



# Article Information Sources for Investment Decisions: Evidence from Japanese Investors

Sumeet Lal, Abdul-Salam Sulemana <sup>(10</sup>), Trinh Xuan Thi Nguyen <sup>(10</sup>), Mostafa Saidur Rahim Khan \*<sup>(10</sup>) and Yoshihiko Kadoya <sup>(10</sup>)

School of Economics, Hiroshima University, 1-2-1 Kagamiyama, Higashihiroshima 7398525, Japan; d215788@hiroshima-u.ac.jp (S.L.); d212182@hiroshima-u.ac.jp (A.-S.S.); d210466@hiroshima-u.ac.jp (T.X.T.N.); ykadoya@hiroshima-u.ac.jp (Y.K.)

\* Correspondence: khan@hiroshima-u.ac.jp

**Abstract:** Although the traditional sources of financial knowledge in Japan are financial advisors and investment groups, the digital era and artificial intelligence have made other sources of information, such as social media and mass media, more influential. As such, it has become important to examine the socioeconomic, demographic, and psychological factors influencing the use of these information sources in the context of investment decisions. However, little research has been carried out to examine such associations using a large-scale nationwide dataset. We fill this gap by utilizing a dataset comprising almost 65,000 active investors from one of the largest online security companies in Japan, ensuring the representativeness and generalizability of our results. We show that active investors are more inclined to use social media and mass media than financial advisors and investment groups. The probit regression model shows that the use of each of the four sources of information is strongly shaped by an individual's characteristics, which, to some extent, are not mutually exclusive for each source type. The study results imply that the government should regulate and monitor the quality and accuracy of the information disseminated by mass media and social media and educate investors on how to critically evaluate and verify the information that they receive.

**Keywords:** information sources; investment decisions; financial advisors; investment group; mass media; social media; Japan

### 1. Introduction

Selecting the appropriate source(s) of information for investment decisions is an important but difficult task in complex, digitized financial markets (Eysenbach 2008; Kramer 2012; Metzger and Flanagin 2013). Conventional sources of information, such as media, investment groups, and financial advisors, and digital sources, such as social media, play an important role in investment decisions. However, inflated and misleading information often leads to poor reliability and trustworthiness. For example, investment groups were once a popular source of information for their members, particularly during the 2000s (Nofsinger 2018). However, Barber and Odean (2000) found that investment groups lost their reliability as an information source, because their claims of superior performance were over-exaggerated, owing to the psychological impulse to seek pride and avoid regret. Financial advisors have traditionally been an authentic and valuable source of information, helping investors to make appropriate decisions. However, Bhattacharya et al. (2012) found that general investors have somewhat lost their reliance on financial advisors, even though their suggestions were valuable and free. This lack of reliance on financial advisors could be associated with a lack of better investment decisions (Bodnaruk and Simonov 2015). Recently, social media, such as Facebook, Instagram, and Twitter, have become important sources of new information about firm-specific analysts' recommendations, analysts' price targets, and quarterly earnings (Gu and Kurov 2020; Bollen et al. 2011; Bartov et al. 2018;



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**Copyright:** © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). Azar and Lo 2016). Siikanen et al. (2018) found that Facebook had a significant influence on stock buying and selling decisions, particularly at the household level. Social media have become a source of opinion formation, adding emotions and creating fake information that affects important decisions in financial markets (NASDAQ 2019). In fact, there are formal and informal channels of information in the financial market, and investors' use of information sources is often determined by their co-existence (Baltakiene et al. 2021). Given the advantages and disadvantages of various sources of information for investment decision making, it is important to investigate how investors prioritize sources of information. Additionally, given the growing influence of social networks as an information source, clientele groups should be identified and compared with users of other sources of information.

Because a significant share of financial market decisions is influenced by investor psychology (NASDAQ 2019), we consider that the socioeconomic conditions and psychological orientation of prospective investors play a significant role in selecting the appropriate sources of information (Chang 2005; Lim et al. 2014; Stolper and Walter 2017; Glenn and Heckman 2020; Dewi 2022; Ludwig et al. 2023). Several behavioral finance and social cognitive theories suggest that the investors' socioeconomic backgrounds and psychological orientations play a significant role in shaping their use of information for investment decisions (Kahneman and Tversky 1979; Bandura 1977; Kelman 1974). For instance, behavioral theories, such as the Prospect Theory, Confirmation Bias Theory, Availability Heuristics, Anchoring and Adjustment, and others, posit that investors' risk tolerance, cognitive biases, and information processing styles have a substantial impact on their choice of information sources (Kahneman and Tversky 1974, 1979; Nickerson 1998; Tversky and Kahneman 1973). Furthermore, social cognitive theories, such as the Social Learning Theory and Social Influence Theory, suggest that investors hailing from diverse socioeconomic backgrounds may tend to emulate the information-seeking behaviors of their peers or role models (Bandura 1977; Kelman 1974). Those investors who maintain strong social ties with knowledgeable individuals or institutions may rely on these connections to access financial information. Consequently, investors with different psychological and social orientations can exhibit variations in their ability to comprehend and analyze information. In addition, socioeconomic conditions can exert a significant influence on the breadth and quality of an individual's social capital, thereby shaping their choice of information sources. This interplay of behavioral and social cognitive factors underscores the intricate relationship between investors' backgrounds, preferences, and their approach to acquiring and processing financial information.

While previous studies have explored the impact of information sources on investment decisions (Tseng 2013; Bodnaruk and Simonov 2015; Yang et al. 2017), a notable gap remains in the literature regarding the factors that influence individuals' preferences for various information sources in the context of investment decision making. Only a handful of studies have provided valuable insights into the complexity of the interplay between various forms of information sources and the socioeconomic and psychological factors that influence their use in financial or investment decisions. For example, Calcagno and Monticone (2015) analyzed the role of various socioeconomic and demographic factors in influencing the use of professional advice in Italy and found that financial literacy, self-confidence, trust in the adviser, experience, years of schooling, wealth, and risk tolerance were significantly and positively associated with professional advice. This result coincides with that of Kramer (2016) in a study conducted in the Netherlands. In Japan, Fujiki (2020) explored the factors influencing the actual and intended sources of financial knowledge, finding that households choosing financial institutions and advisors had mainly older household heads and had more financial assets, a higher level of educational attainment, and a higher ratio of risky asset holdings for stocks and bonds. Khan et al. (2020) analyzed the relationship between demographic and social parameters and the use of social media in financial decision making and found that cohort generation and occupation were significantly and favorably associated with the use of social media. Similarly, Cwynar et al. (2019) examined the factors influencing the use of social media as an information source in finance in Poland and found that people with more diversified asset portfolios and those who hold the riskiest assets are more likely to use social media for information purposes.

