

Information Searches Affect Individual Investment Preferences: Testing a Moderating Effect of Income

Shun-Yao Tseng

Abstract—Risk-taking in investment decision-making is a major means to create individual wealth. Investors search information for risk-reducing strategies in risky investment decision-making. Digital information on financial measures and advice-seeking information are two usual studied variables in information searching. This study extends the information search aspects to discuss heuristics reliance to enrich our understanding of individual risk-taking in investment choices. A test for differences based on income is also conducted. In addition, this article discusses two forms of risky investments, stocks/options investments as well as mutual funds investments. We test our model with a sample of experienced investors by confirmatory factor analysis and hierarchical regression analysis. The results show that heuristics have a strong positive effect on mutual fund investment preferences. An increase of advice-seeking information search significantly increases individual interest in stocks/options investment for high-income investors. Accordingly, implications for financial consultants and ethics issues are discussed as well.

Index Terms—Heuristics, income, information search, investment preference.

I. INTRODUCTION

Information plays a critical role in individual risk-taking in risky investment decision-making behavior [1]-[4]. Investors seek to achieve expected returns “by decreasing the level of associated uncertainty through information search” ([5], p.505). Digital information on financial measures and seeking advice are two usual means in information searching.

Research finds the positive effect of information search on individual hold risky investments [6]-[8]. Digital information on financial measures [6], [9] and advice seeking information [10] are two usual studied variables. Reference [9] and [6] find that digital information search is the primary consideration in individual risky investment decisions, even combined with various other variables such as a personal-financial -need factor and an advocate-recommendation factor. Reference [7] and [8] find that professional advice positively influences the decision to hold stocks.

People may also employ heuristics to reduce the associated effort with information processing [11]. These heuristics, such as viewing a company with strong prior performance as a good investment [12]-[13], are generally useful, although a reliance on the heuristics from an intuitive judgment based on psychological factors may lead to serious errors [14]. However, little empirical research focuses on the effects of

heuristics on investment decision-making, a gap this article endeavors to fill.

This study extends the information search aspects to discuss heuristics reliance, a simplified information search method, on risky investment choices. Specifically, the study here discusses two forms of risky investments, stocks/options investments as well as mutual funds investments. A test for differences based on income is also conducted. Two research questions are proposed: One, how do extended information searches influence individual investment preferences? Two, how does income moderate the effects of information searches on individual investment preferences? This study thus expects to better understand the influences of information searches on risky investment preferences.

II. RESEARCH MODEL AND HYPOTHESES

A. Information Search

Reference [15] defines information search as “an expressed need to consult various sources prior to making a purchase decision” ([5], p. 505). In [4]’s theory of risk-taking in consumer behavior, information search plays a risk-reducing strategy before individuals decide to buy. Digital information search based on financial measurements and advice-seeking information search receive extensive studies in financial decision-making [4], [7]-[9].

1) Digital information based on financial measurements

Researches on individual investor behavior find some crucial determinants on corporate accounting information [9], including expected dividends [6], [9], [16], long-term growth, financial stability [6], [16], and future expectations [9], [16]. These economical determinants, digital information based on financial measurements, are called digital information for short in this study. Empirical studies show that digital information still remains as a valuable criterion, even when investors seem concerned about human skills in financial management [6]-[9]. Thus, we expect that digital information search will increase individual interest in risky investments because investors might reduce their uncertainty via greater understanding of company’s financial status.

2) Advice-seeking Information Search

Seeking advice, such as from professional financial advisors [8], [12] and friends/relatives [9], [12], is especially necessary since investors now have a greater choice of investment products due to the diversification of financial investments [17]. Moreover, due to the lack of understanding for various risky investments, investors desire advice and education from professional advisors [1], [2]. They especially desire face-to-face contact when choosing more

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Shun-Yao Tseng is with the Department of International Trade, College of Hsing Wu, Taipei, Taiwan.101, Sec.1, Fenliao Rd., LinKou Township, Taipei County 244, Taiwan (e-mail: 078013@mail.hwc.edu.tw).

complex or riskier investments [2].

Studies on financial investments demonstrate the positive association between information search from advice and risky investments [7], [8]. For example, [8] uses data from the U.S. survey of Consumer finances (SCF) in 1992, 1995, 1998, and 2001 to analyze the determinants of stock holdings. They find that professional advice positively influences the decision to hold stocks across time.

