

行政院國家科學委員會專題研究計畫 成果報告

高齡社會的來臨：為 2025 年的台灣社會規劃之整合研究--
人口老化對國家儲蓄率的影響以及老年人接受理財教育前
後的儲蓄態度(第 3 年)
研究成果報告(完整版)

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中文摘要： 我們利用老人資料庫檢驗性別以及其他因素對於台灣老人風險投資行為的影響。我們的實證結果顯示風險投資行為存在性別差異。

中文關鍵詞： 台灣老人、性別差異、風險資產、投資行為

英文摘要： In this investigation, we explore the effects of gender as well as its confounding factors on the risky asset investment decisions of the elderly. Using the Taiwanese elderly survey data, our empirical evidences suggest that there exist the gender differences in risky asset investment behavior of the Taiwanese elderly. Taiwanese female elderly are found to be more likely to invest in risky assets than male elderly at same ages. Moreover, the Taiwanese elderly at retirement ages are less likely to invest in risky assets than the elderly at pre-retiree ages. Furthermore, the probability of the elderly investing in risky assets rises with the ownerships of other assets including banking deposits, house, real estate, and business.

英文關鍵詞： Gender difference, Risky asset, Investment behavior, Taiwanese elderly

Gender-Based Difference in Risky Asset Investment Behavior of the Taiwanese Elderly

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Abstract

In this investigation, we explore the effects of gender as well as its confounding factors on the risky asset investment decisions of the elderly. Using the Taiwanese elderly survey data, our empirical evidences suggest that there exist the gender differences in risky asset investment behavior of the Taiwanese elderly. Taiwanese female elderly are found to be more likely to invest in risky assets than male elderly at same ages. Moreover, the Taiwanese elderly at retirement ages are less likely to invest in risky assets than the elderly at pre-retiree ages. Furthermore, the probability of the elderly investing in risky assets rises with the ownerships of other assets including banking deposits, house, real estate, and business.

Keywords: Gender difference, Risky asset, Investment behavior, Taiwanese elderly

1. Introduction

Many welfare states in the world face a common problem that its public retirement programs are not sufficient for securing the retirement incomes of its elder population, so it is of considerable important to examine the potential for its elder population to support themselves through their own wealth accumulations. In addition to the problem of insufficient retirement incomes provided by public programs, Taiwanese elderly also faces the problem of a weakened intra-family transfer mechanism. In the past, Taiwanese elderly normally perceived intra-family transfers as the most important sources for their retirement incomes. However, they have realized that intra-family transfer mechanism has become less reliable, whereas own financial preparations have become more important. For instance, as shown in Table 1, the importance level of intra-family transfer went down from 53.37% in 2005 to 48.29% in 2009, while the importance level of incomes generated from financial assets¹ went up from 10.78% in 2005 to 14.93% in 2009. Taiwanese elderly has gradually changed their attitudes toward the own financial preparation for retirement, but the financial preparation rate of retired population is still considered too low. Due to a serious ageing trend, the low financial preparation rate has remained a matter of public concern in Taiwan.

The low financial preparation rate for retirement does not imply that the elderly are lack of wealth. As matter of fact, most of Taiwanese elderly have accumulated a certain level of wealth at retirement,² but their asset allocations have been rather restricted. Majority of Taiwanese elderly hold their wealth in the form of house asset. Some of them even own other real estate including the second house and land. However, it is relatively difficult to generate stable and sufficient incomes for retirement from real estates. The insufficient incomes for retirement provided by houses can be explained by the following

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¹ Financial assets include saving deposits, stock, bond, and mutual funds.

²The portfolio of retirement wealth includes house and real estate, insurance, and financial assets.

reasons. First, the reverse mortgage³ is one of very few possible ways for the elderly to generate retirement incomes from real estate assets, but it is not yet well implemented in Taiwan. Moreover, the bequest motive reduces the willingness of the Taiwanese elderly using houses for the reverse mortgage. Second, majority of Taiwanese elderly can not generate rental incomes for retirement from houses because they are mostly owner-occupied.

In addition to real estate assets, public retirement insurance benefits are also another type of retirement wealth. However, there exist big variations in terms of pension incomes among Taiwanese elderly. In fact, Taiwanese public pension systems are not evenly implemented. For instance, the elderly who used to work in the public sector can receive salary related pension annuity incomes, while the elderly who used to work in the private sector can only receive a lump-sum pension provided by the private employer.⁴ A significant percentage of the current Taiwanese elderly is not yet covered by public pension program.⁵ Therefore, majority of Taiwanese elderly do not strongly rely on the pension incomes.