The existing literature on the information sources and the factors influencing their use has at least four weaknesses. First, sample selection and omitted variable bias are concerns. For example, Khan et al. (2020) and Cwynar et al. (2019) focused mainly on a specific area or small institutions, with limited use of important explanatory variables, thus questioning the representativeness and precision of the sample. Second, several studies suffer from a limited sample size bias. For example, Khan et al. (2020) and Cwynar et al. (2019) used data from 201 and 415 respondents, respectively, thereby limiting the generalizability of their findings to the entire population. Third, some studies have used a single information source (e.g., Khan et al. 2020; Cwynar et al. 2019; Calcagno and Monticone 2015; Kramer 2016) or merged multiple information sources into one (e.g., Fujiki 2020) to investigate the factors influencing their use. These classifications do not depict a broader picture and can produce ambiguous and inconclusive results. Finally, important financial variables, such as financial literacy, and time-discounting variables, such as impatience and impulsivity, are missing from the studies of Khan et al. (2020), Cwynar et al. (2019), and Fujiki (2020). These variables can help to capture individuals' cognitive abilities and psychological reflections in the rational decision-making process (Meier and Sprenger 2013).

In the context of the changing influence of traditional sources of information and the emergence of new outlets of information, this study investigates the source(s) of information for investment decisions and their associations with the socioeconomic backgrounds of Japanese investors. We hypothesize that Japanese investors are increasingly relying on social and mass media, and that the choice of information source is influenced by their socioeconomic backgrounds. This study contributes to the existing literature in several ways. First, this is the first study to use almost 65,000 active investors from one of Japan's largest online security companies. Such a large-scale, nationally representative dataset allows us to explore the all-inclusive, multidimensional factors that influence individuals' preferences by using each of the four main sources of information separately for investment decisions. In other words, our study fills the gaps related to sampling bias, omitted variable bias, and misclassification issues, and includes important financial and psychological variables that have been excluded in previous studies. Additionally, our study provides a new perspective for understanding the role of various socioeconomic, financial, and psychological factors in shaping people's cognitive and rational decision-making processes, such as using the type of information that best serves their interests in investment decisions. We believe that identifying these factors can have important implications for policymakers, financial institutions, and media organizations in Japan for improving the effectiveness and credibility of their information dissemination strategies, ultimately benefiting investors and the wider financial environment.

## 2. Data and Research Design

## 2.1. Data

Our study used large-scale data collected via an online survey by Rakuten Securities, one of the largest online security companies in Japan. Their database is one of the largest in the country and represents all socioeconomic segments of the Japanese population. The survey, which was conducted toward the end of 2022, was aimed at the population of active account holders of this security company aged 18 years and above and residing across Japan. The data collection period in 2022 lasted for 2 months, from November to December, and the survey included questions on the demographic, socioeconomic, and psychological characteristics and preferences of the Japanese adults. After excluding missing data, the sample size was 64,413 observations, representing 49.55% of the valid responses of 130,000 observations. More than half of the observations were dropped, which could have affected the efficiency and overall representativeness of the results. To assess whether this might have occurred, we checked the distribution of the data before and after

dropping the observations with missing values but observed no significant difference in distribution that could have materially affected our results. Thus, the final data of this study appeared to be sufficient and representative enough to provide unbiased results.

#### 2.2. Variables

## 2.2.1. Dependent Variables

A detailed description of all dependent and independent variables included in our study is provided in Table 1. To begin with, the dependent variables in this study are based on the preference of the four sources of information presented to the respondents for investment decisions, derived from the question "What sources of information do you refer to when making investment decisions?" The respondents were provided with four options, of which they could select more than one option, based on their real-time use of that/those specific source(s). The four main types of information sources were: mass media (including newspapers, television, online), social media (including friends), investment groups, and financial advisors. As the respondent had the opportunity to select more than one option, we created a separate binary code for each of these four information sources to effectively capture the role of socioeconomic and psychological factors in influencing their use. For each of the four dependent variables, a value of 1 was assigned if an individual specifically used only that particular information source, while the value of 0 was assigned to all other sources. The same procedure of coding is repeated to every other information source, leading to the creation of four dependent binary variables.

Tal	ble	1.	Vari	iable	defin	itions.
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Variables	Type and Definition
Dependent Variables	
Mass media	Binary variable that equals 1 if a respondent selects mass media (including newspaper, television, and online sources) for investment decisions, otherwise 0
Social media	Binary variable that equals 1 if a respondent selects social media (including friends) for investment decisions, otherwise 0
Investment group	Binary variable that equals 1 if a respondent selects investment group (including investment club) for investment decisions, otherwise 0
Financial advisor	Binary variable that equals 1 if a respondent selects financial advisor for investment decisions, otherwise 0
Independent Variables	
Male	Binary variable: $1 = male, 0 = female$
Age	Age of participants in 2022
Age squared	Age squared in years
Years of education	Continuous variable: number of years of education
Married	Binary variable: $1 = $ currently married, $0 = $ otherwise
Children	Binary variable: 1 = have at least 1 child, 0 = otherwise
Unemployed	Binary variable: 1 = currently unemployed, 0 = otherwise
Log of household income	Log of annual earned income, before taxes and with bonuses, of the entire household in 2021 (unit: JPY million)
Log of household assets	Log of balanced amount of financial assets (savings, stocks, insurance, etc.) of entire household (unit: JPY million)
Months elapsed since account opening	Number of months since account opening

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Variables	Type and Definition
Financial literacy	Continuous variable: average score for the number of current answers from three financial literacy questions
Risk aversion	Continuous variable: risk of rain preference (percentage score from the question, "Usually when you go out, how high must the probability of rainfall be before you take an umbrella?")
Myopic view of the future	Binary variable: $1 = agree / completely agree with, "Since the future is uncertain, it is a waste to think about it," 0 = otherwise$
Impatience	Continuous variable: simple mean of the standardized values of the elicited discount rates (DR1 to DR2)
Hyperbolic discounting	Binary variable that equals 1 if DR1 > DR2, otherwise 0
Instrumental variable (IV)	
Cognitive skills	Ordinal variable: ranking of individual's Japanese language ability from having not attended school to very good

Table 1. Cont.