B. Heuristics

Heuristics are methods people use to reduce the effort associated with a task [11], [18]. Limited to bounded rationality [11], [19], people employ heuristics as “methods for arriving at satisfactory solutions with modest amounts of computation” ([11], p.11) to reduce the effort they expend on the decision-making processes. Reference [18] summarizes heuristics as “methods that use principles of effort-reduction and simplification.” Heuristics are usually useful for simplifying information processes [12], [14], [18]. However, reliance on heuristics from intuitive judgment under uncertainty may lead to severe errors [14]. Some studies on why people employ heuristics have noted that individuals will suffer from both information overload [3], [7] and investment complexity [1], [17] due to bounded rationality [11], [19]. Reference [18] posits that heuristics make the decision process easier. Reference [20] empirically supports the influence of prior fund performance on fund evaluation. They note that investors “seemed to gravitate towards prior fund performance in a significant way (p. 53).” Thus, it is expected that heuristics, such as viewing a company with strong prior performance as a good investment, may increase an investor’s interest in higher risk investments.

C. Income

Research suggests that the rich increase their information search [5], [7] and hold a larger portion of their portfolios in risky investments [21]. For example, [7] finds that wealth positively influences individual information searching. He concludes that wealthier households tend to hold more stocks through the demand for costly information with a higher precision. Reference [8] finds that the decision to hold stocks is positively correlated with income, which is especially consistently significant across time.

Studies on risky investment decision-making find that income has prominent direct effects on information searching behavior and investment choices separately [8], [21]. However, few research studies have examined whether income moderates the information searches effects in risky investment decision-making, an issue that will be explore further in this study.

D. Research Model and Hypotheses Development

According to the [4]’s theory of risk-taking in consumer behavior, individuals acquire information under uncertainty to reduce risk and then decide to buy. Considering three types of information searches mentioned above, researches show that (1) digital information search is a crucial determinant in risky investment decision-making [6], [9], [16], (2) Reference [7] formulates that costly information acquisition, such as expert advice, induces investors to hold more stocks, and (3) Reference [18] posits that heuristics make the

decision process easier by an effort-reduction framework. Accordingly, we propose our research model that information searches, including digital information, advice-seeking information, and heuristics reliance, positively affect individual risky investment preferences, as shown in Fig. 1. We thus begin a series of hypotheses related to a proposed research model.

Hypothesis 1 : *Investor’s digital information search positively influences his/her preferences for (a) stocks/options investments or for (b) mutual funds investments*

Hypothesis 2 : *Investor’s advice-seeking information search positively influences his/her preferences for (a) stocks/options investments or for (b) mutual funds investments.*

Hypothesis 3 : *Investor use of heuristics positively influences his/her preferences for (a) stocks/options investments or for (b) mutual funds investments.*

We also investigate the moderating role of income in information search – investment preference model. Researches point out that the rich and the rest take risks differently because of differences in information acquired [7]. In this light, our hypothesis is:

Hypothesis 4: *Income moderates the positive relationship between information searches and risky investment preferences (including (a) stocks/options investments and (b) mutual funds investments).*

Hypothesis 4-1: *Income moderates the positive relationship between digital information search and risky investment preferences (including (a) stocks/options investments and (b) mutual funds investments).*

Hypothesis 4-2: *Income moderates the positive relationship between advice-seeking information search and risky investment preferences (including (a) stocks/options investments and (b) mutual funds investments).*

Hypothesis 4-3: *Income moderates the positive relationship between use of heuristics and risky investment preferences (including (a) stocks/options investments and (b) mutual funds investments).*

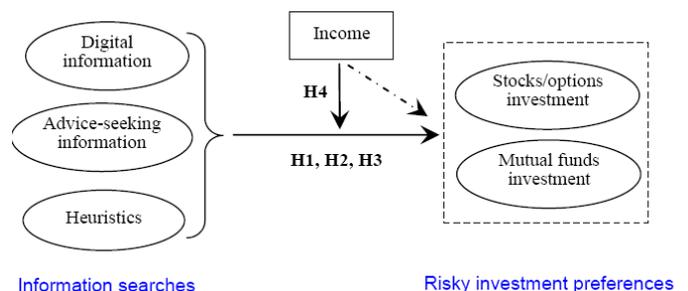


Fig. 1. Research model and research hypotheses.

III. RESEARCH METHODOLOGY

A. Instrument Development

To evaluate investor attitudes and behavioral intentions in risky investment decision-making, the survey instrument measurement was a psychometric scale developed from the literature reviews, depicted as follows. This article including five constructs with thirteen items. Five constructs are digital information search, advice-seeking information search, heuristics, stocks/options investment preferences, and mutual funds investment preferences.

