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Social Networks and Financial Investments: Evidence from Stock and Mutual Fund Holders in Taiwan

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我們謝謝學刊編委會與匿名審查人的修改建議。特別是審查人之一對於本文在分析方法與數據跟圖示呈現等方面給我們鉅細靡遺的建議，讓本文最後的呈現得到了非常多的改善，我們非常感謝。

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Social Networks and Financial Investments: Evidence from Stock and Mutual Fund Holders in Taiwan

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Although scholars have long emphasized the influence of social networks when working with risky financial assets, empirical studies using network measures to assess these effects are scarce. This study draws on the literature of social networks and economic sociology to formulate hypotheses regarding the influence of social networks on participation in financial investments. To test our hypotheses we used a representative dataset from the Taiwan Social Change Survey (TSCS, 2007), which contains information on the stock and mutual fund holdings of respondents. Our results show that higher proportions of people in one's social network who hold stocks or mutual funds exert positive impacts on financial investment participation. This effect is stronger for social networks composed largely of strong rather than weak ties. Further, network effects were found to be less significant for individuals with higher education levels. This study sheds light on how social networks can influence individual financial behaviors, and discusses the extent and limitations of network influences.

Keywords: social networks, stocks and mutual funds, investor, tie strength

社會網絡與金融投資：臺灣的股票與共同基金投資者的分析

摘 要

雖然過去有學者強調社會網絡對於風險資產投資可能帶來影響，然而目前仍較少文獻透過調查分析資料與社會網絡測量的方式，來衡量一般民眾從事風險投資的情況。本文從社會網絡與經濟社會學的理论文獻中發展數個經驗假設，並透過2007年臺灣社會變遷調查的樣本資料，檢視一般民眾受到人際網絡中其他投資人影響的可能性。我們的資料分析顯示：臺灣一般民眾參與股市與共同基金的可能性，與人際網絡中其他人參與投資的比重有關，特別是具有強連帶特徵的人際網絡影響力量更強。然而，人際網絡的作用對於較高教育程度的人影響較小。這些發現與過去社會網絡相關文獻的理论預期一致，也提供了在金融市場中探究社會網絡可能影響的一個難得機會。最後討論本文發現與金融市場發展以及財富不平等議題之間的關聯。

關鍵詞：社會網絡、股票與基金、投資者、強連帶

A. Introduction

Sociologists have noted how financial investments in the past few decades have become an important strategy for individual wealth accumulation (Keister and Moller 2000). Rapid developments in technology and finance have influenced the growing involvement of the public in stock markets around the world (Dore 2000; Powell and Snellman 2004). For example, at the end of the 1990s, the percentage of households in the United States owning shares reached 48.9 percent (Hong et al. 2004). The American stock market has seen significant growth, with the Dow Jones Industrial Average rising from 3,600 in 1994 to 11,700 in 2000—more than tripling in five years. Other booming stock markets are found in Europe, Asia, and Latin America (Shiller 2000). The prevalence of stock market investment and shareholding in many countries since 1990 has been recognized as one of the most significant social transformations in the twentieth century (Nofsinger 2002). These factors influence both the distribution of wealth and social stratification (Keister 2005).

While prior research has predominantly examined individual financial investments through the lens of socioeconomic conditions and personal traits (Keister 2003; Shaw 1996), there remains limited understanding regarding the influence of social networks on such investments. This gap persists despite the widely accepted notion that the economic activities of social actors are primarily embedded within their social networks (Granovetter 1985). The attributes of relatively high levels of uncertainty and risk associated with stock and mutual fund investments make

the role of social networks particularly relevant, especially when social actors cannot anticipate decision outcomes (Beckert 1996).¹ The uncertainty that investors face is related to information gaps, the presence of alternative options, and imprecision in predicting future market outcomes (March 1994; Rogers and Kincaid 1981). These characteristics often encourage investors to rely on social networks as a means of navigating uncertainty (Zuckerman 1999; Seasholes 2010).

To better understand how social networks influence individual decisions about risky financial assets, one can review the core tenets of economic sociology developed in the past few decades. Ever since Granovetter's (1974) study on job acquisition, empirical research has demonstrated how economic actors depend on social networks for information, advice, and transactions when encountering high-risk or uncertain economic situations (DiMaggio and Louch 1998; Mizruchi and Stearns 2001; Uzzi 1999). In the literature, social networks are considered informal channels for information dissemination that lower uncertainty and search costs (Röper et al. 2009). Since social relationships contain an element of trust that cannot be attained through other sources (Buskens and Raub 2002), they may be more efficient than mass media channels for gathering large quantities of reliable information (Granovetter 2005; Podolny 2001).

The significance of social networks in influencing economic

1 Beckert (1996) suggests that for social actors the greater the situational uncertainty, the lower the chance of recognizing the right situation in which to select an action. He asserts that in uncertain circumstances, "the only tangible guidance available to the actor is that which can be inferred from the patterns and outcomes that emerge from relations among actors" (Beckert 1996: 828).

activity is supported by studies indicating that regular information sharing among individuals in networks leads to greater engagement in financial investments (Duflo and Saez 2002; Hong et al. 2004; Shiller and Pound 1989). In this context, investments are largely portrayed as the consequences of information dissemination and imitations of economic behaviors, which aligns with the general theoretical mechanisms of mimicry and conformity found in the diffusion literature (Rogers 1962; Strang and Soule 1998). Even though networks influence economic activity, the effect does not work equally across all individuals. There are at least three reasons why individuals with higher socioeconomic statuses or levels of education are thought to rely less on networks in investment decisions: they are generally more independent in acquiring relevant financial knowledge (Hong et al. 2004; Kim and McKenry 1998), have more diverse sources of information, and experience less pressure from their social circles (Chang 2005; Lin 1999). Moreover, a key insight in network studies is that ties with varying strengths exert different impacts on individuals (Granovetter 1973). In particular, strong and weak ties differ in the content of exchanges between partners, the emotional intensity of ties, the amount of time spent together, and the level of trust. Given these differences, the influence of weak and strong ties on investment behaviors is likely to vary. Levels of cohesion among individuals typically enhance trust and facilitate information exchanges. The literature suggests that the influence of social networks may vary among individuals from different social strata, as well as across different tie strengths.