#### 2.2.2. Independent Variables

To effectively investigate the role of socioeconomic and psychological factors in investors' information source preferences, we categorized the independent variables into three main categories. First, we examined sociodemographic factors, such as sex, age, educational attainment, marital status, having children, and unemployment. Second, we considered finance-related variables, including household income, household assets, duration of investment participation, and financial literacy. Finally, we analyzed psychological aspects, which included risk aversion, a myopic view of the future, impatience, and hyperbolic discounting. We considered that including specific financial and psychological variables effectively captured the cognitive reflection and time preferences of people's rational choices regarding various sources of information for investment decisions.

#### 2.3. Descriptive Statistics

Descriptive statistics for the study are presented in Table 2. Among the four dependent variables, approximately 72% of the participants utilized mass media as their primary source of investment information. Approximately 49% of the participants relied on social media, whereas almost 15% and 16% preferred investment groups and financial advisors, respectively, to obtain information for their investment decisions.

Regarding the demographic factors, the average age of the respondents was approximately 43 years, and 61% were male. Approximately 66% were married, and 56% had at least one child. The average number of years of education was 15, and 4% of the participants were unemployed. In terms of the socioeconomic variables, our study reported an average income of JPY 7,581,459, with maximum and minimum household incomes of JPY 20,000,000 and JPY 1,000,000, respectively. The average household assets were approximately JPY 18,200,000, with maximum and minimum values of JPY 100,000,000 and JPY 2,500,000, respectively. On average, the respondents had held an account with a financial institution for approximately 55 months, with a maximum of 280 months and a minimum of 1 month. Regarding the psychological factors, we found that, on average, approximately 1.50% of the respondents were impatient. Hyperbolic discounting was observed in approximately 11% of the participants; approximately 54% of the respondents were identified as risk-averse; and 11% had a myopic view of the future.

To compare the average values of the two datasets and determine whether they came from the same population, ANOVA and *t*-tests were conducted for the probability of using mass media, social media, investment groups, and financial advisors, distributed by age group, sex, and employment status. The results of these tests are shown in Tables 3–5, along with the test statistics and significance levels.

Variables	Mean	Std. Dev.	Min	Max
Mass media	0.7203	0.4488	0	1
Social media	0.4851	0.4998	0	1
Investment group	0.1470	0.3541	0	1
Financial advisor	0.1573	0.3641	0	1
Male	0.6148	0.4867	0	1
Age	42.5012	11.5791	20	102
Age squared	1940.4240	1060.8660	400	10,404
Years of education	15.2800	2.0141	9	21
Married	0.6615	0.4732	0	1
Children	0.5556	0.4969	0	1
Unemployed	0.0424	0.2016	0	1
Household income	7,581,459	4,095,800	1,000,000	20,000,000
Log of household income	15.6869	0.5860	13.8155	16.8112
Household assets	18,200,000	22,800,000	2,500,000	100,000,000
Log of household assets	16.1256	1.0571	14.7318	18.4207
Months elapsed since account opening	55.0143	54.1841	1	280
Financial literacy	0.8179	0.2806	0	1
Risk aversion	0.5393	0.2267	0	1
Myopic view of the future	0.1193	0.3242	0	1
Impatience	0.0151	0.9316	-0.7860	3.9623
Hyperbolic discounting	0.1135	0.3172	0	1
Observations		3		
Instrumental variable (IV)				
Cognitive skills	3.2644	0.9412	1	5
Observations		63,74	.6	

Table 2. Summary statistics of the study variables.

As shown in Table 4, the distribution of the probability of using the four different information sources by age group was considerably different, particularly between the users of mass media and social media, at a significance level of 1%. The use of mass media among the oldest population (those aged 65 years and over) was the highest (84%), followed by the age groups of 50–65 years (77.76%), 35–49 years (71.56%), and 18–34 years (66.55%). There appeared to be a descending pattern of mass media users by age group. However, this pattern was reversed among social media more (61.77%), followed by all other age groups in ascending order. The use of investment groups and financial advisors as information sources did not vary much by age group, but was still significant at a 1% level, with the majority of individuals, regardless of age, preferring not to indulge in these kinds of information sources for investment decisions. This raises the important question of whether the roles and essence of traditional information sources for investment decisions are disappearing from Japanese society in the digital era. Such associations and evidence are explored in the Discussion Section.

Mass Madia		Age (	years)		<b>T</b> ( 1	Social	Age (years)				
wass wieura	18–34	35–49	50–65	>65	Total	Media	18–34	35–49	50-65	>65	Total
0	6187	8045	3444	339	18,015	0	7071	14,181	10,240	1675	33,167
	33.45%	28.44%	22.24%	15.84%	27.97%		38.23%	50.13%	66.12%	78.27%	51.49%
1	12,309	20,244	12,044	1801	46,398	1	11,425	14,108	5248	465	31,246
	66.55%	71.56%	77.76	84%	72.03%		61.77%	49.87%	33.88%	21.73%	48.51%
Total	18,496	28,289	15,488	2140	64,413	Total	18,496	28,289	15,488	2140	64,413
	100%	100%	100%	100%	100%		100%	100%	100%	100%	100%
F-statistics		F	<sup>2</sup> = 231.74 ***			F- statistics		F	= 1145.96 ***		
Investment		Age (	years)			Financial		Age (years)			
Group	18–34	35–49	50–65	>65	Total	Advisor	18–34	35–49	50-65	>65	Total
0	15,837	23,937	13,316	1854	54,944	0	15,757	23,808	12,924	1794	54,283
	85.62%	84.62%	85.98%	86.64%	85.30%		85.19%	84.16%	83.45%	83.83%	84.27%
1	2659	4352	2172	286	9469	1	2739	4481	2564	346	10,130
	14.38%	15.38%	14.02%	13.36%	14.70%		14.81%	15.84%	16.55%	16.17%	15.73%
Total	18,496	28,289	15,488	2140	64,413	Total	18,496	28,289	15,488	2140	64,413
	100%	100%	100%	100%	100%		100%	100%	100%	100%	100%
F-statistics			F = 6.93 ***			F- statistics			F = 6.79 ***		

 Table 3. Distribution of probability of using four information sources by age group.