The concept of *heuristics* in this article refers to the simplification of information searches based on intuitive judgment [14], [18]. Three items for the construct of *heuristics* measured the investor's judgment of good investment based on information from companies with high sales growth, generating strong earnings, and prior strong performance, as shown in Table I.

Three items for the construct of *digital information search* measured the investor's tendency to make information searches to evaluate a firm's expected earnings, financial statements, and the status of its products/services [9]. Three items for the construct of *advice-seeking information search* measured the investor's tendency to seek help from professional financial advisors, family, friends, and published materials (e.g. magazines and brochures from financial institutions) ([3], p. 118). *Preferences for risky investments*, according to the control orientation [17], was measured by four items to reflect the tendency of investor's preferences for different risky investments. The items of *stocks/options investments* included stocks, futures, and options. The items of *mutual funds investments* included domestic and foreign mutual funds [7], [17].

All items were measured on a five-point Likert scale (with the following definitions: 1= strongly disagree, 3= neither agree nor disagree, and 5= strongly agree). The preliminary instrument was reviewed by four financial scholars and two investment scholars to assess its clarity. The instrument items were pretested with 55 investors using the same data collection method. Of the 55 questionnaires, seven were discarded due to the respondents' inexperience with investments. The Cronbach's α of scales was acceptable [22] with the minimum score being above 0.7.

B. Data Collection

Data was collected using a questionnaire survey administered through an interview. In an effort to motivate subjects to respond, an incentive in the form of a US\$10 supermarket coupon was offered to all participants. 395

investors who were holding or had experienced investing in higher risk investments were randomly selected. The reason for selecting individuals with some investment experience was that, based on the feedback from the pilot study, they were more likely to understand and complete the questionnaire and seemed to be more interested in participating.

A total of 378 successful questionnaires were obtained (effective response rate: 95.7%). Of the respondents, 65.3% were females; 76.8% had at least a university degree; and 52.6% had annual incomes of US \$20,000 or more.

C. Data analysis and Results

Data analysis was performed in two stages, the development of a measurement model and the evaluation of a research model. LISREL 8.5 was used for data analysis with confirmatory factor analysis (CFA) [23] as the first stage and PASW 18.0 was used for hierarchical regression analysis as the second stage.

1) Development of A Measurement Model

A confirmatory factor analysis (CFA) is conducted to validate the critical factors of digital information search, advice-seeking information, heuristics, stocks/options investment preference, and mutual funds investment preference.

The CFA showed acceptable fit indices [24] with the chi-square/df ratio for this model being 1.62 (since $88.97/55=1.62$), NNFI=0.97, CFI=0.98, GFI=0.96, AGFI=0.94, RMR=0.033, and RMSEA=0.040. Moreover, convergent validity and discriminant validity of the measurement model was assessed as follows.

Convergent validity is assessed by how closely related two measures are with the same construct, and these two measures to some degree are akin to internal consistency between items of a measure [25]. In this study, convergent validity of the measurement model was assessed by three criteria. First, a significant t-statistic for all factor loadings on their assigned construct should be obtained [23]. Second, the composite reliabilities (CR) for each construct must be at or above 0.7 [26] and third, the average variance extracted (AVE) for each construct should exceed 50 percent [26]. As shown in Table II, all factor loadings were statistically significant. The CR for each construct was greater than 0.7, with the values ranging from 0.75 to 0.84, and AVE for each construct was greater than 0.5, with values from 0.51 to 0.66. Thus, convergent validity is demonstrated.

Discriminant validity is obtained if the measure of a construct is not correlated with measures of other constructs to which it is not supposed to be related [25]. The chi-square difference test [23] was used to assess discriminant validity. We computed the χ^2 difference for the original measurement model with its five latent constructs against the ten other possible alternative measurement models with four latent constructs, where the expected correlation between the two constructs of interest was fixed at 1. The results that all χ^2 difference statistics were clearly significant indicate that the original measurement model was significantly better than all other possible alternative measurement models, as shown in Table III. Thus, this test supported the discriminant validity.

TABLE I: MEASUREMENT ITEMS FOR HEURISITICS CONSTRUCT

HEU1	I think that this stock, from a company with high sales growth and generating strong earnings, is likely to be a good investment.
HEU2	I think that the return on this stock, from a company with high sales growth and generating strong earnings, is likely to be higher.
HEU3	I think that the future return on this stock, from a company with strong performance during the past three to five years, is likely to be higher.

