financial awareness for retirement planning (coefficient=0.0137, significant at the 5% level). However, the effect is not significant for education planning and credit management.

[Insert Table 6 here]

In summary, these findings reveal significant heterogeneity in media coverage across various financial planning topics. Both national and state-level analysis demonstrates a positive relation between media coverage and financial awareness regarding IRA savings. This suggests that financial education through media channels, such as newspapers, could be a potential source to enhance financial awareness and foster better financial capabilities among the general population.

6. Conclusion

This paper seeks to explore financial awareness in the United States over time. It introduces an innovative search-based financial awareness index in education planning, credit management, and retirement planning, utilizing big data on Search Volume Index (SVIs) from Google Trends. Both national and state level indexes in all three areas are employed. It is found that financial awareness in the general population changes over time and exhibits significant variations across states. The observed variability in financial awareness could provide valuable insights for policymakers and educators. It enables them to better assess the financial literacy level of the population and target interventions more effectively.

Using the financial awareness index, I examine its predictive power for financial behavior and outcomes. It confirms that higher level of financial awareness in education planning correlates with higher balances in 529 saving plans. Similarly, higher awareness in credit management is associated with lower credit card delinquency rates, while increased awareness in retirement planning predicts greater savings in IRAs. These results underscore the positive relationship between financial awareness and responsible financial behavior. It is evident that being aware of the financial issues and

adopting proactive attitudes are essential for fostering responsible financial behavior and achieving favorable financial outcomes. Furthermore, the paper demonstrates that the financial awareness index captures information not contained in the traditional financial literacy measure. These findings emphasize the importance of adopting a comprehensive definition of financial literacy and integrating the often-overlooked dimension of financial awareness as a distinct component in future studies.

Moreover, this paper explores avenues to enhance financial awareness, which could subsequently lead to positive financial behavior and outcomes. Specifically, I examine the role of media information and identify substantial variation in media coverage on financial planning topics. This variability in media attention significantly contributes to differences in financial awareness levels, particularly in areas such as retirement planning. Disseminating information to the public and offering public education to the population have always been central to the mission of the media. In the national campaign to combat nationwide financial illiteracy, the media has played a pivotal role. The finding further confirms the positive influence that media exerts on the populations' financial awareness.

The lack of high-frequency data to capture changes in a population's financial situations poses a significant challenge in household finance research. It calls for more innovative data sources to study various under-explored research topics (Goldstein et al., 2021). This paper responds to this need by exploring the potential of using search-based data as a complementary data source to traditional survey-based measures. It validates the use of big data from internet searches to derive high-frequency financial awareness measures and proposes a methodology for doing so. However, it is important to recognize that while search-based data could be an ideal complement to survey-based measures, it cannot be a substitute. Traditional survey-based data collection provides detailed individual-level information and can be tailored to address specific research needs---features that search-based method lacks. Therefore, a combination of traditional survey-based data and innovative search-based data can be an effective improvement to the current data issues in household finance studies.

References

- Atkinson, A. and Messy, F. (2012). Measuring Financial Literacy: Results of the OECD/International Network on Financial Education Pilot Study. OECD Working Papers on Finance, Insurance and Private Pension, 15.
- Choi, H. and Varian, H. (2012). Predicting the Present with Google Trends. *Economic Record*, 88 (s1):2–9.
- Da, Z., Engelberg, J., and Gao, P. (2011). In Search of Attention. *The Journal of Finance*, 66(5):1461–1499.
- Da, Z., Engelberg, J., and Gao, P. (2015). The Sum of All FEARS Investor Sentiment and Asset Prices. *The Review of Financial Studies*, 28(1):1–32.
- Federal Reserve Bank of New York. (2023). State Level Household Debt Statistics 2003-2022.
- Ginsberg, J., Mohebbi, M.H., Patel, R.S., Brammer, L., Smolinski, M.S., and Brilliant, L. (2009). Detecting Influenza Epidemics Using Search Engine Query Data. *Nature*, 457:1012–1014.
- Goldstein, I., Spatt, C. and Ye, M. (2021). Big Data in Finance. *The Review of Financial Studies*, 34(7), 3213–3225.
- Investment Company Institute. (2022). The US Retirement Market, Fourth Quarter 2022. www.ici.org/statistical-report/ret_22_q4_data.xls.
- Lusardi, A, Michaud, P. and Mitchell, O. S. (2017). Optimal Financial Knowledge and Wealth Inequality. *Journal of Political Economy*, 125(2): 431-477
- Lusardi, A. and Mitchell, O. S. (2008). Planning and Financial Literacy: How Do Women Fare? *American Economic Review*, 98(2):413–417.
- Lusardi, A. and Mitchell, O. S. (2011). Financial literacy and Planning: Implications for Retirement Well-being. In Mitchell, O. S. and Lusardi, A., Eds., *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*, p. 17–39. Oxford and New York: Oxford University Press.
- Lusardi, A. and Mitchell, O. S. (2014). The economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52(1):5–14.
- McCormick, M. (2009). The Effectiveness of Youth Financial Education: A Review of the Literature. *Journal of Financial Counseling and Planning*, 20 (1), 70-83.