Note: \*\*\* *p* < 0.01.

Table 4. Distribution of probability of using four information sources by sex.

Mass Madia	S	ex	Total	Total Social Modia -		Sex			
Mass Media –	Female	Male	Iotai	Social Media –	Female	Male	Total		
0	7994	10,021	18,015	0	10,847	22,320	33,167		
	32.22%	25.31%	27.97%		43.71%	56.37%	51.49%		
1	16,820	29,578	46,398	1	13,967	17,279	31246		
	67.78%	74.69%	72.03%		56.29%	43.63%	48.51%		
Total	24,814	39,599	64,413	Total	24,814	39,599	64,413		
	100%	100%	100%		100%	100%	100%		
Mean Difference	-19.0665 ***			Mean Difference	31.5061 ***				
Investment	S	Sex		Financial	S	ex			
Group	Female	Male	Total	Advisor	Female	Male	Total		
0	21,673	33,271	54,944	0	20,031	34,252	54,283		
	87.34%	84.02%	85.30%		80.72%	86.50%	84.27%		
1	3141	6328	9469	1	4783	5347	10,130		
	12.66%	15.98%	14.70%		19.28%	13.50%	15.73%		
Total	24,814	39,599	64,413	Total	24,814	39,599	64,413		
	100%	100%	100%		100%	100%	100%		
Mean Difference		-11.5988 ***		Mean Difference		19.6426 ***			

Note: \*\*\* *p* < 0.01.

Maaa Madia	Employment Status		Tatal	Costal Madia	Employn	Employment Status			
Mass Media	Employed	Unemployed	Iotal	Social Media	Employed	Unemployed	Total		
0	17,494	521	18,015	0	31,269	1898	33,167		
	28.36%	19.06%	27.97%		50.70%	69.45%	51.49%		
1	44,186	2212	46,398	1	30,411	835	31246		
	71.64%	80.94%	72.03%		49.30%	30.55%	48.51%		
Total	61,680	733	64,413	Total	61,680	2733	64413		
	100%	100%	100%		100%	100%	100%		
Mean Difference		-10.6079 ***		Mean Difference		19.2493 ***			
Investment	Employn	yment Status		Financial	Employn	nent Status			
Group	Employed	Unemployed	Total	Advisor	Employed	Unemployed	Total		
0	52,561	2383	33,167	0	51,947	2336	54,283		
	85.22%	87.19%	51.49%		84.22%	85.47%	84.27%		
1	9119	350	9469	1	9733	397	10,130		
	14.78%	12.81%	14.70%		15.78%	14.53%	15.73%		
Total	61,680	2733	64,413	Total	61,680	2733	64,413		
	100%	100%	100%		100%	100%	100%		
Mean Difference		2.8576 ***		Mean Difference		1.7617 *			

Table 5. Distribution of probability of using four information sources by employment status.

Note: \*\*\* *p* < 0.01, \* *p* < 0.10.

Similarly, the probability of using the four different information sources by sex showed a great difference, particularly among users of mass media and social media, at a 1% significance level. The *t*-test statistics provided evidence that males opted to use mass media more often than females, but females tended to use social media more often than males. However, the magnitude of mass media usage was greater for both males and females than that for social media users. The preference for investment groups and financial advisors as information sources for investment decisions varied slightly by sex in absolute terms at a 1% significance level. However, neither source was highly preferred nor used by either sex. Specifically, approximately 16% of males used investment groups to make financial decisions, whereas females made up approximately 12.70% of users. Females comprised the majority of users with financial advisors as an information source, at 19.28%, while males accounted for 13.50% of users. However, these percentages for both sexes were considerably lower than those for users of mass media and social media.

Finally, there was dramatic heterogeneity at a 1% significance level, particularly among mass media and social media users classified by employment status, as shown in Table 5. Specifically, 80.94% of unemployed individuals used mass media as their preferred information source, which could be because of the free/no-cost information, while 71.64% of employed individuals followed closely behind, at almost 72%. Nevertheless, the use of social media by employment status showed an uncanny trend. Social media did not seem to be highly preferred by either employed or unemployed populations, with more than 50% of people in both categories opting not to use this kind of media for investment decisions. However, among those who used it, the percentage of users in the employed category was higher than that of those who were unemployed (49.30% vs. 30.55%). As investment groups and financial advisors are paid information sources, it is not surprising that unemployed individuals prefer to use fewer of these sources than employed individuals; however, the variation among these groups across both information sources was not substantial, albeit

significant. Conversely, professional information sources seemed to be strongly unfavored by most people (at least 84%) in both employment categories. This finding indicates that the financial services industry has become increasingly digital, with social media and mass media marketing becoming more critical means of relying on financial information from potential investors for decision making.

#### 2.4. Research Design

We employed the following equation to investigate the relationship between the preference for various types of information sources for investment decisions and demographic, socioeconomic, and psychological factors among Japanese investors.

$$Y_{1i} = f(X_i, S_i, T_i, \varepsilon_i) \tag{1}$$

$$Y_{2i} = f(X_i, S_i, T_i, \varepsilon_i)$$
<sup>(2)</sup>

$$Y_{3i} = f(X_i, S_i, T_i, \varepsilon_i)$$
(3)

$$Y_{4i} = f(X_i, S_i, T_i, \varepsilon_i) \tag{4}$$

where  $Y_{1i}$ ,  $Y_{2i}$ ,  $Y_{3i}$ , and  $Y_{4i}$  are the measures of the dependent variables—mass media, social media, investment groups, and financial advisors, respectively.  $X_i$  is a vector of an individual's demographic characteristics,  $S_i$  represents the respondent's socioeconomic factors,  $T_i$  represents psychological characteristics, and  $\varepsilon_i$  is the error term.