Financial wealth also serves as the sources of retirement incomes. Unlike both real estate and retirement insurances, the incomes generated from saving wealth are more flexible and available to support the retirement. In fact, the saving behaviors defined by the economists include depositing money at banks and purchasing financial security assets such as stock, mutual fund and bond. Purchasing financial assets is also called as the portfolio investment. Banking deposits are normally considered as riskless assets because they are normally insured by deposit insurances. However, the banking deposits have a relatively lower return. On the other hand, financial assets have relatively higher potential returns as well as higher risk. Due to the conservative cultural background, Taiwanese elderly are more likely to hold riskless banking deposits rather than holding risky financial assets. The banking deposits provide stable interest incomes for retirement, but the currently low interest rate of deposit makes interest incomes be insufficient for the retirement. Therefore, investing on risky assets becomes the alternative way to increase the retirement incomes. However, the percentage of the Taiwanese elderly holding risky financial assets is relatively low. In order to raise the retirement incomes, it is important for the Taiwanese elderly to change their attitudes toward the risky financial assets. In addition, the policy makers have to provide the incentives for the Taiwanese elderly to adjust their portfolio. In order to provide effective incentive policies, they have to understand the major determinants of risky financial investment decisions of the Taiwanese elderly? Therefore, the main goal of this paper is to empirically explore the risky investment behavior of the Taiwanese elderly. In fact, there exists a substantial literature on portfolio choice between risky and riskless assets for the population in general, but few have investigated on portfolio allocation of the elderly. Moreover, very limited evidences have been provided for the Asian elderly. Therefore, our paper contributes to the literature by exclusively exploring the risky investment behavior of the elderly and employing the Taiwanese elderly data to add the Asian evidences.

Several determinants of a household participating in the risky markets such as stock and bond have been well established. Bogon (2010) summarizes that the participation in the stock market is strongly and

³ The elderly can use the owner-occupied house to make mortgage from the bank.

⁴ The labor pension program was shifted from a lump-sum pension provided by employer to a transferrable pension account.

⁵ In the October of 2008, a national pension program was implemented to cover the population who are covered by neither public employee pension nor labor pension in Taiwan.

positively associated with both wealth and education, sensitive to transaction costs and influenced by peer effects. Bertaut and Haliassos (1997) show that the participation costs in risky asset markets are affected by the level of education, the degree of risk aversion, labor income risk, and bequest motives. It is widely believed that the relative risk aversion is negatively associated with the likelihood of holding risky assets in portfolio. In other words, a risk averter tends to avoid the risky investment behavior. The relative risk aversion is actually associated with some demographic factors. Both age and gender are among these demographic factors. Previous studies were interested in exploring whether the relative risk aversion is positively associated with age. However, they found mixed evidences. For instances, several studies [e.g. Morin and Suarez (1983); Riley and Chow (1992); Bellante and Green (2004)] provide the evidence that the relative risk aversion increases with age for the general public. However, on the other hand, Bellante and Saba (1986) and Jianakoplos and Bernasek (1998) provide the opposite evidences. Therefore, it is hard to make a general conclusion that the relative risk aversion definitely rises with age, and the elderly will hold more or less risky assets than the nonelderly. Hurd (2002) provides more theoretical arguments for the ambiguity regarding whether the elderly hold less risky assets. He points out that the elderly populations face more mortality risk, so they are less likely to hold risky assets in comparison with the nonelderly populations. However, on the other hand, the elderly populations have normally accumulated a substantial wealth, so they are more capable of making risky investments due to the wealth effect. Therefore, the elderly will hold less risky assets if the mortality risk effect dominates the wealth effect, and *vice versa*.

It is widely believed that there are gender differences in risky asset investments because men and women have different levels of risk aversion. The widespread and stereotype view suggests that women are more risk-averse than men in financial-making decision. Several survey data and experimental evidences support this widespread view [e.g. Sung and Hanna (1996); Jianakoplos and Bernasek (1998); Palsson (1996); Sunden and Surette (1998); Barsky et al. (1997); Levin (1988); McDonald (1997); Kahn (1996); and Richardson (1996); Croson and Gneezy (2009); Dwyer et al. (2002)]. However, Schubert et al. (1999) question the prevalence of stereotypic gender-specific risk attitudes. They find that females do not generally make less risky financial choices than males. A few studies such as Papke (1998), and Schooley and Worden (1996) even report insignificant difference in risk aversion between men and women. Moreover, the gender difference in investment decision may be caused by the overconfidence of male. Barber and Odean (2001) documented that overconfidence affects male investment decisions.