OECD. (2013). *Financial Literacy and Inclusion: Results of OECD/INFE Survey across Countries and by Gender*. Paris: OECD Centre.

Singer, E. (2002). The Use of Incentives to Reduce Nonresponse in Household Surveys. In R.M. Groves, D. A. Dillman, J. L., and Little, R. J. A., Eds., *Survey Nonresponse*, pg. 163–178. Wiley: New York, NY.

Table 1: Heterogeneity of Financial Awareness

	Education Planning	Credit Management	Retirement Planning
Panel A. National level heterogeneity over time			
Mean	0.0028	-0.0014	0.0006
Std.	0.0637	0.0861	0.1004
Min	-0.1336	-0.2533	-0.2112
Max	0.1545	0.2302	0.2550
Max-Min	0.2880	0.4835	0.4662
Panel B. Heterogeneity across states			
Mean	-0.0052	-0.0015	0.0074
Average Std.	0.3422	0.3159	0.4385
Average (max-min) difference	1.9891	1.6830	2.3815

Note: Panel A is based on the quarterly financial awareness index at the national level. It shows the mean, standard deviation, minimum and maximum index during 2006-2022 for education planning and credit management and during 2009-2022 for retirement planning. Panel B is based on the quarterly financial awareness index at the state level. The mean, standard deviation and difference between the maximum and minimum index across states in each quarter is first calculated. Then I take the average of these statistics over time.

Table 2: Correlations

Panel A: Correlation between Financial Awareness and Financial Behavior: US Level				
	Financial awareness index: education planning		Financial awareness index: credit management	Financial awareness index: retirement planning
Financial behavior: education planning	0.4232 ***			
Financial Behavior: credit management			-0.2489 **	
Financial behavior: retirement planning				0.2255 *
Panel B: Correlation between Financial Awareness and Financial Behavior: State Level				
	Financial awareness index: education planning		Financial awareness index: credit management	Financial awareness index: retirement planning
Financial behavior: education planning	0.3338 ***			
Financial Behavior: credit management			-0.1214 ***	
Financial behavior: retirement planning				0.1529 **
Panel C: Correlation between Financial Awareness and Financial Knowledge: US Level				
	Financial awareness index: education planning	Financial awareness index: credit management	Financial awareness index: retirement planning	Financial knowledge
Financial awareness index: education planning	1			
Financial awareness index: credit management	0.3291	1		
Financial awareness index: retirement planning	0.6169	-0.3691	1	
Financial knowledge	0.681	0.5157	-0.1895	1
Panel D: Correlation between Financial Awareness and Financial Knowledge: State Level				
	Financial awareness index: education planning	Financial awareness index: credit management	Financial awareness index: retirement planning	Financial knowledge
Financial awareness index: education planning	1			
Financial awareness index: credit management	0.5562 ***	1		
Financial awareness index: retirement planning	0.2746 **	0.2647 ***	1	
Financial knowledge	0.1237	0.0918	0.0502	1

Note: The table shows the correlations between financial behavior and financial awareness index at the US level in Panel A and at the state level in Panel B; it shows the correlations among financial awareness in education planning, credit management and retirement planning and financial knowledge in the US level in Panel C and at the state level in Panel D.

*, **, *** denote 10%, 5%, 1% significance levels, respectively.