This study examines the influence of social networks and the

extent of network effects on individuals when they are involved in risky financial investments. It also analyzes whether the effect of social networks on individuals differs based on their level of education, and whether the strength of ties makes a difference. We first develop four empirical hypotheses using a dataset from the Taiwan Social Change Survey. The survey consists of a probability sample with information on financial assets held by the respondents and their social networks. After presenting the empirical results, the merits and potential contributions of this research are discussed in the Conclusion section.

B. Social Networks and Financial Investments: Theory and Hypotheses

Individuals turn to social networks when facing uncertain decisions. We posit that social networks influence investment behaviors, particularly with regard to risky financial assets. Specifically, we argue that the number of investors in an individual's immediate social circle influences the likelihood of that individual investing in stocks or mutual funds. Having more people in one's social network who participate in financial investments provides access to a wider range of investment information. When that information is consistent and reliable, it gives potential investors more confidence in their own viewpoints, analyses, and judgments regarding the stock market. We therefore believe that the tendency of individuals to engage in high-risk investments within their networks positively influences the likelihood of a person investing in stocks or mutual funds.

Several empirical studies have shown that financial decisions such as individual participation in high-risk investments are positively associated with the extent to which others in their social networks also invest. For instance, Shiller and Pound (1989) found that nearly 45 percent of the individual investors in their sample were influenced by other stock market investors when making purchase decisions. From their study of how social interaction impacts the decisions of university employees to enroll in a savings plan offered by their employer, Duflo and Saez (2002) found that a 1 percent increase in the enrollment rate of an entire department increased the enrollment rate for individuals by 0.2 percent. Similarly, Hong et al. (2004) observed that more-social American households (as measured by frequent church attendance and interactions with neighbors) are more likely to invest in the stock market than less-social households. Ivković and Weisbenner (2007) reported that a 10 percent increase in purchases of a specific stock by one household resulted in a 2 percent increase in the likelihood of other households purchasing the same stock. While the above findings were for nonprofessional investors in the United States, similar results have been reported in European countries (Georgarakos and Pasini 2011), as well as for professional mutual fund managers (Hong et al. 2005). This demonstrates how individuals are influenced by the social networks surrounding them when making investment decisions. Our belief that larger numbers of investors in an individual's social network positively affects the probability of that individual participating in investment activity leads to the first hypothesis:

Hypothesis 1: The higher the proportion of an individual's social network with people investing in stocks or mutual funds, the higher the likelihood the individual will invest in stocks or mutual funds.

Although all investors may be influenced to some degree by their social networks in financial investments, the effect may not be equal across all individuals. For several reasons we expect that individuals with higher levels of education are less influenced by their networks. First, Kim and McKenry (1998) observed that individuals with higher education levels were less likely to depend on social contacts such as family members, friends, neighbors or colleagues when seeking assistance. This is consistent with Lin's (1999) argument that individuals with higher education levels or socioeconomic statuses have access to more diverse information sources. Consequently, they have wider ranges of information choices, and are less likely to be influenced solely by information from their social networks.

Hong et al. (2004) argue that individuals with more education are typically equipped with both cognitive abilities and practical skills to make independent investment decisions. Conversely, individuals with less education are more likely to rely on their networks for analyses of stock markets, interpretations of mutual fund performance, or information on opening transaction accounts. Similarly, Chang (2005) built on Lin's (1999) study to suggest that individuals with higher socioeconomic statuses who have access to wider ranges of resources within their networks are more likely to seek additional information outside their immediate social circles for cross-checking. Hence, as socioeconomic status

increases, the “exclusive use of networks” for financial decisions decreases (Chang 2005:1486). Based on these arguments, we expect that the impacts of social networks are smaller for more highly educated individuals. Hypothesis 2 reflects this argument:

Hypothesis 2: The effect of social networks on investing will be smaller for individuals who have a higher level of education.

Besides individual characteristics, the relationship between social networks and investment behaviors is also likely to be contingent on social tie type, and especially on tie strength (Granovetter 1973). As Granovetter suggests, strong ties (family members, close friends) indicate stronger emotional attachment and cohesion, which likely facilitate frequent information exchanges and greater trust. We assert that when uncertainty is high, information obtained through strong ties is more likely to be considered reliable. Empirical studies show that managers in U.S. banks tend to seek advice from close colleagues regarding high-risk and challenging deals (Mizruchi and Stearns 2001; Uzzi and Lancaster 2003). Likewise, when individuals are faced with large, uncertain, and risky economic transactions such as purchasing secondhand cars, legal services, or house maintenance, they tend to conduct such transactions with people within their social networks (DiMaggio and Louch 1998). According to Röper et al. (2009), one-quarter of the individuals in their Netherlands sample found their homes through family members, friends, or acquaintances, mostly because they were deemed trustworthy and provided abundant and reliable information. The third hypothesis reflects the idea that by fostering network cohesion, strong ties

enhance trust among individuals and across information channels:

Hypothesis 3: The effect of social networks on investing is stronger for social networks consisting of strong ties than those with weak ties.