Given the binary nature of the dependent variables, we used probit regression models to estimate Equations (1)–(4). To prevent intercorrelations between the independent variables, we assessed all models for correlation and multicollinearity (Appendix A). The correlation matrix indicated a weak relationship (below 0.7) between the explanatory variables, and no multicollinearity was detected (variance inflation factor < 10).

Additionally, we considered the possibility of endogeneity bias from the potential causal relationship between financial literacy and financial-information-source-seeking behaviors. While people with higher levels of financial literacy tend to seek information from various sources for investment purposes, those who frequently use investment information sources may become more financially literate (Gentile et al. 2016; Kramer 2016). Owing to this potential bias, we employed the cognitive skills variable as an instrumental variable (IV) for financial literacy across the four equations.

The full specifications of Equations (1)–(4) using IV are as follows:

*Mass Media*<sub>i</sub>(1 = mass media and 0 = all other sources)

 $= \beta_0 + \beta_1 Male_i + \beta_2 Age_i + \beta_3 Age sqaured_i + \beta_4 Education_i$ 

 $+\beta_5 Married_i + \beta_6 Children_i + \beta_7 Unemployed_i$ 

- $+ \beta_8 \log of household income_i$
- $+\beta_9 \log of household asset_i$
- +  $\beta_{10}$  months elapsed since account opening;
- $+ \beta_{11}$ Financial literacy<sub>i</sub>(IV

= cognitive skills $) + \beta_{12}$ Risk aversion<sub>i</sub>

- $+ \beta_{13} myopic view of future_i$
- $+ \beta_{14} Impatience_i$
- +  $\beta_{15}$ *Hyperbolic discounting*<sub>i</sub> +  $\varepsilon_i$

(5)

Social Media<sub>i</sub>(1 = social media and 0 = all other sources) $= \beta_0 + \beta_1 Male_i + \beta_2 Age_i + \beta_3 Age sqaured_i + \beta_4 Education_i$  $+\beta_5 Married_i + \beta_6 Children_i + \beta_7 Unemployed_i$  $+ \beta_8 \log of household income_i$  $+ \beta_9 \log of household asset_i$  $+ \beta_{10}$  months elapsed since account opening; (6) $+ \beta_{11}$ Financial literacy<sub>i</sub>(IV = cognitive skills $) + \beta_{12}$ Risk aversion<sub>i</sub>  $+ \beta_{13}$ myopic view of future<sub>i</sub>  $+ \beta_{14} Impatience_i$ +  $\beta_{15}$ *Hyperbolic discounting*<sub>i</sub> +  $\varepsilon_i$ Investment  $Group_i$  (1 = investment group and 0 = all other sources)  $= \beta_0 + \beta_1 Male_i + \beta_2 Age_i + \beta_3 Age sqaured_i + \beta_4 Education_i$  $+\beta_5 Married_i + \beta_6 Children_i + \beta_7 Unemployed_i$  $+ \beta_8 \log of household income_i$  $+ \beta_9 \log of household asset_i$  $+\beta_{10}$  months elapsed since account opening<sub>i</sub> (7) $+ \beta_{11}$ Financial literacy<sub>i</sub>(IV = cognitive skills $) + \beta_{12}$ Risk aversion<sub>i</sub>  $+ \beta_{13}$  myopic view of future,  $+ \beta_{14}$ Impatience<sub>i</sub> +  $\beta_{15}$ Hyperbolic discounting<sub>i</sub> +  $\varepsilon_i$  $= \beta_0 + \beta_1 Male_i + \beta_2 Age_i + \beta_3 Age sqaured_i + \beta_4 Education_i$  $+\beta_5 Married_i + \beta_6 Children_i + \beta_7 Unemployed_i$  $+ \beta_8 \log of household income_i$  $+ \beta_9 \log of household asset_i$  $+ \beta_{10}$  months elapsed since account opening;  $+ \beta_{11}$ Financial literacy<sub>i</sub>(IV

# Financial Advisor<sub>i</sub>(1 = financial advisor and 0 = all other sources)

= cognitive skills $) + \beta_{12}$ Risk aversion<sub>i</sub>

 $+ \beta_{13}$  myopic view of future<sub>i</sub>

 $+ \beta_{14}$ Impatience<sub>i</sub>

+  $\beta_{15}$ *Hyperbolic discounting*<sub>*i*</sub> +  $\varepsilon_i$ 

# 3. Empirical Results

To better understand the effects of various socioeconomic, demographic, and psychological factors on different information sources, we conducted a cross-sectional regression analysis of the following four dependent variables: mass media, social media, investment groups, and financial advisors. The results both with and without the IV model are presented in Table 6.

(8)