Table 3: Financial Awareness and Financial Behavior: National Level

	A. Education Planning ($\Delta \ln$ (529 plan assets))					
	(1)		(2)		(3)	
Δ ASVI	0.0989	***	0.1099	***	0.1018	**
	(0.0353)		(0.0362)		(0.0391)	
Δ financial knowledge					-0.3260	
					(0.9888)	
$\Delta \ln$ (income)			1.0879	*	0.0370	
			(0.5361)		(0.6173)	
$\Delta \ln$ (population)			0.6893		1.8958	
			(4.8078)		(6.4999)	
$\Delta \ln$ (employment)			-1.1598	*	-0.7338	
			(0.6316)		(0.6816)	
No. of obs	38		38		23	
R-square	0.1791		0.3079		0.3117	
B. Credit Management (Δ credit card delinquency)						
	(1)		(2)		(3)	
Δ ASVI	-0.0135	**	-0.0109	*	-0.0127	*
	(0.0065)		(0.0065)		(0.0073)	
Δ financial knowledge					-0.0584	
					(0.0563)	
$\Delta \ln$ (income)			-0.0295		-0.0383	
			(0.0243)		(0.0368)	
$\Delta \ln$ (population)			0.0291		-0.1561	
			(0.2440)		(0.3781)	
Δ l (employment)			-0.0721	**	-0.0612	
			(0.0294)		(0.0404)	
No. of obs	68		68		48	
R-square	0.0619		0.2112		0.2087	
C. Retirement Planning (Δ IRA share)						
	(1)		(2)		(3)	
Δ ASVI	0.0059	*	0.0061	*	0.0085	**
	(0.0035)		(0.0033)		(0.0032)	
Δ financial knowledge					-0.0169	
					(0.0287)	
$\Delta \ln$ (income)			-0.0007		-0.0157	
			(0.0147)		(0.0184)	
$\Delta \ln$ (population)			0.2771		0.1369	
			(0.1712)		(0.1920)	
$\Delta \ln$ (employment)			-0.0364	**	0.0007	
			(0.0162)		(0.0203)	
No. of obs	56		56		48	
R-square	0.0509		0.1967		0.1616	

Note: Estimated results from OLS regressions. Dependent variables are change in the natural logarithm of 529 plan assets in Panel A, change in credit card debt balance with 90+ days delinquency in Panel B, and change in shares of IRA assets out of total financial assets in Panel C. Explanatory variables are change in financial awareness index ($\Delta ASVI$) in the corresponding financial planning area in column (1) under each panel; columns (2) also includes control variables of change in the natural logarithm of personal income, change in the natural logarithm of population, and change in the natural logarithm of employment; in column (3), one more explanatory variable: three-year change in financial knowledge is added to the regression. *, **, *** denote 10%, 5%, 1% significance levels, respectively.

Table 4: Financial Awareness and Financial Behavior: State Level

	A. Education Planning ($\Delta \ln$ (529 plan assets))					
	(1)		(2)		(3)	
Δ ASVI	0.0708	**	0.0832	***	0.0759	***
	(0.0081)		(0.0078)		(0.0090)	
Δ financial knowledge					-0.1290	
					(0.0829)	
$\Delta \ln$ (income)			0.2544	**	-0.1517	
			(0.1256)		(0.1233)	
$\Delta \ln$ (population)			-0.2972		0.5104	
			(0.5993)		(0.5064)	
$\Delta \ln$ (employment)			-0.4029	**	-0.5985	***
			(0.1753)		(0.1451)	
No. of obs	608		576		368	
State fixed effects	No		Yes		Yes	
R-square	0.1114		0.2264		0.2752	
B. Credit Management (Δ credit card delinquency)						
	(1)		(2)		(3)	
Δ ASVI	-0.0077	***	-0.0033		0.0026	
	(0.0029)		(0.0028)		(0.0030)	
Δ financial knowledge					-0.0117	
					(0.0140)	
$\Delta \ln$ (income)			-0.0582	***	-0.0268	
			(0.0201)		(0.0227)	
$\Delta \ln$ (population)			0.2178	**	-0.0018	
			(0.0977)		(0.0948)	
$\Delta \ln$ (employment)			-0.3617	***	-0.3156	***
			(0.0272)		(0.0287)	
No. of obs	459		432		324	
State fixed effects	No		Yes		Yes	
R-square	0.0147		0.4351		0.3270	
C. Retirement Planning (Δ IRA share)						
	(1)		(2)		(3)	
Δ ASVI	0.0398	**	0.0337	*	0.0338	*
	(0.0166)		(0.0200)		(0.0201)	
Δ financial knowledge					0.0063	
					(0.1024)	
$\Delta \ln$ (income)			-0.2430		-0.2444	
			(0.2728)		(0.2745)	
$\Delta \ln$ (population)			-0.5237		-0.5218	
			(0.6017)		(0.6041)	
$\Delta \ln$ (employment)			0.4629	**	0.4624	**