Similar to Hypothesis 2, which posits that a higher level of education has a diminishing effect on social network influence, we are interested in considering how differences in tie strength influences the impacts of social networks on individual investment behaviors. Earlier studies found that individuals with lower socioeconomic statuses and educational attainment tend to have networks that are locally constrained and primarily composed of strong ties. Conversely, individuals with higher levels of education tend to have networks with wider geographical scopes and weaker ties (Lin 2000; Bott 1957). This suggests that individuals with higher socioeconomic statuses and education levels have access to wider ranges of information sources within their networks, whereas those with less education tend to rely on close connections due to limitations in their own networks (Lin 1999, 2000; Burt 1992). Due to concerns regarding trust and emotional attachment, lower-status individuals tend to seek financial information from family members or close friends (Chang 2005). This is consistent with the argument that individuals with lower levels of education tend to rely more on trust because they have less market knowledge, and are therefore more likely to conform to norms established within their social networks (Guiso et al. 2008: 2582). Since highly educated individuals are likely to have networks consisting of weak ties connecting diverse social groups (Lin 1999), they tend to encounter wider ranges of social norms,

and consequently have access to multiple information sources within their networks. This facilitates their ability to compare norms and copy the behaviors of more diverse ranges of role models rather than rely on one type of social norm. Based on these arguments, the final hypothesis is expressed as

Hypothesis 4: The effect of social networks consisting of strong ties on investment will be greater for individuals who have a lower level of education.

C. Stock and Mutual Fund Investors in Taiwan

We tested our hypotheses and investigated the relationship between the participation of individuals in high-risk financial investments and their social networks in Taiwan. The current large amount of stock and mutual fund holdings in Taiwan resembles the enthusiasm of American stock market activity in the 1990s. The nature of family and social relationships in Taiwan and their significance in the local economic landscape led us to view it as a valuable empirical setting.

Since the end of the 1980s, the combination of an enormous amount of floating capital and limited stocks resulted in large-scale public efforts to make stock market investments, which in turn resulted in the Taiwan Stock Exchange index surpassing 12,000 in 1990 (Champion 1998); *Newsweek* consequently called Taiwan (Republic of China) the “Republic of Casino.” Since then, Taiwanese capital markets have influenced the country’s social

structure by transforming household economic activity (Kan 2000; Luo 1997; Taiwan Stock Exchange 2000). Based on the 2000 edition of the Taiwan Stock Exchange Factbook, individual investors held between 56 and 59 percent of all stocks between 1995 and 1999, and 31 percent of Taiwanese had opened at least one brokerage account by the end of 2000 (Barber et al. 2007; Taiwan Stock Exchange 2000). The percentage of individual shareholders consistently remained around 40 percent between 2006 and 2011 (Taiwan Stock Exchange 2011). The importance of social relationships in economic activity is a unique trait of the market in Taiwan. As recently as the 1980s, informal financial channels such as rotating savings and credit associations were popular in local society. The prevalence of social relationships serving as the basis for financial resources for small entrepreneurs is well documented (Kan 2000; Tang 1995; Shen and Wang 2005).

D. Data, Measurements, and Analytic Strategy

1. Data

Data were collected from the fifth wave of the Taiwan Social Change Survey (TSCS), a biannual stratified probability survey of all Taiwanese adults aged eighteen years and older. The 2007 TSCS covered comprehensive household wealth topics such as real estate ownership, financial assets (savings, stocks and mutual funds), and other business investments. The present study focuses exclusively on stock and mutual fund ownership. Interviews

were conducted with 2,040 respondents; 240 gave incomplete responses to some items, and 50 identified their spouses as the primary investors in their networks, which raised the potential for investors being conflated with their investing alters.² After removing these individuals, the final analytical sample consisted of 1,750 respondents. Most of the excluded respondents did not provide information about their family incomes. They were also more likely to be male, unemployed, of Mainland Chinese descent, and rural residents with less education and lower incomes compared to respondents in the final sample.

2. Dependent variable

Information regarding stock or mutual fund investments served as the dependent variable. TSCS respondents were asked whether they or their spouses were currently investing in stocks or mutual funds. Their responses were coded as a dummy variable: 1 for individuals who invested in stocks or mutual funds, 0 for those who did not. In total, 486 (27%) reported that they invested in financial products such as stocks and mutual funds.

3. Independent Variables

Since we were interested in understanding how networks influence individuals who invest in stocks or mutual funds and their actual holdings, the presence of investors in an individual's

² In the terminology of social network analysis, ego and alter are tied to each other by social relations. Ego is usually referred to as the focal individual (in our case the survey respondent), and alter is another individual to whom the ego is connected.

network was measured in two ways. The first addressed the existence of investors in social networks, as measured by a survey item on respondent knowledge of people they personally knew who were investing in stocks or mutual funds.³ Answers were rated along a four-point Likert scale, with 1 indicating that all or almost all network alters were known to invest, 2 indicating many alters, 3 indicating few alters, and 4 indicating almost no alters. Respondents who did not answer this question were assigned a score of 0. In our statistical analysis, higher values indicate higher proportions of investors in a respondent's social network. A score of 0 presented a challenge in terms of ambiguity. Reasons for not responding to this survey item ranged from the absence of any investors in a network, to the respondent's inability to recall any investors at the time of the survey, to a reluctance to disclose such information. We therefore incorporated a binary variable: 1 if the respondent failed to provide any information regarding investors in their social networks, and 0 for all other reasons.

The second measure addressed social network tie type. Respondents were asked to identify the first person they thought of in their networks who invested in stocks or mutual funds, and then describe their relationship with that person.⁴ Responses were coded as one of twenty-eight categories,⁵ ranging from close

3 A similar approach is used by public health scholars in evaluating vaccination willingness in a respondent's social circle. Researchers ask respondents to judge how many out of the total number of social contacts they believed got vaccinated in the past year (Bruine de Bruin et al. 2019: 978). Scholars have shown that such social contact category evaluations produce accurate assessments of the situation in the general population (Galesic et al. 2012).

4 We assumed that the person who first came to mind was likely to be in close contact with and exert an influence on the respondent. Social network scholars have used a similar approach to measure valuable social contacts (Lin 2012).