Source: [14], p. 1126 and [12], p.100

2) Evaluation of A Research Model

A hierarchical regression analysis is conducted to evaluate a research model, as shown in Table IV. The results showed that both advice-seeking information search and heuristics reliance significantly positively influenced the mutual funds preferences in model 6, supporting H2b and H3b (respectively, $\beta = 0.191, P < 0.000; \beta = 0.132, P < 0.02$). In contrast, they did not have the same influences on the stocks/options preferences in model 3, not supporting H2a and H3a (respectively, $\beta = -0.004$, and $\beta = -0.004, n.s.$).

Interaction terms in Table IV may assess the moderating effects of income. In the stocks/options preference model (model 3), two of the three hypothesized interactions (income*ADV and income*HEU) were significant. Thus, H4-2a and H4-3a received support. In the mutual funds investment preference model (model 6), only single hypothesized interactions (income*DIG) was significant. Thus, H4-1b received support. Moreover, to clarify the nature of the moderating effects, simple slopes [27] for information searches for each income were computed and the resulting regression lines were plotted. We divided the income categories into under twenty thousand US dollars and over twenty thousand US dollars subgroups, a low income group and a high income group. Only income enhances the positive relationship between advice-seeking information search and stocks/options investments preferences, as shown in Fig. 2. That is, increases in advice-seeking information searches increased the investors' interest in stocks/options investment even more when they were high income.

IV. DISCUSSION AND LIMITATIONS

A. Discussion and Contributions

This study on individual investment decision-making is an attempt to better understand the following. How do extended

TABLE II: RESULTS OF RELIABILITY AND CONVERGENT VALIDITY TESTING

Constructs and Items	Standardized loading	t-value*	Mean	Reliability C.R.	AVE
Heuristics			3.34	0.75	0.51
HEU1	0.71	13.43***			
HEU2	0.80	15.26***			
HEU3	0.61	11.51***			
Digital information search			3.79	0.84	0.64
DIG1	0.74	15.57***			
DIG2	0.83	17.84***			
DIG3	0.82	17.47***			
Advice-seeking information search			3.30	0.80	0.58
ADV1	0.76	15.40***			
ADV2	0.82	16.78***			
ADV3	0.70	14.08***			
Stocks/options Investment			3.28	0.75	0.60
DIR1	0.68	7.28***			
DIR2	0.86	7.74***			
Mutual funds Investment			3.70	0.79	0.66
IND1	0.91	10.89***			
IND2	0.70	9.66***			

Note: * t-statistics greater than 3.317 are significant at $p < 0.001$, ***: $p < 0.001$

C.R: composite reliability
AVE: average variance extracted

information searches influence individual investment preferences? And how does income moderate the effects of information searches on individual investment preferences? Two contributes to the better understanding of individual information searching in investment choices are as follows.

TABLE III: DISCRIMINANT VALIDITY OF MEASUREMENT MODEL

Model	$\chi^2_{(df)}$	Difference in χ^2 value
Original Model	$\chi^2_{(55)} = 88.97$	
Combining DIG with ADV	$\chi^2_{(56)} = 462.10$	373.13***
Combining DIG with HEU	$\chi^2_{(56)} = 317.47$	228.50***
Combining DIG with STO	$\chi^2_{(56)} = 216.39$	127.42***
Combining DIG with FU	$\chi^2_{(56)} = 230.56$	141.59***
Combining ADV with HEU	$\chi^2_{(56)} = 330.57$	241.60***
Combining ADV with STO	$\chi^2_{(56)} = 213.40$	124.43***
Combining ADV with FU	$\chi^2_{(56)} = 228.41$	139.44***
Combining HEU with STO	$\chi^2_{(56)} = 216.31$	127.34***
Combining HEU with FU	$\chi^2_{(56)} = 226.64$	137.67***
Combining STO. with FU	$\chi^2_{(56)} = 214.41$	125.44***

Note: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

With 1 df, the critical values of chi-square are 3.841 at $p=0.05$, 6.635 at $p=0.01$, and 10.827 at $p=0.001$.

STO: stocks/options, FU: mutual funds

First, by extending the information search aspects to discuss heuristics reliance, this empirical study may enrich our understanding of individual risk-reducing strategies in risky investment decision-making. We find that heuristics have a strong positive effect on mutual fund investment preferences. This result echoes [20]'s demonstration of a significant influence of prior fund performance on fund evaluation. Possibly, by learning from individual investment experience [18], investors find that the accuracy of heuristics may help them to achieve expected returns [7] in a simple way. This simple way provides a piece of information that is readily available and easily understood [28], [29] to evaluate a complex investment task. Accordingly, the use of heuristics may induce investors to have more interest in mutual funds investments.