		(0.1873)	(0.1879)
No. of obs	243	216	216
State fixed effects	No	Yes	Yes
R-square	0.0234	0.0744	0.0744

Note: Estimated results from OLS regressions. Dependent variables are change in the natural logarithm of 529 plan assets, change in credit card debt balance with 90+ days delinquency, and change in IRA ownership in Panels A, B and C respectively. Explanatory variables include change in financial awareness index ($\Delta ASVI$) in the corresponding financial planning areas in column (1); column (2) also includes controls for change in the natural logarithm of personal income, change in the natural logarithm of population, and change in the natural logarithm of employment; in column (3), one more explanatory variable: three-year change in financial knowledge is added to the regression.

All data is at the state level.

*, **, *** denote 10%, 5%, 1% significance levels, respectively.

Table 5: Media Coverage and Financial Awareness: U.S. Level

	A. Education Planning		B. Credit Management		C. Retirement Planning			
	(1)	(2)	(3)	(4)	(5)	(6)		
$\Delta News_t$	-0.00004 (0.0001)	-0.00003 (0.0002)	0.0002 (0.0003)	0.0001 (0.0003)	0.0043 (0.0020)	**	0.0043 (0.0020)	**
$\Delta News_{t-1}$	-0.0002 (0.0001)	-0.00002 (0.00002)	-0.0002 (0.0003)	-0.0003 (0.0003)	-0.0003 (0.0020)		-0.0003 (0.0020)	
$\Delta TotalNews$	0.1305 (0.2923)	0.1467 (0.3021)	0.0466 (0.3932)	0.1089 (0.3825)	0.1868 (0.4983)		0.1930 (0.5138)	
$\Delta \ln (income)$		-0.1613 (0.3690)		-0.9373 (0.4665)	**		-0.0642 (0.6138)	
$\Delta \ln (population)$		0.2412 (3.7888)		-0.9019 (4.7878)			-3.7083 (7.0341)	
$\Delta \ln (employment)$		0.0929 (0.4357)		1.3867 (0.5547)	**		-0.2107 (0.6671)	
No. of obs.	68	68	68	68	56		56	
R-square	0.0040	0.0075	0.0181	0.1299	0.1109		0.1178	

Note: Estimated results from OLS regressions. Dependent variables are national financial awareness index in areas of education planning, credit management, and retirement planning in Panels A, B, and C respectively. Explanatory variables are change in news coverage on the financial topics in current and last quarter, and change in total news articles in current quarter among top national newspapers. Columns (2), (4), and (6) also include control variables of change in the natural logarithm of personal income, change in the natural logarithm of population, and change in the natural logarithm of employment.

*, **, *** denote 10%, 5%, 1% significance levels, respectively.