5 Strong tie categories include parents, parents-in-law, spouse, children, children-in-law, siblings,

relations such as family members and relatives, to more distant ones such as former colleagues and online friends. The remaining twenty-seven types (excluding spouses) were recoded as one of two dummy variables: one for strong and one for weak tie. Following the guidance of Granovetter (1973, 1974) and Lin et al. (1981), strong ties were defined as those involving the same kinship or friendship group. Weak ties included connections with individuals at workplaces (e.g., colleagues and business relations), schools (e.g., former classmates and teachers), or other social environments (e.g., neighbors, participants in the same association or club, individuals from the same village). Respondents who reported that they did not have any network alters who invested in stocks or mutual funds served as our analytical reference group.

4. Control variables

We controlled for respondent sociodemographic characteristics previously identified as important factors determining participation in financial investments (Keister 2005; Shaw 1996; Lee 2012). Age and age squared were included to account for the curvilinear effect of age. Males were assigned a dummy value of 1 and females 0. Respondent ethnicity was indicated by two dummy variables: a value of 1 for individuals of Hakka descent, 0 for others, and a value of 1 for individuals who

other family members, friends (好朋友), and acquaintances (普通朋友). Weak ties include previous neighbors, current neighbors, former classmates, people from the same area, teachers, students, current colleagues, senior colleagues, junior colleagues, former colleagues, clients, people met through work, members of the same religious group, members of the same association, people met through the work of the other person, online friends, people met via somebody else, or people met through other channels. The influences of family members may be similar to transactional family dynamics (Schermerhorn and Cummings 2008), which this research did not consider.

identified themselves as having Mainland China origins, and 0 for others. People who described themselves as members of any other ethnicity served as a reference group. Marital status was controlled for using a dummy variable (1 for married respondents, 0 otherwise). Last, respondent community type was recorded using two dummy variables: 1 for those living in urban areas and 0 otherwise, and 1 for respondents living in dense metropolitan areas and 0 for those living elsewhere. Respondents living in rural areas served as the reference group.

The second group of control variables addressed respondent socioeconomic status. Education level was controlled for by including an ordinal variable indicating the highest level of education: 1 for elementary school, 2 for junior high school, 3 for senior high school, 4 for vocational school, and 5 for university degree. Employment status was controlled for with a dummy variable (1 employed and 0 unemployed). Job status was controlled for using the ISCO classification system developed by the ILO (Ganzeboom and Treiman 1996). For retired individuals we recorded the status score of the last job they held. Respondents without status scores were assigned a score of 0; they were given a dummy variable value of 1 if they did not have a status score, 0 otherwise.

The third set of control variables indicated household financial situation and respondent willingness to take financial risks. Individuals who hold stocks or mutual funds are typically perceived as psychologically better prepared to accept higher levels of risk in their financial decisions. Risk acceptance was assessed using the TSCS item, “If you had a certain amount of

money to invest, how much risk would you be willing to take on a scale of 1 to 10?” Lower scores indicated more risk-averse respondents. Monthly family income was controlled for using a TSCS ordinal variable ranging from 1 to 27; the amount of outstanding household debt was measured as an ordinal variable ranging from 1 to 9. Finally, a dummy variable was included to control for home ownership: 1 for homeowners, 0 for others.

5. Analytical Strategy

Since our dependent variable was a dummy variable, binomial logistic regression models were estimated for hypothesis testing, with the full model expressed as

$$P(Y_i) = \frac{1}{1 + e^{-(z_i)}}$$

in which

$$z_i = \alpha_i + \beta_1 SC_i + \beta_2 EDU_i + \beta_3 (SC_i \cdot EDU_i) + \beta_4 ST_i + \beta_5 WT_i + \beta_6 (ST_i \cdot EDU_i) + \beta_7 (WT_i \cdot EDU_i) + \sum \beta_j Cov_j$$

In the model, $P(Y_i)$ denotes the probability that *person_i* invests, SC_i the extent of individuals in *i*'s social network who invest in the stock market, EDU_i education level, ST_i a dummy variable indicating a strong tie between a respondent and the respondent's first referral in a social group, and WT_i a dummy variable indicating a weak tie. Considering the reported odds ratios and our hypotheses, we predicted the following relationships:

$$e^{\beta_1} > 1; 0 < e^{\beta_3} < 1; e^{\beta_4} > e^{\beta_5}; 0 < e^{\beta_6} < 1$$

E. Results

Figure 1 illustrates the relationship between the density of investors in the social networks of individuals who invest in stocks and mutual funds, and those who don't. As indicated by the dark grey bars, approximately 85 percent indicated that few, many, or almost all of their network connections invested in stocks and mutual funds, compared to only 40 percent of individuals who did not hold similar investments. The same figure also shows that the difference in investing connections between investors and non-investors became more pronounced as the proportion of investors within respondent social networks increased. Specifically, the proportion of investors reporting the presence of only a few investors within their social networks was nearly double that of non-investors. That proportion was more than three times the proportion for respondents with many investors in their networks, and five times the proportion for respondents whose networks were predominantly comprised of investors. This indicates a strong positive association between investor density within a social network and the likelihood that an individual invests in stocks or mutual funds.

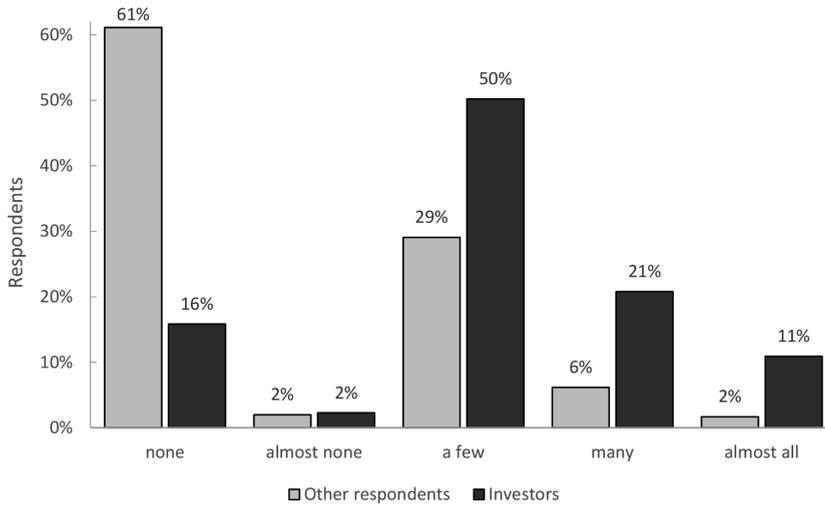


Figure 1: Density of Investing Alters in One's Network (Investors vs. Noninvestors)