Variables	Without IV	With IV	Without IV	With IV	Without IV	With IV	Without IV	With IV	
vallables	Mass	Media	Social	Media	Investmer	nt Group	Financial Advisor		
Mala	0.0470 ***	-0.0868 ***	-0.210 ***	-0.3159 ***	0.1730 ***	0.2119 ***	-0.224 ***	-0.3298 ***	
Male	(0.0115)	(0.0268)	(0.0109)	(0.0216)	(0.0136)	(0.0321)	(0.0130)	(0.0259)	
A	-0.0042	-0.0132 ***	-0.0110 ***	-0.0178 ***	0.00332	0.0071	0.00725 *	-0.0002	
Age	(0.0035)	(0.0037)	(0.00350)	(0.0037)	(0.00392)	(0.0044)	(0.00373)	(0.0042)	
Age squared	0.0001 ***	0.0002 ***	-0.0001 ***	-0.0001	0.0000 *	-0.0001 **	$-1.46\times10^{-5}$	0.0001	
nge squared	(0.0000)	(0.0000)	$(3.89 \times 10^{-5})$	(0.0000)	$(4.31 \times 10^{-5})$	(0.0000)	$(4.06 \times 10^{-5})$	(0.0000)	
Voors of adjugation	0.0259 ***	0.0019	-0.0078 ***	-0.0272 ***	-0.0194 ***	-0.0116 *	-0.00266	-0.0214 ***	
rears of education	(0.0029)	(0.0052)	(0.00271)	(0.0044)	(0.00329)	(0.0061)	(0.00326)	(0.0055)	
Mauriad	0.0043	0.0220	-0.0064	0.0094	-0.0285	-0.0374 *	0.0403 **	0.0570 ***	
Married	(0.0172)	(0.0171)	(0.0162)	(0.0164)	(0.0198)	(0.0203)	(0.0196)	(0.0195)	
Children	0.0139	0.0220	-0.0267 *	-0.0148	0.0407 **	0.0351 **	0.0330 **	0.0362 **	
Children	(0.0148)	(0.0146)	(0.0140)	(0.0139)	(0.0170)	(0.0173)	(0.0167)	(0.0164)	
Unomployed	0.0301	0.0325	0.0397	0.0505 *	-0.0261	-0.0360	0.0326	0.0283	
Onemployed	(0.0325)	(0.0319)	(0.0303)	(0.0299)	(0.0360)	(0.0362)	(0.0351)	(0.0347)	
Log of household	-0.0063	-0.0358 ***	0.0541 ***	0.0234 *	0.0399 ***	0.0505 ***	0.0818 ***	0.0526 ***	
income	(0.0120)	(0.0129)	(0.0114)	(0.0129)	(0.0138)	(0.0154)	(0.0136)	(0.0157)	
Log of household	0.0401 ***	-0.0065	-0.0149 **	-0.0535 ***	-0.00324	0.0095	-0.0231 ***	-0.0622 ***	
assets	(0.0067)	(0.0109)	(0.00611)	(0.0095)	(0.00745)	(0.0128)	(0.00784)	(0.0117)	
Months elapsed	0.0015 ***	0.0012 ***	-0.00134 ***	-0.0015 ***	0.000139	0.0002	-0.00104 ***	-0.0012 ***	
opening	(0.0001)	(0.0001)	(0.000108)	(0.0001)	(0.000125)	(0.0001)	(0.000130)	(0.0001)	
Financial literacy	0.4450 ***	1.7149 ***	0.0863 ***	1.2245 ***	-0.0330	-0.4368	-0.0995 ***	1.0254 ***	
T mancial meracy	(0.0194)	(0.2174)	(0.0190)	(0.2203)	(0.0229)	(0.2977)	(0.0221)	(0.2703)	
Dial. amonoi an	0.0418 *	0.0370	-0.0350	-0.0352	-0.0902 ***	-0.0895 ***	0.0122	0.0058	
KISK aversion	(0.0241)	(0.0237)	(0.0227)	(0.0224)	(0.0276)	(0.0278)	(0.0270)	(0.0266)	
Myopic view of the	-0.1211 ***	-0.0857 ***	0.0140	0.0370 **	-0.000378	-0.0106	-0.0678 ***	-0.0484 **	
future	(0.0161)	(0.0175)	(0.0156)	(0.0160)	(0.0188)	(0.0198)	(0.0190)	(0.0199)	
Impatience	0.0245 ***	-0.0004	0.0167 ***	-0.0041	-0.00516	0.0015	-0.00538	-0.0239 ***	
imputence	(0.0061)	(0.0074)	(0.00556)	(0.0069)	(0.00679)	(0.0086)	(0.00673)	(0.0080)	
Hyperbolic	0.0117	0.0444 **	-0.0305 *	0.0038	0.0315	0.0230	-0.0317	-0.0013	
discounting	(0.0172)	(0.0177)	(0.0163)	(0.0172)	(0.0194)	(0.0210)	(0.0196)	(0.0206)	
Constant	-0.9141 ***	-0.1167	0.354 **	1.0088 ***	-1.378 ***	-1.6419 ***	-1.915 ***	-1.1914 ***	
Constant	(0.1732)	(0.2272)	(0.163)	(0.2021)	(0.198)	(0.2556)	(0.199)	(0.2778)	
Observations	64,413	63,746	64,413	63,746	64,413	63,746	64,413	63,746	
Log likelihood	-36,990	-41,866	-42,432	-47,286	-26,765	-31,760	-27,657	-32,647	
Chi2 statistics	2243	2227	4123	4483	243	238.5	698	771.8	
<i>p</i> -value	0	0	0	0	0	0	0	0	

 Table 6. Probit Regression Results for Preferences of Four Information Sources for Investment Decisions.

Robust standard errors in parentheses \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

Table 6 presents a regression analysis using a probit regression model to better understand the positive role of the socioeconomic, demographic, and psychological factors in influencing the use of each of the four types of information sources for investment decisions. Regarding the demographic factors, males exhibited a greater tendency to consult mass media and investment groups prior to making investment decisions. However, the results were not robust to the IV model for mass media. Meanwhile, older individuals demonstrated a statistically significant and positive association with the frequent use of financial advisory services, while people with more years of education preferred to use mass media more than the other sources. These patterns became insignificant when the IV models were considered. Interestingly, married people tended to seek investment advice from financial advisors, which is consistent with the IV model. Moreover, those with children exhibited a positive association with the use of investment groups and financial advisors. This relationship did not change sign or magnitude from the IV results. Regarding the socioeconomic factors, a higher household income was positively associated with the selection of social media, investment groups, and financial advisors, whereas those with greater household assets tended to favor mass media. The findings for household income in the IV models remained the same, but those for household assets were insignificant. Our results have also revealed that individuals with higher financial literacy tended to refer to mass media and social media platforms as sources of investment information. Furthermore, people who has used investment accounts for longer periods displayed a preference for mass media. The significance of the positive relationship between financial literacy and the duration of account usage remained unchanged in the IV models. Regarding the psychological factors, risk aversion was positively related to the use of mass media, whereas a myopic view of the future became significant and positive with social media only once the IV model was incorporated. A positive relationship was observed between impatience and the utilization of mass and social media as sources of information. Nevertheless, these findings became insignificant when the IV models were incorporated.