Not only for the population in general, several studies have explored gender-based differences in retirement asset allocation decisions [e.g. Hanharan et al. (2000), Bajtelsmit and Bernasek (1996); Bajtelsmit and Jianakoplos (1999), Jianakoplos and Bernasek(1998), Sung and Hanna (1996), Sunden and Surette (1998), Bajtelsmit and VanDerhei (1997), Hinz et al. (2007), Riley and Chow (1992), and Arano et al. (2010)]. However, these studies find that the effect of gender in retirement asset allocation decisions is somewhat ambiguous. For instance, several studies [e.g. Bajtelsmit and Vanderhei (1996); Hinz et al. (1996); Bajtelsmit et al. (1999)] have found that women invest their retirement assets more conservatively than men. Women tend to allocate a smaller percentage to stocks than bonds. Benasek and Shwiff (2001) find that the effect of being a woman was to reduce the percent of the pension invested in stocks. However, the most recent paper by Arano et al. (2010) finds no significant differences in holding stocks between men and women. On the other hand, for married couples with joint

investment decision making, the gender differences are a significant factor in explaining the individual retirement portfolio allocation. Women are found to be more risk averse than their male spouses. Furthermore, the risk aversion of the individual with a spouse is affected by the risk attitude of the spouse. Benasek and Shwiff (2001) find that men who have spouses who are willing to take average risk take greater risk in the allocation of pensions than men whose spouses are unwilling to take any risk. Lastly, Jiankoplos and Bernasek(1998) find that single women are more risk averse than single men and married couples.

Not only the gender of decision maker matters, the offspring gender is also found to have effects on parental investment decision making. Bogon (2010) argues that having sons could induce the parent to hold a less risky portfolio if they want to accumulate more funds for offspring educational expenses. In particular, parents with male children would be risk averse in gains and losses. On the other hand, having daughters could lead parents to gain a higher return from more risky investments because of the need to cover perceived higher expenses associated with having girls. Their argument is based on the assumption that due to social/behavioral influences, there is a higher probability of unexpected consumption (expenses) with female children than with male children⁶. Households with more unexpected expenses (more female children) would be more risk seeking and more likely to invest in risky assets. The empirical evidences found in Bogon (2010) support these arguments. The evidence shows that only female offspring increases the probability of stock market participation. Specifically, a male having only female offsprings increases the probability of stockholding by over 6%. Of course, the offspring gender preference can be also linked to parents' financial decision through bequests [Davies and Zhang (1995)]. In fact, gender bias toward male children has been observed in many societies such as Chinese societies. The bias toward a particular gender has an effect on the economic decisions of a family including bequest. For instance, in order to bequest secure amounts of wealth to male offsprings, parents may be more risk averse and less likely to invest in risky asset markets.

There are several confounding factors of both age and gender for explaining the difference in portfolio allocation decisions. The marital status is one of them. As mentioned earlier, males are often overconfident in the risky asset investment decisions. However, Barber and Odean (2001) find that marriage ameliorates some of the overconfidence biases males express with regard to investment decisions. Moreover, the marriage status is found to have an impact on the saving behavior or asset accumulation in both empirical and theoretical sense [e.g. Cubeddu and Rios-Ruu(1997); Lupton and Smith (2003)]. Marriage could reduce savings because individual members in the risk-reducing institution insure each other against unexpected shocks [e.g. Chaulk et al. (2003); Finke and Huston (2003)]. On the other hand, marriage may enhance wealth because of complementarities in production among the partners [e.g. Light and ureta (2004); Mauldin and Mimura (2007); and Pandey and Kim (2008)]. Moreover, Lillard and Weiss (1996) argue that marriage increases life expectancy at older ages and should encourage more wealth accumulation to maintain additional lifetime consumption.

⁶ There are two intuitive explanations for a higher probability of unexpected consumption with female children: compensating behavior and societal norms. Parents may need to provide more financial assistance to daughters due to labor market gender discrimination, higher likelihood of being unemployed, compensation to daughters for other social inequalities, and so on. In some societies, societal norms also create a higher probability of paying for daughters' weddings or providing other financial assistances. See Bogon (2010).

Health risk is believed to be associated with the portfolio choice. As a matter of fact, the elderly face a higher risk of health care consumption than the nonelderly. A large fraction of the health care costs may have been covered by Public Health Insurance, but many of the elderly have sought for some other medical insurance to cover other uncovered expenses. Hurd (2002) mentions that health status is likely to affect the marginal utility of non-health care consumption. This associated health risk is called utility risk. When future health status is uncertain, the marginal utility of wealth is uncertain. This uncertainty is supposed to affect the decision of portfolio allocation. However, the impact of health and mortality risk on portfolio choice decision may be reduced or eliminated by bequest motive. For the elderly, bequest motive can extend the time horizon, so the mortality risk may not alter choice behavior. Moreover, bequest motives can also directly influence the portfolio allocations among the elderly. If the elderly do not have the bequest motives, they may change their attitudes toward risky assets.