Figure 1 provides an initial bivariate indication of the association between the density of investors in one's network and the likelihood of investment activity. A multivariate binomial logistic regression offers a more formal illustration of this association after controlling for all other potential covariates that can influence this association. Basic descriptive statistics and absolute correlation coefficients involving all model variables are presented in Table 1.

Table 1: Descriptive Statistics and Absolute Correlation Coefficients

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 Investors in network	1.15	1.25	.																	
2 No ties to investors	.50	NA	-.92	.																
3 Strong tie	.30	NA	.61	-.67	.															
4 Weak tie	.19	NA	.45	-.47	-.33	.														
5 Age	44.64	16.66	-.17	.18	-.06	-.15	.													
6 Male	.50	NA	.06	-.05	.05	.01	-.02	.												
7 Ethnicity—Hakka	.14	NA	-.03	-.03	-.00	-.03	.04	-.03	.											
8 Ethnicity—Mainland	.11	NA	.10	-.10	.07	.04	.04	.02	-.14	.										
9 Married	.61	NA	.08	-.09	.08	-.01	.40	.02	.05	.06	.									
10 Urban area	.51	NA	.11	-.12	.06	.09	-.12	.05	-.10	.09	.01	.								
11 Metropolitan area	.26	NA	.07	-.07	.09	-.02	-.03	-.04	-.08	.04	-.09	-.60	.							
12 Education	2.99	1.44	.35	-.33	.20	.19	-.63	.11	-.04	.13	-.25	.12	.12	.						
13 Employed	.63	NA	.21	-.21	.07	.18	-.29	.16	.02	-.05	.07	.04	-.02	.20	.					
14 Social status (ISCO)	28.12	22.43	.36	-.33	.16	.24	-.21	.16	-.01	.07	.09	.07	.05	.39	.75	.				
15 No social status	.32	NA	-.24	.23	-.09	-.19	.19	-.20	-.00	.01	-.10	-.04	-.00	-.18	-.89	-.86	.			
16 Risk acceptance	3.43	2.28	.23	-.20	.15	.09	-.39	.12	-.03	.02	-.16	.09	.09	.38	.19	.23	-.17	.		
17 Monthly income	8.32	4.90	.35	-.35	.24	.15	-.31	.08	.01	.04	-.04	.09	.13	.45	.26	.38	-.24	.26	.	
18 Outstanding loans	2.11	2.80	.11	-.12	.08	.06	-.17	.04	-.04	.02	.07	.12	.02	.13	.11	-.11	.13	.13	.13	.
19 Homeowner	.50	NA	.03	-.02	.03	-.00	.49	-.01	.04	.03	.50	.05	-.09	-.29	-.06	-.02	.00	-.20	-.12	.07

Results for all models are presented in Table 2. Model I, which serves as a baseline, includes control variables only. Regarding demographic characteristics, Model I demonstrates that the probability of an individual investing in stocks and mutual funds follows an inverted U-shape when age is considered: investment likelihood initially increases with age, but decreases at an inflection point at age sixty-two. Model I also indicates that women are more likely to invest than men, and married individuals are more likely to invest than single individuals. Among socioeconomic characteristics, higher education level and social status increase the likelihood of individual investment activity. Last, Model I shows a higher probability of investing in stocks and mutual funds among individuals with higher risk tolerance, higher incomes, no outstanding loans, and home ownership. For the most part, these results are consistent with the literature on determinants of participation in financial investments (Shaw 1996; Grable and Lytton 1998; Hong et al. 2004; Keister 2000, 2005).

Table 2: Binomial Logistic Regression Models for the Relation Between Investors in Social Networks and Holding Stocks or Mutual Funds

	Model I	Model II	Model III	Model IV	Model IV
Investors in social networks					
Investors in network		1.43** (.17)	2.49*** (.49)	1.44** (.17)	1.47** (.17)
No investors in network		.50* (.15)	.57 (.18)	--	--
Investors in network * education			.86** (.04)		
Strong tie				2.12* (.66)	7.98*** (4.07)
Weak tie				1.69 (.56)	6.45** (3.76)
Strong tie * education					.66** (.08)
Weak tie * education					.66** (.09)
Demographic characteristics					
Age	1.13*** (.03)	1.09** (.03)	1.09** (.03)	1.08** (.03)	1.09** (.03)
Age squared	1.00*** (.00)	1.00* (.00)	1.00* (.00)	1.00* (.00)	1.00* (.00)
Female (ref.)	--	--	--	--	--
Male	.70** (.09)	.68** (.09)	.68** (.09)	.68** (.09)	.67** (.09)

Table 2 (continued)

