FACTORS AFFECTING CONSUMERS' STOCK OWNERSHIP DECISIONS IN CHINA

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A Thesis
Submitted to the Faculty of Graduate Studies in
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FACULTY OF GRADUATE STUDIES

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ABSTRACT

The objective of this study was to identify the factors related to individual stock ownership behavior in China, as well to identify the market segments and profiles for individual investors in the Chinese stock market. This study was partially motivated by the rise in China's economy and financial markets, along with the rising consumer income over the last two decades, and the entry of China into the WTO in 2001.

Consumer survey data from individual investors was used in this study, and methods included ordered probit models, structural equation models, factor analysis, and cluster analysis. The probit model and the structural equation model results indicated that factors related to Chinese individual ownership of stocks may be categorized as three main factors: knowledge and behavior, investment benefits/objectives, and socio-demographics. Knowledge and behavior was found to be an important factor related to Chinese individual stock ownership, along with socio-demographics. The factor analysis and cluster analysis results showed that individual Chinese stock investors may be segmented into four major classes, which are mainly decided by their investment preferences, as well as their socio-demographics. Among the four clusters of Chinese individual stock owners, the older wealthy investors with higher net worth tend to be most likely to own stocks, and they prefer holding stocks for less than two years. The information from this study may be useful to help firms and policy makers better understand Chinese individual stock ownership decisions.

ACKNOWLEDGEMENTS

I wish to express my deepest love and special thanks to my dearest mom and dad without whose support and encouragement I would not be where I am at today. I would also like to extend my greatest appreciation to my advisor Dr. Milton Boyd for guiding me to this study of financial services marketing, and for his continuing advice, support, encouragement, and inspiration. And I would like to sincerely thank all my other thesis committee members Drs. Barry Coyle and Jeffrey Pai for their very helpful advice and guidance. As well, I would like to express my gratitude in receiving the J.C. Gilson Fellowship for research funding.

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CHAPTER 1

INTRODUCTION

China has the world's largest population of over 1.3 billion, which accounts for about 20% of the world's population. Since China's Economic Reforms and Openness policy in 1978, and with China's strong economic growth of around 10 percent annually, China's financial markets have been playing a more important role in the world's financial markets. After China entered the WTO in 2001, the financial services sector has become more open and competitive, and a number of foreign firms have been attracted to the Chinese financial markets. More foreign firms are likely to enter the Chinese financial markets in future as well. The increasing importance of the Chinese stock market can be viewed from the following aspects:

1) International Financial Institution Involvement

By the end of May 2007, 52 well established institutions such as UBS, Morgan Stanley, Citigroup and etc. have been authorized to invest in China's Class A shares market as Qualified Foreign Institutional Investors (QFII), while foreign Investors could not invest in Class A shares before 2001 (Chinese Security Regulatory Committee). China's A-shares have since been tracked by international firms.

> "To help both domestic and QFII (Qualified Foreign Institutional Investor) investment professionals better capture value and growth trends and to meet the rising market demand for differentiated investment strategies, today S&P/CITIC Index Information Service Co Ltd launched Style and Pure Style indices for the Chinese A share market."
>
> - Standard and Poor's Press Release, Beijing, July 30, 2007.

2) Listed Among the World's Largest Stock Exchanges

By the end of February 2008, The Chinese stock market capitalization (Shanghai SE and Shenzhen SE) reached approximately four trillion US dollars (USD). Measured by market capitalization of listed companies, the Shanghai Stock Exchange has become the second largest stock exchange in Asia after the Tokyo Stock Exchange and the sixth largest stock exchange in the world, and the Shenzhen Stock Exchange has become the eighteenth largest in the world (World Federation of Exchanges).

3) Large Investor Base

The number of stock trading accounts at the two mainland stock exchanges has grown from less than 500,000 in 1991 since their inception to over 100 million by the end of May 2007 (China Securities Depository and Clearing Corporation Ltd.). Some may argue that the 100 million accounts only represents less than 10% of China's population, however, the vast size of the absolute base of 100 million is of much significance, compared to most of other stock markets. As well, there is still potential growth for the investor base.