Financial knowledge is also important in explaining the financial investment decisions of the elderly. Grable (2000) addressed that financial risk tolerance is positively associated with more financial knowledge as well as other additional factors such as being male, being older, being married, being professionally employed with higher incomes, more education, and increased economic expectations. Jacobs-Lawson and Hershey (2005) summarized previous research and suggested that financial knowledge related to investment can have a significant impact on the quality of one's investment decisions. Rooij et al. (2007) examine the relationship between financial literacy and stock market participation. They find that those who have low financial literacy are significantly less likely to invest in stocks. Moreover, they find financial literacy differs significantly depending on education, age, and gender. Basic and advanced financial literacy increases strongly with education. Women display lower basic financial literacy than men. This gender difference widens in advanced financial literacy. Regarding the age difference, the advanced financial literacy is low among the young, is the highest among middle age respondents, and declines slightly at an advanced age (above 61). In fact, the financial knowledge is not only related to the demographic variables such as education, age and gender, but also to other factors such as occupation and residential areas. Working in the financial service sector is more likely to expose to the financial information. Moreover, the financial information is relatively more available in the urban areas than rural areas. In the practical sense, the information regarding financial literacy is often difficult to obtain due to the data restriction, so employing appropriate proxies of financial literacy becomes necessary in the empirical study.

It is not a new topic in the western society, but a very few literature tries to study gender-based differences in risky investment decisions of the elderly in Asia. The elderly in the east world differs from the elderly in the west world in many perspectives: social security net, family support mechanism, risk tolerance, bequest motive, availability of financial education, and so on. It is important to add some studies employing the Asian data to the literature. Therefore, the major contribution of this study is to provide empirical evidences to explain the differences in risky asset investment decisions among the Taiwanese elderly. This study is not only the first paper to explore the evidences for Taiwanese elderly, but also develops a new and unique hypothesis for the gender effect. Unlike the hypothesis of women being more risk averse in the west world, we hypothesize that female elderly in Taiwan are more likely to invest in risky assets than male elderly. This testable hypothesis will be developed in the next section. Besides examining the gender effects, we also explore the effects of several confounding variables

including age, education, marital status, ethnic background, occupation, residential areas, number of children, son ratio, the receipt of private transfer, no bequest motive, and ownerships of other assets.

Using the Taiwanese elderly survey data conducted in the 2003, our estimation results find that female elderly in Taiwan are more likely to invest in risky assets than male elderly. The result supports our hypothesis. In addition, we also find that female elderly are more likely to save than male elderly. The rest of the paper is laid out as follows. The next section develops our hypothesis. The econometric strategies are discussed in the third section. The following section describes our data source and sample selections. The section five discusses variables used in the study and their expected signs. The descriptive statistics are summarized in the section six. Estimation results for risky investments and saving are displayed in the section seven and section eight respectively. The last section concludes.

2. Hypothesis Development

Previous research using the data from the west world has inconsistent arguments on the gender-based difference in risky investment decisions of the elderly. They argue the gender-based differences in risky investment decisions mainly based on the gender-based differences in risk aversion. Some argues that women are relatively more risk averse than men. However, others believe that women, especially single women, may not be more risk averse. As a result, the gender effects of risky financial investment decisions are somewhat ambiguous. Some find women are less likely to invest in risky assets, while others find insignificant or opposite evidences.

We argue that the gender disparity in risky investment propensities may not be only linked to differences in risk aversion, but to the differences in investment motives based on gender role in the household. In Taiwan, during the working ages, most married Taiwanese males are busy on work to support the family expenses, and let female spouses take care of household financial decisions including daily expenses on consumption, saving, and risky asset investment decisions. These men with a traditional thinking, so called Da-Nan-Ren (Big man), usually give their salary incomes directly to their spouses and do not have ideas on how the family budget is allocated. They believe that their female spouses are good at financial managements than themselves. Therefore, most of them are lack of motives for learning a variety of financial knowledge. On the other hand, female spouses who are budget decision makers have to utilize the scarce financial resources of the family effectively, so they tend to be very sensitive to a variety of financial information including inflation rate (CPI growth rate), banking interest rates and return rates of various financial assets. Moreover, they often follow and exchange the financial investment information with female peers while shopping or having afternoon tea.⁷ Furthermore, housewives have a lot of time to follow the financial asset market information such as stock prices via media or visiting the stock exchange market. As a result, in comparison with their male spouses, these women have more opportunities to accumulate financial knowledge through peer effects and personal experiences. Therefore, after retirement, married female retirees tend to be more likely to participate in the various financial markets including risky asset markets than married male retirees because of the advantages in financial knowledge.

⁷ Married housewives who actively participate in financial markets are often called Tsai-Lan-Tzu, standing for the group of women carrying vegetable baskets at the traditional market or the supermarket.