Ethnicity—others (ref.)	--	--	--	--	--	--
Ethnicity—Hakka	.90 (.17)	.90 (.18)	.90 (.18)	.89 (.17)	.90 (.18)	.90 (.18)
Ethnicity—Mainland	1.13 (.21)	1.04 (.21)	1.07 (.21)	1.04 (.21)	1.08 (.22)	1.08 (.22)
Unmarried (ref.)	--	--	--	--	--	--
Married	1.58** (.28)	1.56* (.28)	1.55* (.28)	1.55* (.28)	1.53* (.28)	1.53* (.28)
Rural areas (ref.)	--	--	--	--	--	--
Urban areas	1.26 (.23)	1.08 (.20)	1.04 (.20)	1.08 (.20)	1.04 (.20)	1.04 (.20)
Metropolitan areas	1.35 (.27)	1.21 (.25)	1.16 (.24)	1.19 (.25)	1.12 (.23)	1.12 (.23)
Socioeconomic characteristics						
Education	1.62*** (.11)	1.49*** (.11)	1.88*** (.19)	1.49*** (.11)	1.98*** (.21)	1.98*** (.21)
Unemployed (ref.)	--	--	--	--	--	--
Employed	1.11 (.35)	1.24 (.40)	1.29 (.42)	1.26 (.41)	1.32 (.43)	1.32 (.43)
Social status (ISCO)	1.02** (.01)	1.02** (.01)	1.02** (.01)	1.02** (.01)	1.02** (.01)	1.02** (.01)
No social status	2.52* (1.07)	2.86* (1.31)	3.15* (1.45)	2.93* (1.34)	3.23* (1.50)	3.23* (1.50)

Table 2 (continued)

Financial situation						
Risk acceptance	1.19*** (.04)	1.18*** (.04)	1.17*** (.04)	1.18*** (.04)	1.17*** (.04)	1.17*** (.04)
Monthly family income	1.06*** (.01)	1.03* (.02)	1.04* (.02)	1.03* (.02)	1.04* (.02)	1.04* (.02)
Outstanding loans	.92*** (.02)	.91*** (.02)	.91*** (.02)	.91*** (.02)	.91*** (.02)	.91*** (.02)
Not a homeowner (ref.)	--	--	--	--	--	--
Homeowner	1.57** (.25)	1.53* (.26)	1.52* (.26)	1.55* (.26)	1.55* (.26)	1.55* (.26)
Constant	.00*** (.00)	.00*** (.00)	.00*** (.00)	.00*** (.00)	.00*** (.00)	.00*** (.00)
Model fit						
Observations	1,750	1,750	1,750	1,750	1,750	1,750
Log likelihood	-801.41	-743.89	-737.76	-742.88	-742.88	-735.82
Chi-squared	377.34***	492.38***	504.64***	494.41***	494.41***	508.53***
Pseudo R-squared	.19	.25	.25	.25	.25	.26

Estimated coefficients are reported as odds ratios; standard errors shown in parentheses.

† p<.1, *p<.05, **p<.01, ***p<.001

Regarding Hypothesis 1, the Model II results shown in Table 2 suggest that individuals with higher proportions of network members who invest in stocks or mutual funds are more likely to invest in such financial products themselves. The coefficient for the proportion of investors in one's social network is both positive and statistically significant (OR = 1.43, $p < .01$). Specifically, at each increased level of investor proportion in an individual's social network, the odds that the individual invests in stocks or mutual funds increases by 43 percent. These results support Hypothesis 1: the likelihood of individuals investing in stocks or mutual funds is positively correlated with the percentage of investors in their social networks.

Hypothesis 2 posits that the influence of active investors in an individual's social network on the likelihood of that individual investing in stocks or mutual funds decreases for individuals with higher levels of educational attainment. In other words, the hypothesis predicts a negative interaction between investors in one's network and educational attainment. Model III in Table 2 includes the interaction term between investor proportion in a social network and an investing individual's level of educational attainment. As shown in the table, the 2.49 odds ratio estimate for investors in a network is statistically significant, as is the estimated odds ratio for education (1.88). Further, the estimated odds ratio for the interaction between factors is statistically significant at .86—indicating, as expected, a negative interaction effect.

Rather than focusing on statistical significance, a better way to assess the interaction between education and network

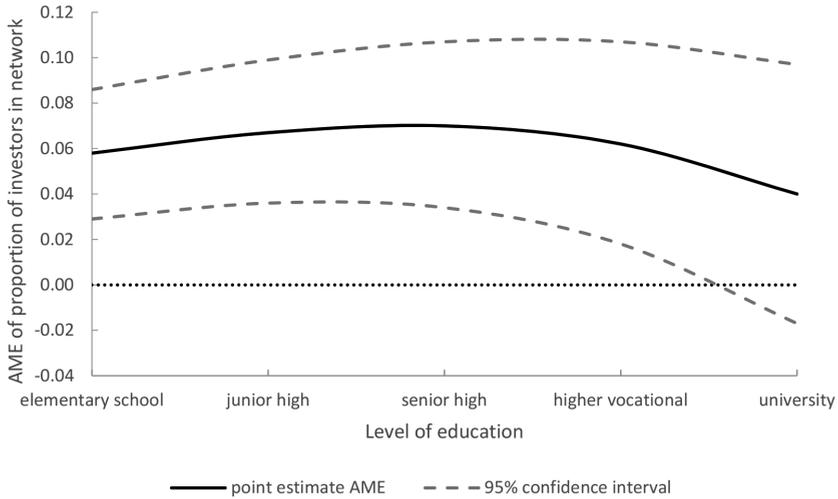


Figure 2: The Average Marginal Effect of Investors in One's Social Network at Varying Levels of Educational Attainment

influence is to examine the marginal effect of the proportion of investors in one's social network at various levels of education attainment, as plotted in Figure 2 (Mize 2019). In this case, the marginal effect denotes (at each level of education) the increase in the likelihood of an individual investing in stocks or mutual funds per each one-unit change in the proportion of investors in a network. The curve of the marginal effect in the figure has a slight inverted U shape, indicating that the marginal effect is largest among respondents who finished senior high; the marginal effect is slightly lower for respondents with elementary school or junior high educations. The right-hand side of the curve has a steeper slope, indicating a decrease in the marginal effect of investors in one's network among respondents who graduated from vocational schools or universities; in these cases the marginal effects from the presence of investors in their networks is not statistically

different from zero. These results indicate that the effect of the proportion of investors in one's social network on an individual's likelihood to invest in stocks and mutual funds is both positive and statistically significant at most education levels, but the marginal effect becomes smaller at higher levels of education. These results support Hypothesis 2.