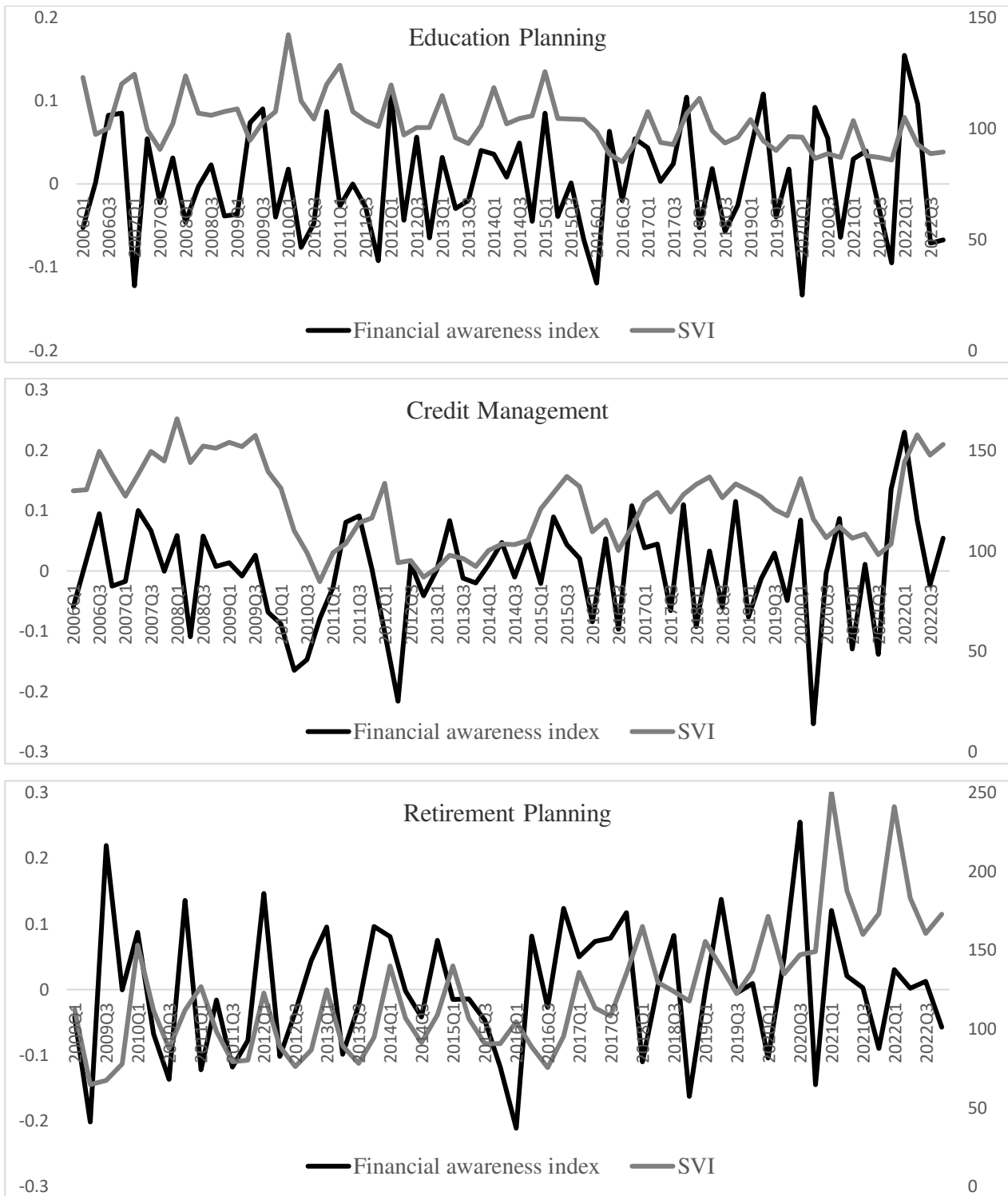
Table 6: Media Coverage and Financial Awareness: State Level

	A. Education Planning		B. Credit Management		C. Retirement Planning	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta News_t$	-0.0003 (0.0003)	-0.0003 (0.0003)	0.0014 (0.0011)	0.0012 (0.0011)	0.0137 ** (0.0053)	0.0137 ** (0.0055)
$\Delta News_{t-1}$	-0.0002 (0.0002)	-0.0002 (0.0002)	-0.0013 (0.0010)	-0.0014 (0.0011)	0.0011 (0.0053)	0.0011 (0.0054)
$\Delta Total\ News$	0.0266 (0.0370)	0.0273 (0.0382)	-0.0086 (0.0305)	-0.0005 (0.0311)	-0.0028 (0.0410)	-0.0034 (0.0426)
$\Delta \ln (income)$		-0.1043 (0.2941)		-0.5842 ** (0.2840)		-0.1158 (0.4138)
$\Delta \ln (population)$		-1.5185 (1.6429)		-0.2533 (1.5780)		1.0577 (2.3810)
$\Delta \ln (employment)$		0.0749 (0.4190)		0.8177 ** (0.4040)		-0.1468 (0.5583)
No. of obs.	1906	1798	1906	1798	1570	1462
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-square	0.0019	0.0024	0.0041	0.0075	0.0072	0.0075

Note: Estimated results from OLS regressions. Dependent variables are state level financial awareness index in areas of education planning, credit management, and retirement planning in Panels A, B, and C respectively. Explanatory variables are changes in news coverage on financial topics in current and last quarter, and change in total news articles in current quarter in the top newspapers in the state. Columns (2), (4), and (6) also include control variables of change in the natural logarithm of state personal income, change in the natural logarithm of state population and change in the natural logarithm of state employment. All regressions also control for state level fixed effects.