We also hypothesize that the single female retiree is more likely to participate in the financial markets than single male retiree. Once a woman maintains the single status after a certain age, she tends to maintain the status until the retirement. As a result, many retired women with single status would have had some financial preparations for their retirements in advance at younger ages. They would have sought for various methods to accumulate a certain amount of money that will be sufficient for retirements. They have no bequest motives, so they do not have to be very conservative in the financial investment decisions. Therefore, they can allocate a certain portion of their wealth on the risky investments with higher returns. The habit of participating in the financial markets is likely to be continued as they retire. However, on the other hand, a single male retiree was more incapable of keeping money in the pocket at the younger ages. As a result, they did not have too much money available for preparing financially for their retirements. Moreover, when they were young, they were still hoping or expected to get married sometime in the future. Therefore, they may postpone their time for learning how to manage their own financial wealth because they are waiting for a wife to take care of these financial matters. Once they realize that they have to be single forever, it may be already a bit late for them to accumulate the financial investment experiences and knowledge. This makes them be less likely to participate in the financial markets at retirements.

3. Econometric Strategies

To analyze the effects of gender on the risky investment decisions of an elderly I employ the univariate probit model in which the dependent variable is a binary variable for the market participation of risky assets such as stock, bond and mutual fund, and the independent variables include the dummy variable for the gender of the elderly, and other confounding variables. The confounding variables comprise of demographic variables of the elderly, children related variables, health variables, and ownerships of alternative assets. The model specification is as follows:

$$Ownership_i = \alpha_i + S_i\beta + X_i\gamma + \varepsilon_i, \quad i = 1, \dots, n, \quad (1)$$

where *ownership* stands for the dummy indicating that the elderly *i* owns at least a risky financial asset. The dummy for the ownership of risky financial asset is equal to 1 if the elderly owns at least one of the risky financial assets including stock, bond, and mutual fund. The dummy variable *S* represents the dummy for the gender of the elderly. The dummy is equal to one if the elderly is a male. We use *X* to stand for a vector of confounding variables including other demographic characteristics of the elderly, children related control variables, health risk variables, and ownerships of alternative assets. The error term is assumed to be normally distributed. Therefore, we use the probit model to estimate the equation (1).

4. Data

The data we use in the study is the Panel Data of Elderly Health and Life Survey, conducted by National Health Bureau and assisted by the Survey Center at the University of Michigan. The first wave of this

panel data was conducted in 1989. The random sample of survey participants include elderly who were above 60 years old and lived in non-aboriginal areas by the end of 1988. The size of this random sample is 4,049. The following waves were conducted in 1993, 1996, 1999, 2003, and 2007 respectively. In addition to the initially surveyed elderly, 2,462 new observations aged between 50 and 66 were added as a supplementary sample starting from the third wave of the survey conducted in 1996. Moreover, in the fifth wave of survey, another 1599 observations aged between 50 and 56 were added in the survey pool. The most recent wave of survey that is available to the public was conducted in 2007.

In addition to the basic demographic characteristics, the survey data also provide the following information of the surveyed elderly: kinship network, living arrangement, work history, health status and medical records, economic conditions, social network, and so on. We obtain the information of wealth holding and portfolio allocation from the section of economic conditions. We can learn whether the elderly hold the house, real estate, business, saving deposits, risky financial assets, and insurance.

Because of the availability of some important variables, our data set is limited to the fifth wave of the survey, which was conducted in 2003. Moreover, new surveyed samples aged between 50 and 56 were added in the fifth wave. Therefore, the fifth wave includes elderly samples aged above 50 years old. We define those persons aged between 50 and 64 years old as pre-retirees. Moreover, we define those persons aged above 65 as retirees. The total sample size is 4806.

5. Variable Selections

Dependent variables

The main dependent variable in our study is the probability of the elderly investing in risky assets.

Explanatory variables

We use a vector of explanatory variables to explain the ownership of risky asset by the elderly. They are classified into the following categories: demographic variables of the elderly, children related variables, health risk variables, no bequest motive, and status of holding alternative assets. The demographic variables of the elderly used in our study include gender, age, education level, ethnic background, marital status, residential area, and dummy for white collar (occupation). The dummy for the gender is equal to 1 if the elderly is male. The race issue is not as serious as the U.S.A., but ethnic background is sometimes considered as an important factor in certain studies. In Taiwan, those people who came to Taiwan with KMT in 1949 are called mainlanders. Most of them were well educated civil servants, teachers, and soldiers. In comparison with native Taiwanese whose ancestor came to Taiwan hundred years ago, mainlanders have the advantages in terms of education, language, social status, and so on. Therefore, we divide the elderly into two ethnic groups: Taiwanese and mainlanders. Moreover, children related variables comprise of number of children, son ratio, as well as intra-family upstream private transfers. The subjective health status that ranks from poor condition to excellent condition is included as the proxy of health risk variable. If the elderly have no properties available for bequests at all, we

consider that the elderly have no bequest motives. In addition to risky financial assets, the elderly can hold a variety of alternative assets including riskless saving deposits, house, real estate, business, and insurance.