Objective of the Study

Given the relatively large role that the Chinese stock market plays in the global stock market, the objective of this study is to identify the factors related to the ownerships of stocks in China by consumers, as well to identify the market segments and consumer profiles of the Chinese stock market investors. This study uses survey data collected in China in 2006. An explanatory probit model, and a structural equation model are constructed to examine proposed factors affecting the stock ownership decisions. A two

step analysis using factor analysis, and cluster analysis is conducted to classify the market segments.

This study considers a larger number of variables that may affect stock ownership, compared to most earlier studies. The information conveyed from this study may be helpful for policy makers in understanding individual investor behavior, in the context of the policy and regulatory environment. Also, this study maybe useful to industry firms such as investment companies, in order to gain a better understanding of the investment behavior of clients, investment product design, and product attributes for marketing.

Structure of the Study

Chapter 2 provides an introduction to the background of the Chinese stock market, including a brief history, the establishment of the two mainland exchanges, types of shares issued by companies and traded on the exchanges, trading rules such as settlement time, price fluctuation limits, and short selling constraints, and regulations and development.

Chapter 3 focuses on the explanatory probit model. First, some past studies on the subject are reviewed to provide some basis for consideration of the variables to be included in the model. Then the Chinese consumer investment survey and the descriptive results of the data are discussed. In the methodology section, a discussion is presented of the advantages of using a probit model compared to traditional methods such as an OLS approach. In later section of the chapter, the probit model estimates and interpretation of the model are included.

Chapter 4 considers the structural equation modeling method (SEM). An SEM model used to analyze the survey data and test latent constructs. Discussion includes

SEM model design, data considerations, identification, model stability, and reporting of results.

Chapter 5 presents analysis for classifying market segments of stock market investors. The approach used is factor analysis and cluster analysis. A discussion on choosing from different methods of conducting factor analysis and cluster analysis is provided. The factors analyzed related to stock ownerships in China and different clusters of consumers are assessed. Lastly, Chapter 6 summarizes the methods and main findings in this study.

CHAPTER 2

BACKGROUND OF THE CHINESE STOCK MARKET

Backgroud of the Chinese Stock Market

The Shanghai Stock Exchange (SSE) and the Shenzhen Stock Exchange (SZSE) were established in 1990. Over the past near two decades, the market has served as an important source of financing for firms and a major investment asset class for investors. The two exchanges list over 1,700 companies, and facilitate security trading for over 100 million investor accounts in mainland China.

The Shanghai Stock Exchange (SSE)

The establishment of the Shanghai Stock Exchange in 1990 was actually a re-opening of the exchange. The Shanghai Sharebrokers' Association was the first stock exchange in China and was established in 1891, and it was renamed to the Shanghai Stock Exchange in 1904. The exchange had been closed since December 1941, when Japanese troops entered and occupied Shanghai. The exchange was not opened again until 1990, except for a temporary period before the foundation of the People's Republic of China in 1949.

The Shanghai Stock Exchange is the larger exchange of the two exchanges in mainland china. Measured by market capitalization, the SSE has a size of more than 3.1 trillion USD and has become the sixth largest stock exchange in the world by the end of February 2008 (Figure 2.1). More than 900 stocks of over 850 companies are listed on the SSE, in addition, more than 200 bonds and funds are traded on the SSE. The Trading volume of the SSE in both dollar terms and number of shares is shown in Figure 2.2. The

annual trading volume of SSE has grown from a minimal level in 1991 to more than $650 billion USD, and 1,000 billion shares in 2006.

Two classes of shares, the Class-A shares, and the Class-B shares, are traded on the SSE. The Class-A shares are denominated in Chinese Yuan (CNY), and the Class-B share in US dollars (USD). Before December 2002, foreign consumers could only participate in the Class-B shares market, where there are a smaller number of companies listed, and the shares are less liquid. Approvals for Qualified Foreign Institutional Investors (QFII) enable large foreign institutional investors to invest in the Class-A share market. By the end of May 2007, the number of QFII has reached 52. The QFII includes well established financial institutions including UBS, Morgan Stanley, Citigroup and etc. (See full list of QFII members in Appendix A).

The trading facilities at the SSE are capable of executing 29 million orders and settling 60 million transactions at a speed of 16,000 transactions per second. The SSE has established a nation-wide satellite telecommunication network with the most sophisticated equipment, the most complete range of functions, the largest number of users, and the widest coverage. It consists of more than 3,000 one-way satellite substations and 1,800 two-way substations.