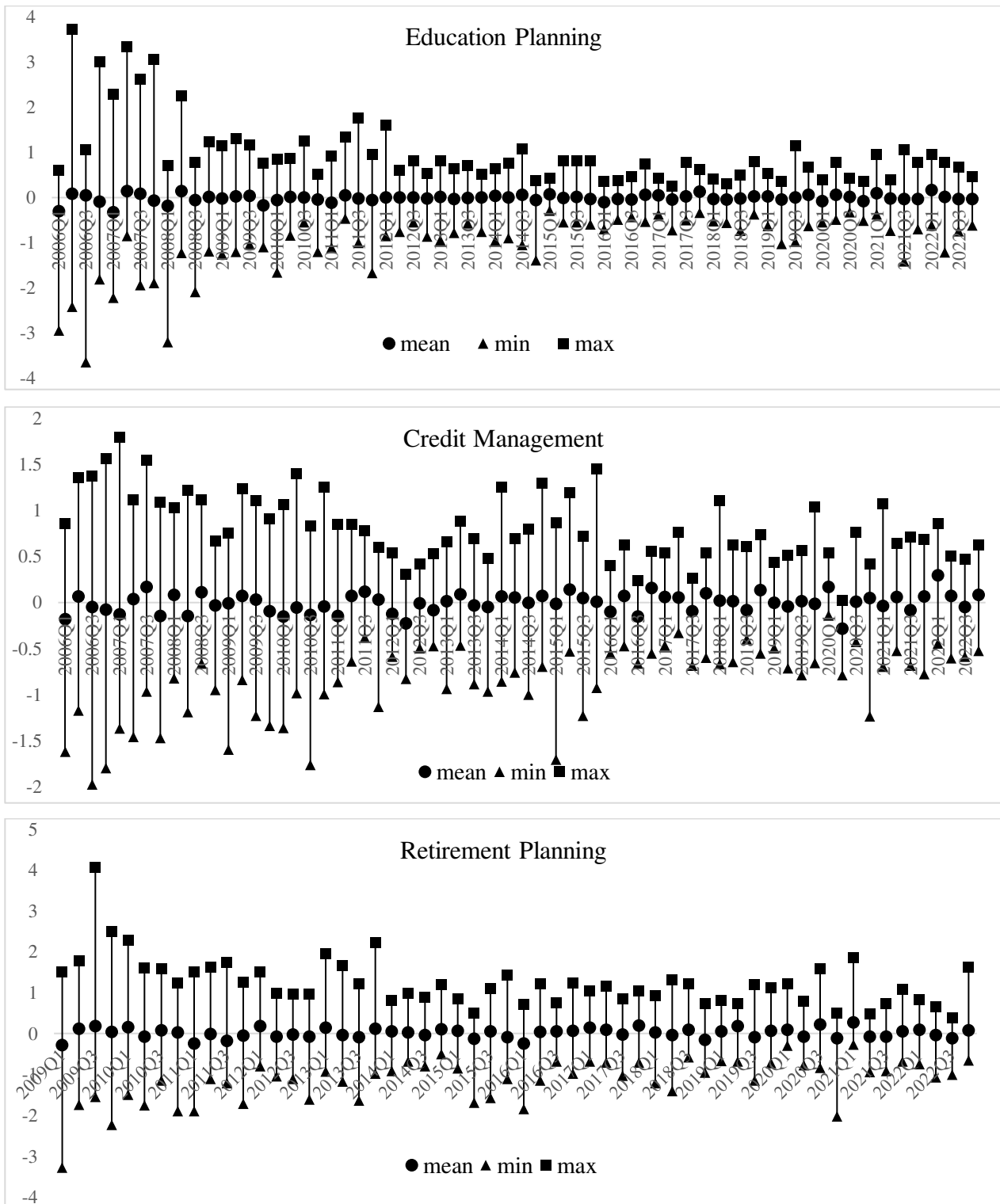
*, **, *** denote 10%, 5%, 1% significance levels, respectively.