6. Descriptive Statistics

As shown in Table 4, there are slightly more men than women in our full sample covering the elderly aged above 50. The mean age of the elderly is about 65.79 years old, whereas 50% of them are above 65. Moreover, 89% of them are ethnic Taiwanese. Furthermore, 84% of them still have spouses alive; 50% of them receive intra-family transfers. On the average, an elderly has 6 years of education and 3.82 children, whereas 53% of his children are sons. Only 36% of them live in the urban area, while 34% of them are classified as white collar. A typical elderly subjectively evaluates the health status as somewhere between fair condition and good condition. Regarding the bequest plan of the elderly, 16% of them have no bequest motives.

About 40% of the elderly have the saving deposits at banks, while only 7.8% of the elderly have invested in risky financial assets. Approximately 70% of the elderly live in the owner-occupied houses, while 23% of them have other real estate including the second house and land. Only a very small percentage of the elderly have the business. The ownership rate of insurance is about 55% among the elderly.

7. Estimation Results

According to the first column of Table 5, we find gender does play a significant role in risky asset investment decision among the elderly aged above 50. However, in contrary to traditionally widespread view, we find males are less likely to invest in risky assets than females. The probability difference is about 1.1%. The elderly aged above 65 are found to be less likely to hold risky assets than the elderly aged below 64. This may imply that the retirees are relatively risk averse in comparison with the pre-retirees. Education level, living at urban area, and being the white collar are positively associated with the probability of the elderly holding risky assets. Number of children has a negative impact on the probability of the elderly investing in risky assets. The likelihood of the elderly investing in risky assets rise with the ownership of one of the following assets: saving deposits, house, real estate, and business. Unlike saving deposits, we do not find the evidence that the mainlander elderly have a higher likelihood of holding risky assets. Moreover, our results do not show a significant effect of bequest motive on holding risky assets while using the full sample of the elderly.

We can make comparisons between the elderly aged above 65 and the elderly aged below 64 based on the results shown on the second column and third column of Table 6. In a similarity with saving deposit, gender is a significant factor in explaining the likelihood of investing in risky assets for the elderly aged below 64, but not for the elderly for the elderly aged above 65. No matter whether they are retirees or pre-retirees, both the education level and urban residence have positive and significant effects, while age does not have significant effects on the probability of holding risky assets. Although it is not statistically significant, the ethnic Taiwanese elderly aged above 65 have slightly bigger likelihood of

investing in risky assets. On the other hand, the ethnic Taiwanese elderly aged below 64 significantly have lower probability of holding risky assets than the mainlander elderly. The number of children has a significant and negative impact on the probability of investing in risky assets especially for the elderly aged below 64. Being a white collar significantly raises the likelihood of the elderly aged below 64 investing in risky assets. The bequest motive has opposite effects for both age cohorts. No bequest motive increases the probability of holding risky assets for the elderly aged above 65, but decreases the probability of holding risky assets for the elderly aged below 64. For both age groups, the ownership of risky assets is positively associated with the ownership of saving deposits as well as real estate and business. The ownership of house can raise the likelihood of holding risky assets for the elderly aged above 65, but not for the elderly aged below 64.

8. Concluding Remark

A number of studies have employed the elderly data in the west societies to explore the determinant factors of asset portfolio allocation of the elderly. However, the literature employing the elderly data from Taiwan is rare. The main contribution of this paper is to add Taiwanese evidences on the financial asset holdings of the elderly to the existing literature. Several findings are worth to be particularly mentioned. First, we find female elderly are more likely to have risky assets than male elderly. Having a higher probability of investing in risky assets is not consistent to the widespread view that women are relatively risk averse than men. However, this finding can be explained by the phenomenon that women are more into the household financial decisions than men. Second, the elderly aged above 65 are less likely to invest in risky assets than the elderly aged below 64. Third, education or urban residence has a positive effect on the likelihood of owning risky assets. Lastly, the probability of investing in risky assets rises with the ownerships of saving deposits, house, real estate, and business.