The SSE Composite Index, and the SSE 180 Index are the two most watched indices for stocks listed on the SSE. Both indices are calculated on a market capitalization weighted basis, similar to the calculation method used for the S&P 500 index.

The Shenzhen Stock Exchange (SZSE)

Market capitalization of companies listed on the Shenzhen Stock Exchange is about one quarter of the size of companies on the Shanghai Stock Exchange, and the SZSE with a size of $784 billion USD is ranked as the eighteenth largest stock exchange in the world (Figure 2.1). More than 900 stocks for 880 companies are listed on the SZSE, including 206 companies listed on the Small and Medium Enterprise Board. As well, more than 200 bonds and funds are traded on the SZSE. The SZSE lists both Class-A and Class-B shares.

Structural Information on the Chinese Stock Market

The Chinese stock market is unique in a number of ways, and the following information lists some general information regarding the market.

Regulation and Clearing Corporation: Listing and trading are regulated by China Securities Regulatory Commission (CSRC). The China Securities Central Clearing and Registration Corporation (CSCCRC) is responsible for the central depository, registration and clearing of the securities. Class-A shares are settled on the next business day (referred as T+1 settlement), and Class-B shares are settled in the next three business days (referred as T+3 settlement).

Transaction Fees: Three types of fees apply to consumers trading Class-A shares. Commissions are from the minimum of 5 CNY to the maximum of 0.3% of transaction amount, and are paid to the brokerage firms. On average, the commissions charged by brokerage firms are around 0.5-1.5% due to competition, and some online brokers even have "0 commissions" (CSRC). Transfer fees are from the minimum of 1 CNY to the maximum of 0.1% of transaction amount, and are paid to CSCCRC. Stamp duties (taxes)

are 0.3% of the transaction amount, and are paid to tax authorities - collected by the exchanges (Shanghai Stock Exchange).

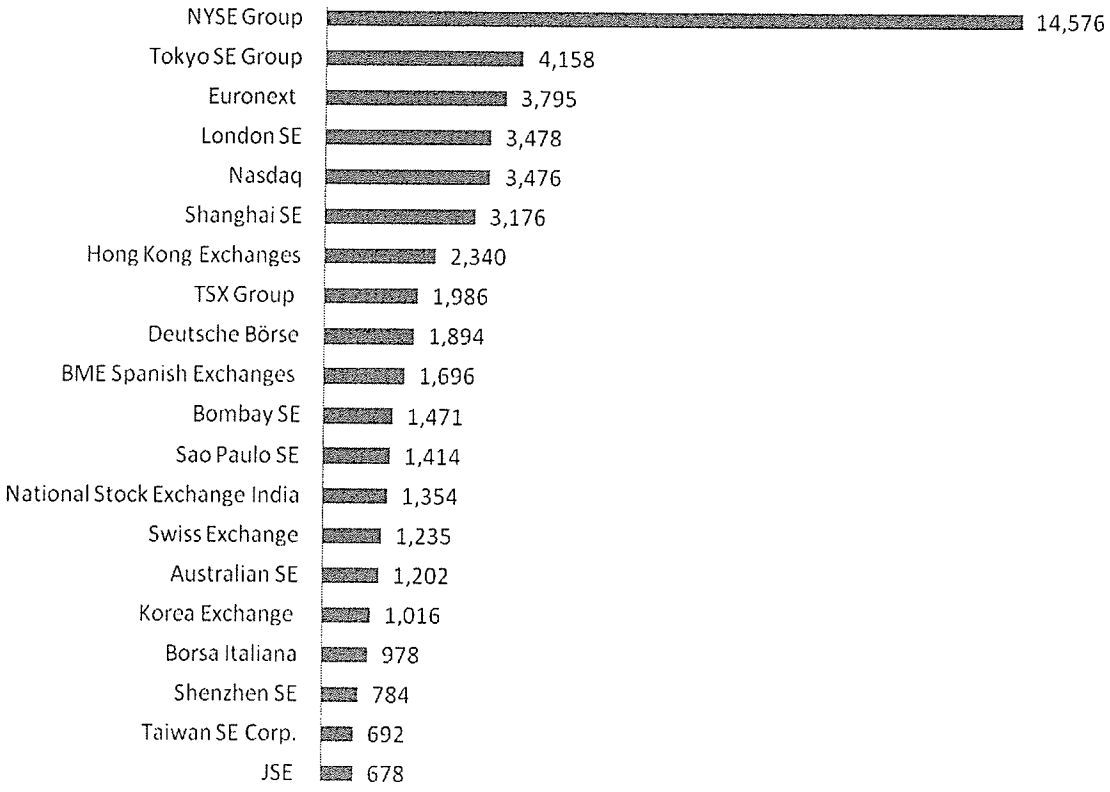
Trading Rules: There is a price fluctuation limit set in China's stock trading. The maximum level of the price of a stock cannot exceed 10% of last closing price, and the minimum level of the ask price stock cannot go below -10% of last closing price, except for the first trading day of an initial public offering (IPO). Also, short-selling of securities in China is not allowed.