Figure 1: National Financial Awareness Index and Search Volume Index (SVI)



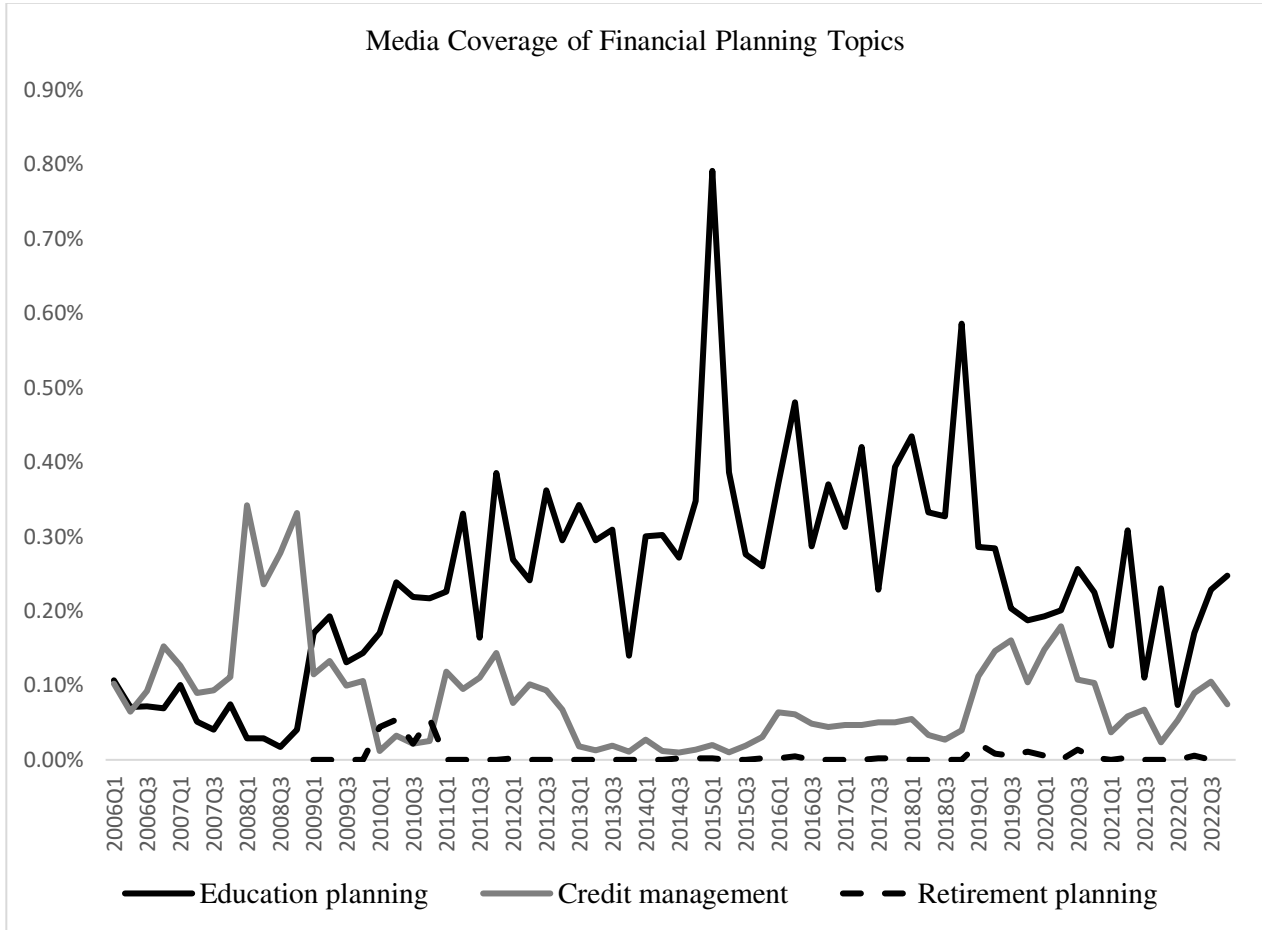
Note: The figure shows the original SVI and financial awareness index in education planning, credit management and retirement planning over time.