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Table 1. Perceived Importance Degree of Retirement Economic Sources

Importance Unit:%

Age cohort	55 above	55~64	65 above	55~64	65 above
Data year	2009	2009	2009	2005	2005
Labor income	21.75	36.16	7.91	39.16	11.78
Support from spouse	11.11	17.23	5.23	17.51	4.40
Deposit and financial investment	14.94	14.94	14.93	13.23	10.78
Pension and insurance	15.77	14.12	17.37	9.54	14.15
Support from children	38.28	27.86	48.29	32.14	53.37
Debt	0.19	0.32	0.06	0.57	0.10
Government assistance	16.33	2.45	29.66	2.77	33.34
Social assistance	0.80	1.22	0.40	0.88	0.56
Others	0.12	0.20	0.05	0.44	0.38
Unknown	0.18	0.07	0.28	-	-

Data source: Ministry of Interior, The Survey of Elderly Status, June of 2009

Table 2. Perceived Importance Degree of Retirement Economic Sources (2009)

Age cohort	Importance Unit:%			
	55~64	55~64	65 above	65 above
Gender	Men	Women	Men	Women
Labor income	48.62	24.14	11.28	4.75
Support from spouse	7.51	26.61	2.49	7.80
Deposit and financial investment	16.33	13.61	16.08	13.86
Pension and insurance	17.60	10.76	26.63	8.70
Support from children	19.18	36.23	37.87	58.04
Debt	0.50	0.15	0.10	0.02
Government assistance	2.15	2.73	26.36	32.75
Social assistance	1.00	1.42	0.35	0.45
Others	0.23	0.17	-	0.10
Unknown	0.15	-	0.28	0.28

Data source: Ministry of Interior, The Survey of Elderly Status, June of 2009

Table 3. Major Retirement Economic Sources in 2009

Age cohort	Unit:%		
	above 55	55~64	65 above
Labor income	20.53	34.64	6.99
Support from spouse	9.63	14.87	4.60
Deposit and financial investment	11.97	11.60	12.33
Pension and insurance	14.77	13.07	16.40
Support from children	32.43	22.45	42.00
Debt	0.19	0.32	0.06
Government assistance	9.58	1.73	17.12
Social assistance	0.60	1.04	0.17
Others	0.12	0.20	0.05
Unknown	0.18	0.07	0.28

Data source: Ministry of Interior, The Survey of Elderly Status, June of 2009

Table 4. Descriptive Statistics

Variable	Full sample					65 above					64 below				
	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max	Obs	Mean	SD	Min	Max
Male	4806	0.529	0.499	0	1	2419	0.557	0.497	0	1	2387	0.501	0.500	0	1
Age	4806	65.790	11.054	50	108	2419	75.253	6.676	65	108	2387	56.201	4.255	50	64
Dummy65	4806	0.503	0.500	0	1	-	-	-	-	-	-	-	-	-	-
Education	4806	6.093	4.721	0	17	2419	4.678	4.567	0	17	2387	7.527	4.433	0	17
Ethnic	4806	0.888	0.315	0	1	2419	0.821	0.384	0	1	2387	0.957	0.203	0	1
Marital	4806	0.844	0.363	0	1	2419	0.806	0.396	0	1	2387	0.882	0.322	0	1
Child	4806	3.821	1.674	1	13	2419	4.477	1.845	1	13	2387	3.156	1.145	1	9
Son	4806	0.533	0.271	0	1	2419	0.523	0.254	0	1	2387	0.544	0.287	0	1
Private transfer	4806	0.502	0.500	0	1	2419	0.621	0.485	0	1	2387	0.381	0.486	0	1
Urban	4806	0.363	0.481	0	1	2419	0.281	0.449	0	1	2387	0.446	0.497	0	1
Health	4806	3.515	1.059	1	5	2419	3.419	1.055	1	5	2387	3.612	1.055	1	5
White Collar	4806	0.348	0.476	0	1	2419	0.280	0.449	0	1	2387	0.416	0.493	0	1
No bequest motive	4806	0.161	0.367	0	1	2419	0.200	0.400	0	1	2387	0.120	0.325	0	1
Ownership of saving deposit	4806	0.399	0.490	0	1	2419	0.375	0.484	0	1	2387	0.424	0.494	0	1
Ownership of risky asset	4806	0.079	0.270	0	1	2419	0.029	0.168	0	1	2387	0.129	0.336	0	1
Ownership of house	4806	0.700	0.459	0	1	2419	0.635	0.482	0	1	2387	0.765	0.424	0	1
Ownership of real estate	4806	0.232	0.422	0	1	2419	0.177	0.382	0	1	2387	0.287	0.452	0	1
Ownership of business	4806	0.025	0.157	0	1	2419	0.006	0.076	0	1	2387	0.045	0.208	0	1
Ownership of insurance	4806	0.555	0.497	0	1	2419	0.363	0.481	0	1	2387	0.749	0.434	0	1