We also examined the kinds of people from various socioeconomic, demographic, and psychological backgrounds who deviated from using information sources when making investment decisions. Among the demographic variables, and consistent with the use of IV, we found that males strongly diverged from the use of social media and financial advisors when making investment decisions, while their preference for social media as a desired information source declined with age. However, we also found that mass media use became significantly and negatively associated with age only when the IV model was used. Interestingly, individuals with more years of education had negative preferences regarding the use of social media and investment groups for attaining financial information, which is consistent with the results of the IV regression. Furthermore, the years of education became significantly negative under financial advisors once the IV model was deployed. Marriage variables were found to be significantly and negatively associated with investment groups only under the use of IV. The individuals with children exhibited a negative association with the use of social media platforms without the use of IV only. Regarding the socioeconomic factors, people with more household assets and those with more investment account usage preferred not to use social media and financial advisors too much, which is consistent with the results of the IV approach. However, higher household income was significant with mass media use only under the IV approach. Intriguingly, the results for the absence of IV revealed that the individuals with higher financial literacy viewed financial advisors negatively as suitable information sources, whereas the results with IV showed otherwise. Regarding the psychological factors, and consistent with the results of IV, risk-averse people did not favor the use of investment groups, while those with myopic views opposed the use of mass media and financial advisors as a means of acquiring financial knowledge. Moreover, the use of IV yielded a negative association between the use of financial advisors and the impatience variable; however, this significance disappeared for social media use under impulsivity, whereby hyperbolic discounting was significantly negative without incorporating IV.

### 4. Discussion

The reliability of information sources for investment decision making has evolved over time. In Japan, investment groups and financial advisors are the traditional sources of financial information and knowledge (Fujiki 2019). However, technological evolution has made other sources of information, such as social media and mass media, more available and lucrative for potential investors. Our uncontrolled observation shows that investors are more inclined to use information from social media and mass media than they are to use that from investment groups and financial advisors. Our findings are consistent with those of previous studies, which have found that financial experts and investment clubs did not perform significantly better in terms of portfolio allocation, risk diversification, and return generation (Bodnaruk and Simonov 2015; Barber and Odean 2000). Ibert (2023) also found that fund managers' performance does not improve unless they invest their own wealth in the fund. Since psychology plays an important role in financial decision making (NASDAQ 2019), it is worthwhile understanding how active investors in the era of digital information select information sources in Japan.

The decision to use a particular source of information for financial decisions is difficult to explain because of the dramatic changes occurring in the world of information through formal and informal outlets, particularly technological advancements. Over the past two decades, investors have observed a boom in the Internet, the proliferation of social networks, and the emergence of artificial intelligence. Thus, the choice of information source is a corollary for the adoption of technology by individual investors. Moreover, investor psychology plays a role in all of these aspects, making such decisions even more complicated. Financial advisors generally provide expert advice because of their expertise and knowledge in security selection, risk management, long-term planning, and portfolio rebalancing. Our study reveals that certain investors prefer financial advisory services. These investors tend to be female, married, and financially literate; have lower levels of education, children, a higher household income but lower financial asset balances, recently opened investment accounts, and a forward-looking perspective; and display patience. These results imply that family orientation, risk aversion, financial soundness, knowledge, and long-term investment views motivate investors to use financial advisory services. This group of investors seems to make passive investments that are not motivated by self-reliance and overconfidence, invest in long-term capital formation, try to ensure the financial security of their family, make joint financial decisions, and are not impulsive with their decisions. Intrahousehold bargaining, risk aversion, and the long-term security of investments can explain the reasons for the preference for formal financial advice (Reiter-Gavish et al. 2021; Lyons et al. 2008; Sivasankaran and Selvakrishnan 2023; Arti and Sunita 2011).

Investment clubs provide crucial support for investment advice among members through collective research, practical knowledge, diverse perspectives, networking, and portfolio reviews. Although several studies have provided evidence of the success of investment groups worldwide, an exaggerated performance is not uncommon. In our study, investment groups remain popular among investors who are male, unmarried, and risk-averse; and have a lower level of education, children, and a higher household income. Investment clubs are usually formed among close associates who prefer to take shared decisions. Our results imply that investors who are self-reliant and confident, but do not have the required expertise and do not like to take excessive risks, prefer investment groups. Sharing information with group members is an effective way to reduce the risk of receiving information from an individual source. Our results are consistent with the findings of previous studies that men and unmarried investors are generally confident and make decisions independently (Renerte et al. 2023; Arti and Sunita 2011) but are also ready to take professional advice during abnormal times, such as the ongoing COVID-19 pandemic (Rabbani et al. 2021).

Mass media, such as newspapers, television, radio, and online news outlets, have played an important role in disseminating information for investment decisions over the years (Dong et al. 2022). Before social media became influential, mass media was used to provide information to all investor types. The information content of mass media is much larger than that of social media (Dong et al. 2022). Mass media was popular among investors because it disseminated information, created sentiment, provided advice and forecasting, covered sensational news, and provided education and awareness services, among many other reasons. Although the information provided by mass media has been successful in predicting the market, there have been many instances of providing incredulous information that is susceptible to bias and becoming a hub of sensationalism (U.S. Securities and Exchange Commission 2022; Office of the Compliance Inspections and Examination 2012). In different market settings, mass media information could generate differential investor sentiment and vulnerability (Yang et al. 2017). Nevertheless, mass media remains a popular source of investment information among many investors. Our study finds that investors who are female and younger, and have low household income, investment experience, financial literacy, and long-term views prefer mass media as a source of investment information. Being female and young, and having low household income, are associated with being less active and prolific investors, although their financial knowledge and long-term views support long-term investment (Yusuff et al. 2020). These groups of investors prefer information. Because cognitive functions decrease with age, which limits older people in processing information, they might not prefer mass media (Ivan et al. 2020; Loos and Ivan 2022; Davis 2006). Our study also finds that impulsive investors prefer mass media, consistent with the finding that many investors show impulsiveness by increasingly relying on online media without assessing its authenticity (CNBC 2021b).