Hypothesis 3 posits that the impact of the proportion of investors in one's social network on the likelihood of an individual investing in stocks or mutual funds is stronger in networks characterized by strong social ties than weak ties. As shown in Table 2 (Model IV), two dummy variables were added to indicate whether the first investor in a respondent's network who came to mind was connected via a strong or weak tie. Note that the dummy for individuals who did not state whether they had investors in their networks functioned as the reference group. The Model IV coefficient for strong ties is both positive and statistically significant (OR=2.12, $p < .05$), for weak ties statistically non-significant. This result indicates that, adjusting for all other covariates, the odds of investing in stocks and mutual funds for those with strong-tie connections with investors in their social networks was 2.12 times greater than the odds for those whose networks did not include investors. Results from a statistical test to evaluate whether the estimated odds ratios for those with either strong-tie or weak-tie connections were statistically distinct indicate that the null hypothesis cannot be rejected, since the effects of strong and weak ties are equal ($X^2 = 2.02, p = .15$). In other words, Hypothesis 3 was not supported.

According to Hypothesis 4, the impact of a strong connection

to the first investor in a network that comes to mind is more significant for individuals with less education. Table 2 (Model V) includes interaction terms between both strong and weak ties and education level. While Hypothesis 4 specifically addresses the interaction effect between strong ties and educational attainment, additional estimates for the interaction term between weak ties and education level were included. The goal for these exploratory analyses was to investigate the potential interaction effects of additional factors of interest, as well as to offer a systematic comparison to complement our empirical inquiries. Once again individuals without investors in their networks served as the reference group. Compared to having no ties to other investors, the interaction term coefficients between education and both strong (OR = .66, $p < .01$) and weak ties (OR = .66, $p < .01$) were negative and statistically significant. Although the results confirm Hypothesis 4, additional statistical tests were performed to determine statistical differences between the interaction effects of strong vs. weak ties with educational attainment. Similar to our Hypothesis 3 results, we failed to find evidence supporting the idea that the two interaction effects were significantly different.

Figure 3 shows the estimated probabilities of investing among individuals at the five education levels with no ties, weak ties, and strong ties with other investors in their social networks. The overlapping confidence intervals for those with strong and weak ties indicate no statistically significant differences in investment probability. However, for individuals with no ties to investors in their networks, estimated confidence intervals were less than those for individuals with strong ties to investors with

lower levels of education. This indicates that at lower levels of education, individuals with networks have lower probabilities of investing than those without networks at a statistically significant level. The confidence intervals overlap at higher levels of education, indicating no statistically significant differences in the probabilities of investing among individuals with strong, weak, or no ties with other investors in their networks. These results support Hypothesis 4: the effect of strong ties to other investors in a network decreases for individuals with higher levels of educational attainment.

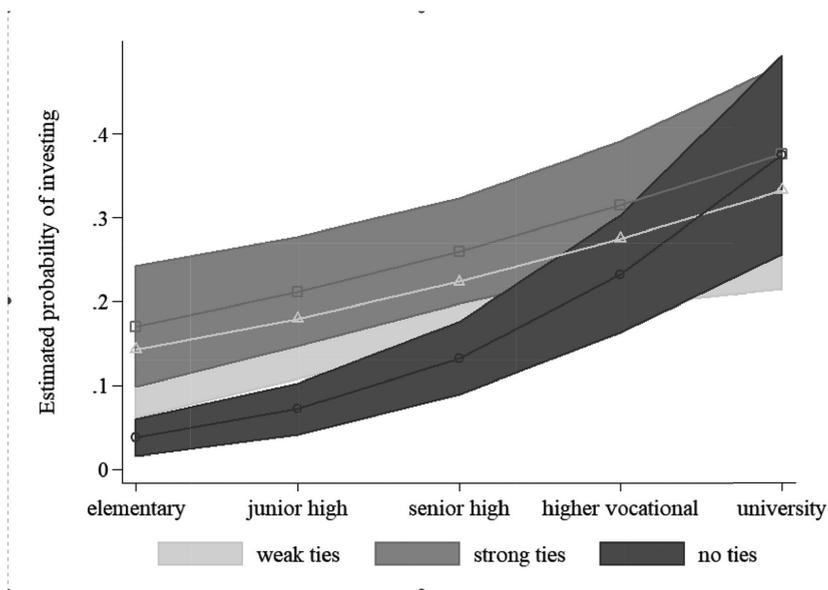


Figure 3: Estimated Odds Ratio of Investing in Stocks or Funds for No Ties, Weak Ties, and Strong Ties at Varying Levels of Educational Attainment

In summary, the results underscore the association between the presence of investors in an individual's social networks and the likelihood that the individual will invest in stocks and mutual funds. Stronger ties between such individuals and investors in their social groups increases this likelihood, with education level exerting a moderating effect. The association between the proportion of investors in a social network and willingness to invest in stocks or mutual funds was found to be weaker among those with the highest education levels. Combined, these results support the idea that individuals considering investments in risky financial products are influenced by the presence of investors in their social networks, especially when such connections are characterized by strong ties. However, this influence decreases for individuals with higher education levels.

F. Discussion and Conclusion

In their efforts to understand investor decisions, economics and behavioral finance scholars have generally approached the issue from efficient-market and cognitive constraint perspectives, while sociologists emphasize that investors are not socially isolated in terms of acquiring information about high-risk investments (Beckert 1996). As Granovetter (1985) observed, economic behaviors are embedded in social relationships, and the economic behaviors of social actors are best understood in the context of social relationships. We used this embeddedness approach to explore associations between individual behaviors when participating in high-risk investments and influences from

their social networks. Our working assumption was that a higher proportion of investors within one's social network increases the likelihood of individuals engaging in investment activity. We also investigated how network composition (i.e., relationship type) influences its impact on financial market participation, and how such effects vary across different levels of educational attainment. The survey-based empirical data used in this study mostly supports the hypotheses developed from the economic sociology and social network literatures.