Figure 2: Financial Awareness Index Heterogeneity Among States



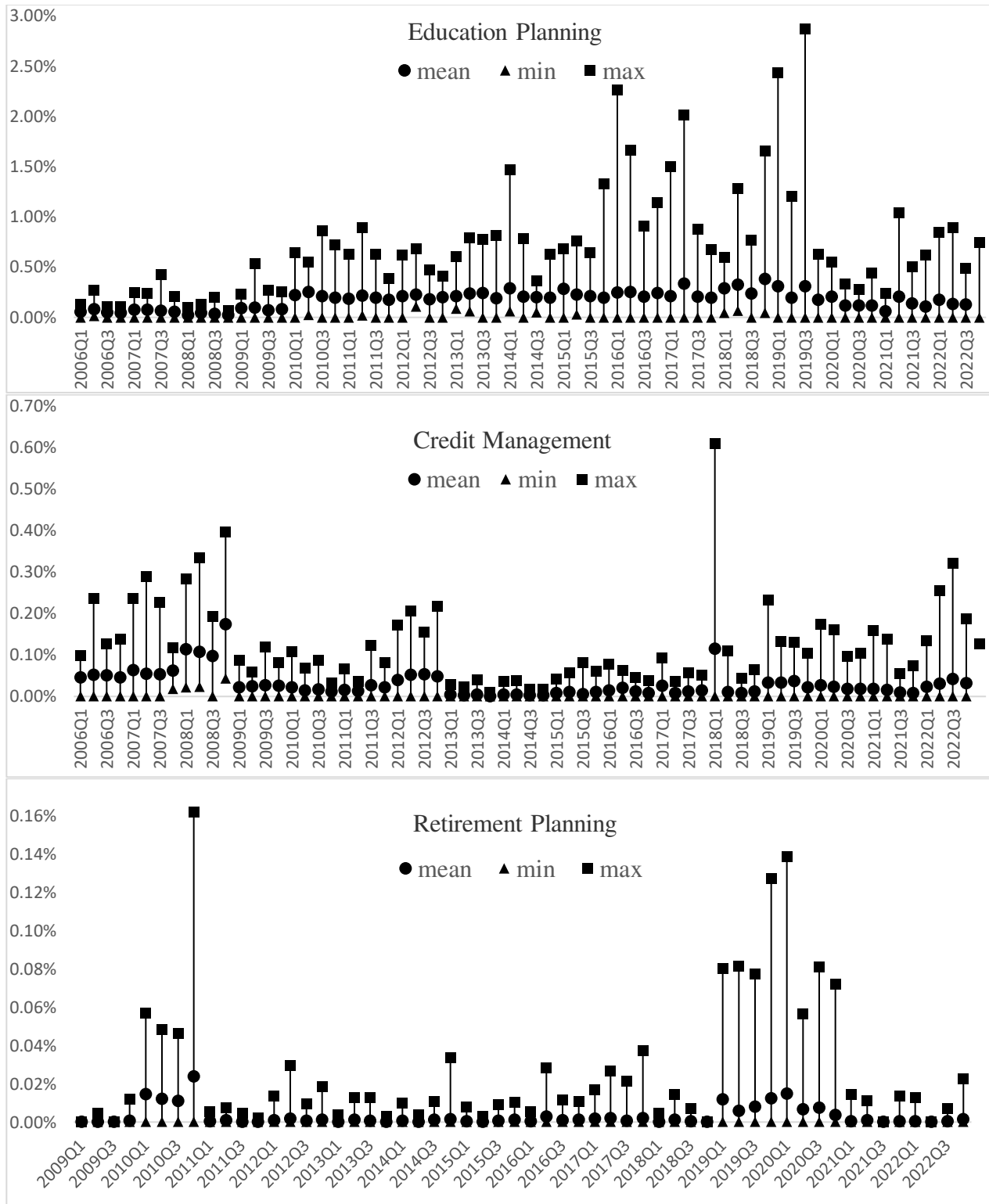
Note: The figure shows the mean, maximum, and minimum level of financial awareness index among all states in education planning, credit management, retirement planning over time.

Figure 3: Media Coverage: U.S. Level



Note: The figure shows the national media coverage ratios in education planning, credit management and retirement planning over time.

Figure 4: Media Coverage Heterogeneity Among States



Note: The figure shows the mean, maximum and minimum level of financial awareness index in education planning, credit management and retirement planning among 29 states over time.