Social media platforms, such as Twitter, LinkedIn, Instagram, Reddit, and Facebook, have created digital platforms for investors. Along with mass media, social media has become an important and prolific source of information for investment decisions (Dong et al. 2022; Dure 2021; Siikanen et al. 2018). Recent data show that approximately 75% of investors use social networks to make investment decisions (Hill 2022). Our study finds that active investors who are women, younger, unemployed, and financially literate, and who have less education, a higher household income but not household assets, relatively low investment experience, and a myopic view of the future, are likely to prefer social media as a source of information for investment decisions. Our results are consistent with the evidence that social media is particularly popular among female, younger, and non-wealthy investors, owing to its availability, diversified use, lower cost, and risk-taking characteristics (Financial Industry Regulatory Authority 2023; CNBC 2021a; WSJ 2021; Halek and Eisenhauer 2001). Savio and Raroque (2012) have indicated that wealthy people have a greater tendency to personally manage their investments rather than rely on social networks. However, this group of investors' over-reliance on social networks shows that they may be myopic about the long-term consequences of their decisions. The demographic and socioeconomic characteristics of this group of investors implies that they prefer instant information from various social media outlets, but also have the financial literacy required to judge the information. The ability to judge the source and content of information is particularly important when using social media information, because unreliable and unverified information is widely available (Financial Industry Regulatory Authority 2023; Pelster and Gonzalez 2016).

Our study has some limitations that should be considered when interpreting the results. First, because the data were collected during the COVID-19 pandemic, the choice of information sources could have been influenced by the risk and uncertainty during that period. Second, as the study was conducted among active investors, the extrapolation to all investors should be interpreted with caution. However, the study of the preferences for information sources by a significant number of active investors provides fresh evidence on their choices of obtaining information in a changing environment. We plan to conduct a longitudinal study on the choice of information for investment decisions in the future.

#### 5. Conclusions

This study investigated the demographic, socioeconomic, and psychological factors that influence the use of four types of information sources—social media, mass media, financial advisors, and investment groups—in investment decisions among active Japanese investors. According to our main findings, active investors are more inclined to use social networks and mass media than financial advisors and investment groups. Although these results may appear surprising, they are not unreasonable, given the level of convenience, accessibility, real-time market sentiment, cost-effectiveness, and diverse perspectives presented by social media and mass media. Moreover, the use of each of the four information sources is strongly influenced by an individual's specific characteristics. Specifically, those who use mass media for investment decisions are mostly female, young, financially literate, and long-standing customers of the company or show hyperbolic discounting. Those who

are inclined to use social media tend to be female, younger, and unemployed, and have a higher household income, financial literacy, and a myopic view of the future. The users of traditional sources of financial knowledge, such as financial advisors, are female, and have children, a higher household income, patience, and a long-term view of investment. The users of investment groups tend to be male, unmarried, and have children, a higher household income, and/or financial literacy.

These results have the following implications, particularly for the government and traditional providers of financial knowledge, such as financial advisors: First, since mass media and social media are widely used, financial market regulatory authorities should educate investors so that they can understand the value of information and distinguish between authentic and false information. Second, despite some challenges, financial advisors can play an important role for long-term risk-averse investors. Therefore, financial advisors should develop customized solutions for this group of investors. The government could also implement such measures as providing preferential tax treatment, subsidies, and consultation services for investors who consult these advisors to incentivize their usage.

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#### Appendix A

Table A1. Correlation matrix.

	Fin. Literacy	Impatience	Hyperbolic	Male	Age	Years_Edu	Married	Child	Unemploy	Log_Asset	Log_Inc	Elapse _Month	Risk_ Aversion	Myopic _View
Fin.literacy Impatience Hyperbolic Male Age Years_of_edu Married Child Unemployed Log_income Log_of_asset Elasped_month Risk_aversion Myopic view	$\begin{array}{c} 1\\ 0.0758\\ -0.0125\\ 0.2234\\ 0.1029\\ 0.1785\\ 0.0500\\ 0.0252\\ 0.018\\ 0.1516\\ 0.2098\\ 0.1194\\ 0.0445\\ -0.0467\end{array}$	$\begin{array}{c} 1 \\ 0.1857 \\ 0.0704 \\ 0.0924 \\ 0.0204 \\ 0.024 \\ 0.0246 \\ 0.0474 \\ 0.0154 \\ 0.0407 \\ 0.069 \\ 0.0087 \\ -0.0044 \end{array}$	$\begin{array}{c} 1\\ 0.0367\\ 0.0282\\ 0.0082\\ 0.0104\\ 0.0156\\ 0.0192\\ 0.002\\ -0.002\\ 0.0204\\ 0.0059\\ 0.0086\end{array}$	1 0.1862 0.1232 0.0766 0.0565 0.0804 0.0952 0.1136 0.1967 0.0629 -0.030	$\begin{array}{c} 1 \\ -0.119 \\ 0.2296 \\ 0.3424 \\ 0.3043 \\ 0.0836 \\ 0.4021 \\ 0.4024 \\ 0.1464 \\ -0.075 \end{array}$	$\begin{array}{c} 1\\ 0.0257\\ -0.051\\ -0.0228\\ 0.2176\\ 0.1835\\ 0.0404\\ 0.0687\\ -0.0263\end{array}$	$\begin{array}{c} 1 \\ 0.6094 \\ -0.0234 \\ 0.4402 \\ 0.1775 \\ 0.0784 \\ 0.0101 \\ -0.0417 \end{array}$	1 0.0142 0.2679 0.1378 0.0931 0.0049 -0.048	$1 - 0.2176 \\ 0.1457 \\ 0.1527 \\ 0.0553 \\ - 0.0159$	$1 \\ 0.4036 \\ 0.0754 \\ 0.0421 \\ -0.0448$	1 0.2747 0.1277 -0.0739	1 0.0884 -0.0287	1 0.0597	1

Variable	VIF	1/VIF		
Male	1.14	0.8754		
Age	1.81	0.5516		
Married	2.32	0.4316		
Child	1.90	0.5260		
Log_of_hincome	1.66	0.6023		
Log_of_hasset	1.57	0.6374		
Unemployed	1.22	0.8219		
Elasped_month	1.25	0.7995		
Years_of_education	1.16	0.8611		
Financial_literacy	1.12	0.8920		
Impatience	1.05	0.9505		
Risk_aversion	1.04	0.9623		
Hyperbolic discounting	1.04	0.9632		
Myopic view of the future	1.01	0.9875		
Mean VIF	1.38			

Table A2. VIF test results.

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