Second, this article further examines a moderating role of income in a proposed model to shed light on how income affects the effects of individual information searching on investment choices. In model 3 and Fig. 2, our result confirms [7]'s conclusion that rich investors are more likely to obtain costly information with a higher precision. Greater search and acquisition of valuable information, especially from experts, induces high-income investors to purchase more stocks. Our result implies a value of enhancing the sophistication of the information that a counselor provides, especially for investors who are of high income.

Reporting on two dimensions of stocks/options and mutual funds investments, the findings show that income and both advice-seeking information search and heuristics reliance have dramatic effects on investment preference variation. Accordingly, the practical implications for professional

advisors or governments could be addressed. First, this study has an implication for ethical issues. The government should promote policies dealing with the ethical behavior of both firms and advisors [30] to protect individual investments, especially for investors who prefer mutual funds. Second, to enhance the effect of information provided in individual

stocks/options choices, information providers might significantly concern about the moderating effects of individual income. Organized and valuable information from advisors might induce high-income investors to purchase more stocks/options.

TABLE IV: MODERATED REGRESSION ANALYSIS FOR INCOME

Variables		Standardized Beta					
		Stocks/ options			Mutual funds		
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Main var.	Digital (DIG)	-0.070	-0.078	-0.061	0.089+	0.081	0.046
	Advice (ADV)	-0.018	-0.010	-0.004	0.179***	0.187***	0.191***
	Heuristics(HEU)	-0.002	0.001	-0.004	0.132**	0.135**	0.132**
Moderator	Income		0.096+	0.093+		0.095+	0.94+
Interaction terms	Income*DIG			0.082			-0.175**
	Income*ADV			0.142*			0.056
	Income*HEU			-0.106*			-0.041
ΔR^2 / F-stat		Model 1 and model 2: 0.009 / 3.411+			Model 4 and model 5: 0.009 / 3.411+		
		Model 2 and model 3: 0.032 / 4.095**			Model 5 and model 6: 0.029 / 4.084**		

Notes: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

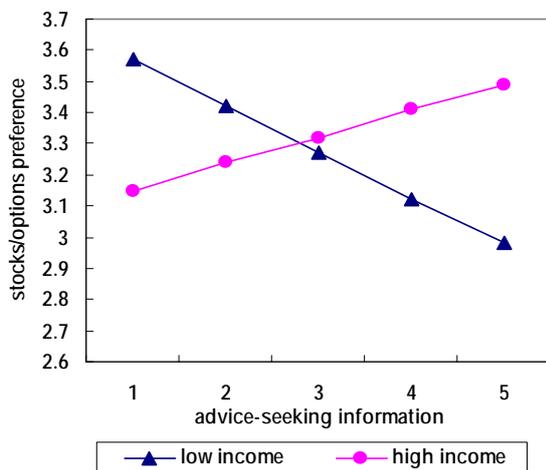


Fig. 2. Graph of moderating effect of income on advice-seeking information and stocks/options preferences.

B. Limitations

In this article, we use a psychometric scale to measure the investors’ investment preferences to reflect their investment decision-making behavior. Although behavioral intentions such as investment preferences are the principal antecedents of voluntary behavior according to the theory of reasoned action (TRA) [31], methodological problems of surveys in the research design limit our study in terms of an individual’s actual investment behavior.

This study has investigated the moderating effect of income, focusing on demographic element, on individual risky investment preferences. The results may be also influenced by individual psychological characteristics, such as risk aversion [1], [2]. Therefore further studies related to this angle may be necessary.

V. CONCLUSION

This study extends the information search aspects to

discuss heuristics reliance, a simplified information search method, on risky investment choices. We hypothesize that information searches affect investor investment preferences. Furthermore, we conduct an investigation for the moderating effect of income.

Reporting on two dimensions of stocks/options and mutual funds investment, the findings show that heuristics have a strong positive effect on mutual fund investment preferences. An increase of advice-seeking information search significantly increases individual interest in stocks/options investment for high-income investors. This empirical demonstration of an extending model may help to better understand individual risky investment decision-making behavior.

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Shun-Yao Tseng is an associate professor at Hsing Wu college, School of Commerce, Department of International Trade. She holds a Ph.D. in the Institute of Business & Management at National Chiao Tung University, Taiwan (2011). Her research areas include statistics, multivariate data analysis and consumer behavior. Her research interests focus on individual decision-making behavior.