Researchers from diverse disciplines have acknowledged the significance of social networks in individual financial behaviors, but few have used specific network measures to assess network effects in detail. One possible reason is the difficulty of constructing a suitable probability sample consisting of individual investors, as well as the challenges of developing appropriate measures for assessing the effects of investor social networks. This study used a dataset from the Taiwan Social Change Survey to demonstrate the significance of social networks in financial activities, and in doing so it provides a rare perspective for assessing how financial investors are influenced by surrounding social contexts, a factor frequently emphasized by economic sociologists.

Weak social ties have been shown to transmit information across clusters of individuals, making them important factors for behavior diffusion (Burt 1992; Granovetter 1973). Our results indicate that investors are more likely to be influenced by the presence of other investors in their networks when the ties are strong, a finding that is consistent with studies of reliance

on social networks for advice on topics with higher levels of uncertainty (Mizruchi and Stearns 2001; DiMaggio and Louch 1998), including financial investments perceived as carrying risk. Whereas previous studies have suggested a general network effect on individual investors (Hong et al. 2004), this study attempted to identify their possible impacts in order to present a nuanced understanding of how networks operate, as well as the extent of their limitations. As a result, we acknowledge certain qualifications regarding our theoretical arguments—for example, our analysis did not reveal a significant difference in effect between strong and weak ties on investing behaviors, despite the persistent effect of strong ties. There are at least two possible explanations, the first being the social context of Taiwan, a society characterized by stronger social bonds than those that have been the focus of other studies (Granovetter 1973). In other words, the less-distinct nature of societal differentiation might restrict the empirical demonstration of effect differences across tie strength levels. Second, the perceived stakes of financial investment likely encourage seeking more reliable advice—probably from connections with stronger ties. This differs significantly from behaviors such as job seeking, where economic costs are lower, and where connections with weaker ties are more likely to be utilized (Granovetter 1974, 1985).

While our empirical results largely confirm prior theoretical propositions, we will mention several research limitations. First, due to our specific data requirements, the sample used for our analysis was considerably smaller than the original survey sample, which has implications for the scope of study inferences. The

majority of respondents who were excluded from the original sample were male, unemployed, with Mainlander origins, and residing in rural areas—factors to consider when contemplating possible inferences from the findings. Second, when using survey data to investigate the investment backgrounds of individuals in social networks, it is important to consider accuracy issues tied to memory recall. Further, respondents with stock market investments may be more inclined to notice investors within their social networks with similar investments, potentially affecting the validity of inferences drawn from the study results.

Since our analysis entailed cross-sectional rather than longitudinal survey data, we cannot rule out the possibility of reverse causation between investment activity and social relationships—that is, the intention of investors to actively seek social relationships due to information needs. While this limitation is common in social network studies, a number of prominent researchers have addressed this challenge (Hong et al. 2004). Lin (2012) and others have noted that interpersonal networks—analyzed as examples of **structural property**—tend to require sustained periods of cultivation and maintenance. This is especially true of kinship ties that are difficult to sever. In contrast, the participation of individuals in financial investments may exhibit unstable and intermittent patterns due to financial market cycles. As economic sociologists have observed, evaluating the returns of instrumental investments in interpersonal relationships becomes more difficult when individuals find themselves in economically unstable situations (Beckert 1996: 818). Other factors to consider include ethical and moral norms (inherent

in strong relational ties), which frequently conflict with the instrumental expectations of investment profitability (Chan 2009). Ethical dilemmas and difficulties tied to cultivating and evaluating network outcomes make it challenging to expect material returns from social relationships, which usually demand long-term and continuous effort. Despite these challenges, we suggest that future researchers explore more appropriate research designs to mitigate the possible impacts of reverse causation and measurement errors. Until more advanced bodies of data become available (e.g., real-time and detailed records of individual investment activities and interpersonal interactions), the theoretical propositions presented in this paper will continue to require further replication and validation.

We also note that the mechanisms through which social networks influence investment activities warrant further clarification in terms of their impact pathways. Drawing from existing studies, we propose that interpersonal networks can influence individuals through **information acquisition** and **norm compliance**. Access to investment information for stocks may trigger self-interest motives for making financial investments, and the presence of investors within one's social network may foster imitative or herd behavior, leading individuals to take bolder investment actions while perceiving reduced risk aversion. However, data limitations prevented this study from clearly distinguishing between these two mechanisms, their roles, and their causal pathways. We suspect that these two influences are interconnected and mutually reinforcing, but it remains for future researchers to perform a more nuanced exploration.

This paper addressed a concerning social trend in financial investing. Global stock markets have experienced sustained growth over the past two decades, with increasing participation from populations across various global societies. Recent research on European stock market investors suggests that large-scale trends in stock market investment are linked to the dismantling of social welfare systems and reductions in retirement pensions (Schimank 2011)—in other words, stock investments are often motivated by economic insecurity and growing wealth gaps. In Taiwan, stagnant wage growth over the past two decades has led many young individuals to consider ways to achieve financial independence, resulting in a significant influx of new and inexperienced investors. While stocks represent an important avenue for wealth accumulation, the majority of investors fail to achieve the profits they were hoping for (Barber et al. 2007; Schimank 2011). Socioeconomically disadvantaged individuals with limited interpersonal networks face greater challenges to accessing high-quality investment advice. Our findings indicate that strong ties in social networks exert a more significant impact on investment activities, especially among socioeconomically disadvantaged groups. Policymakers need to be aware of the potential for a negative cycle in which the majority of investors are constrained by the types and sizes of interpersonal networks. Future researchers are not only encouraged to empirically confirm the impacts of various kinds of social networks on individual investment performance, but also to identify the mechanisms through which social inequalities are replicated within financial markets.

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