Trading of Derivatives: There is currently no trading of stock options, and no trading of stock index futures in China. Trading of warrants of a limited number of companies is available now. Some critics comment that since there are no hedging instruments available (at least very limited availability), that hedging in The Chinese stock market remains a challenge.

H-Shares: This refers to stocks of China-incorporated companies listed on the Hong Kong Stock Exchanges. Similar terms used include N- and L- Shares respectively for shares of China incorporated companies traded in New York and London.

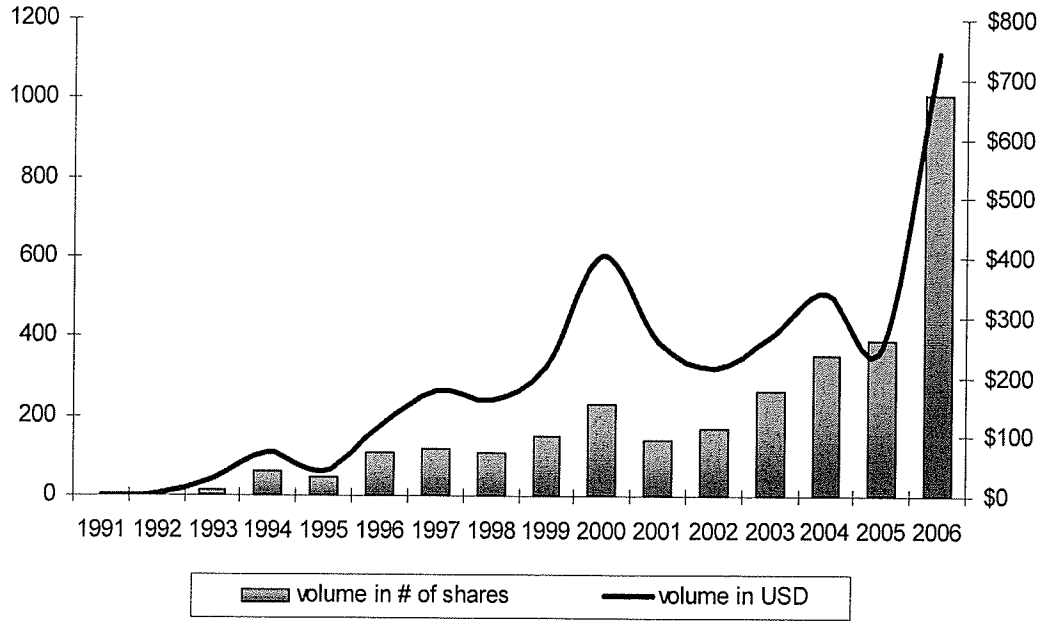
Red-Chips: This refers to companies incorporated and listed in Hong Kong, but the controlling shareholders and major business activities are in mainland China. And the term is similar to the China concept stock.

Figure 2.1 Market Capitalization of the World's 20 Largest Stock Exchanges (in USD Billions)



Notes:
1: Data from World Federation Exchange website: http://www.world-exchanges.org
2: By the end of February 2008, the Shanghai Stock Exchange was the sixth largest stock exchange in the world measured by market capitalization with a size of over 3.1 trillion USD. The Shenzhen Stock Exchange was the eighteenth largest stock exchange in the world with a size of about 784 billion USD.
3: Total world equity market size was approximately 55 trillion USD in 2008.