Table 5. Estimation results for the ownership of Risky Financial Assets

	Full		65 above		64 below	
	Coefficient	Marginal	Coefficient	Marginal	Coefficient	Marginal
Male	-0.189** (0.0714)	-0.0118* (0.00466)	-0.103 (0.154)	-0.00249 (0.00384)	-0.191* (0.0832)	-0.0245* (0.0107)
Age	- -	- -	-0.0137 (0.0118)	-0.000327 (0.000283)	0.0123 (0.0104)	0.00157 (0.00132)
Dummy65	-0.359*** (0.0932)	-0.0226*** (0.00593)	- -	- -	- -	- -
Education	0.0685*** (0.00948)	0.00423*** (0.000633)	0.0696*** (0.0174)	0.00166*** (0.000481)	0.0684*** (0.0119)	0.00873*** (0.00156)
Ethnic	-0.0469 (0.104)	-0.00300 (0.00690)	0.161 (0.167)	0.00341 (0.00321)	-0.332* (0.148)	-0.0528 (0.0288)
Marital	-0.00633 (0.112)	-0.000392 (0.00696)	-0.303 (0.175)	-0.00914 (0.00657)	0.174 (0.151)	0.0200 (0.0156)
Child	-0.0669* (0.0296)	-0.00413* (0.00183)	-0.0500 (0.0444)	-0.00119 (0.00107)	-0.0879* (0.0434)	-0.0112* (0.00553)
Son	-0.0649 (0.114)	-0.00401 (0.00704)	-0.0157 (0.239)	-0.000374 (0.00570)	-0.0730 (0.133)	-0.00930 (0.0170)
Private transfer	-0.0976 (0.0762)	-0.00603 (0.00475)	-0.0894 (0.137)	-0.00219 (0.00350)	-0.106 (0.0936)	-0.0133 (0.0115)
Urban	0.276*** (0.0678)	0.0185*** (0.00504)	0.385** (0.132)	0.0115* (0.00510)	0.198* (0.0819)	0.0257* (0.0108)
Health	-0.00885 (0.0333)	-0.000546 (0.00206)	0.0463 (0.0621)	0.00111 (0.00150)	-0.0261 (0.0401)	-0.00333 (0.00512)
White Collar	0.304*** (0.0776)	0.0207*** (0.00595)	0.222 (0.151)	0.00600 (0.00469)	0.376*** (0.0932)	0.0507*** (0.0133)
No bequest motive	-0.0335 (0.131)	-0.00202 (0.00773)	0.394* (0.182)	0.0127 (0.00754)	-0.413* (0.202)	-0.0416** (0.0154)
Ownership of saving deposits	0.708*** (0.0710)	0.0525*** (0.00641)	0.636*** (0.141)	0.0196*** (0.00547)	0.743*** (0.0833)	0.106*** (0.0129)
Ownership of House	0.296** (0.0932)	0.0164*** (0.00475)	0.516** (0.164)	0.0110** (0.00350)	0.145 (0.116)	0.0175 (0.0132)
Ownership of Real Estate	0.335*** (0.0683)	0.0248*** (0.00611)	0.322* (0.136)	0.00998 (0.00554)	0.320*** (0.0804)	0.0453*** (0.0127)
Ownership of Business	0.709*** (0.133)	0.0818** (0.0249)	1.265** (0.396)	0.124 (0.0844)	0.640*** (0.143)	0.122** (0.0377)
Insurance	0.0337 (0.0786)	0.00207 (0.00484)	0.0703 (0.146)	0.00172 (0.00367)	0.0148 (0.0992)	0.00188 (0.0125)
N	4806	4806	2419	2419	2387	2387

* p<0.05(5% significance level) ** p<0.01(1% significance level) *** p<0.001(0.1% significance level)

國科會補助計畫衍生研發成果推廣資料表

日期:2011/12/01

國科會補助計畫	計畫名稱: 人口老化對國家儲蓄率的影響以及老年人接受理財教育前後的儲蓄態度
	計畫主持人: 吳文傑
	計畫編號: 97-2420-H-004-158-KF3 學門領域: 社會福利
無研發成果推廣資料	

97 年度專題研究計畫研究成果彙整表

計畫主持人：吳文傑		計畫編號：97-2420-H-004-158-KF3				計畫名稱：高齡社會的來臨：為 2025 年的台灣社會規劃之整合研究--人口老化對國家儲蓄率的影響以及老年人接受理財教育前後的儲蓄態度	
成果項目		量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）	
		實際已達成數（被接受或已發表）	預期總達成數（含實際已達成數）	本計畫實際貢獻百分比			
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	1	1	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	1	1	100%		
國外	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		章/本
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

<p>其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)</p>	<p>無</p>
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	成果項目	量化	名稱或內容性質簡述
科 教 處 計 畫 加 填 項 目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與(閱聽)人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

達成目標

未達成目標（請說明，以 100 字為限）

實驗失敗

因故實驗中斷

其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文： 已發表 未發表之文稿 撰寫中 無

專利： 已獲得 申請中 無

技轉： 已技轉 洽談中 無

其他：（以 100 字為限）

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

本研究針對老人的風險性投資行為進行研究，這在台灣算是新議題，因此可以帶動未來進一步的研究。