Figure 2.2 Shanghai Stock Exchange Historical Trading Volume in USD and in Number of Shares: 1991-2006 (Billions)



Notes:
1: Shanghai Stock Exchange was established on November 26th, 1990.
2: The figure shows growth of the Chinese stock market reflected by historical trading volume of the Shanghai Stock Index.
3: Data from Shanghai Stock Exchange website: http://www.sse.com.cn

CHAPTER 3

FACTORS RELATED TO STOCK OWNERSHIP IN CHINA: PROBIT ANALYSIS

Along with China's rapid economic growth in recent years, Chinese investors have had a relatively high savings rate. A World Bank Policy Research working paper by Kuijs (2005) showed that China's total domestic savings level was 41.7% of GDP, compared to 14.3% in the US, and 25.5% in Japan. Savings levels measured by total household savings were 16% of GDP in China, 4.8% in the US, and 8.2% in Japan, respectively. A number of previous studies explain that savings levels are related to differences in economic development, structure and regulation of the financial system, the functioning of financial institutions, and socio-demographics trends such as aging (Modigliani and Cao 2004, He and Cao 2007, Loayza et al. 2003).

Categories of consumer savings are determined by needs and preferences of consumers, and a survey by the Peoples Bank of China (PBOC) in 2002 revealed that reasons for savings include education for offspring (19.8%), retirement (13.6%), buying a house/apartment (11.9%), illness, unemployment or accident (11.1%), and savings for durable goods such as cars and appliances (10%).

Past Literature

A number of earlier studies provide some basis for constructing an explanatory probit model, and related determinants of investment decisions. Friedman and Savage (1948) introduced the concept of risk aversion in their utility model. According to their model, other things being equal, an average (risk averse) investor's expected utility when holding a more risky asset such as stocks would be lower than when holding a less risky

asset such as T-bills. Haliassos and Bertaut (1995) tested whether investors' risk aversion and liquidity needs are significant determinants for investing in stocks. Their results showed that investors that are less risk averse would have a higher probability of owning stocks, and investors that are willing to give up liquidity would have higher probability of owning stocks.

A number of socio-demographic variables were also examined in the logit model in Haliassos and Bertaut (1995), including gender, race, marital status, and a cultural factor, but only gender showed statistical significance. In China, ethnic background tends to be less important as the population is relatively homogeneous. However, family size or having dependent children may be important variables for Chinese investors. Other socio-demographics such as age, income, and education may also be considered related to Chinese investors' ownership of stocks.

The earlier mentioned People's Bank of China (PBOC) survey results indicated a number of factors that are closely tied to investors, including safety and liquidity, that may affect investors' investment decisions. However, if an investor is more constrained by safety and liquidity needs, the investor may be more risk averse and may have less willingness to invest in riskier assets, such as stocks.

The PBOC survey results also emphasize the importance of housing in Chinese investors' decisions. Arrondel and Lefebvre (2001) concluded that it would be difficult to analyze ownership for risky assets such as stocks in a household portfolio without considering the role of housing. A home owner's asset allocation for their investment portfolio may be very different because they may use funds not invested in housing to purchase stocks. This is because stocks have some similarities to real estate in the sense

that they generally have long-term returns greater than bonds, and they have more inflation protection than bonds. However, stock ownership may also be viewed as a complement to home ownership. For example, if an investor is wealthy, they may prefer to invest more in housing, but may also invest more in stocks as well, for diversification and liquidity reasons.

King and Leape (1987) propose that the informational status that the investor has acquired with respect to certain assets such as knowledge of stocks affects the holding of assets such as stocks. Therefore, a Chinese investor's knowledge of stocks and the investor's information source may influence the investor's willingness to own stocks. The lack of development in China's relatively new financial services industry could mean that if consumers and investors are less well informed, they may purchase less stocks.

Factors of market imperfection and inefficiency such as borrowing or liquidity constraints (Paxson 1990), and short sale constraints (Bris et al. 2003) all currently apply to China, and may be factors that influence portfolio diversification. However, these factors are difficult to measure and to accommodate into empirical models (Hochguertel et al. 1997). Also Hubbard (1985), and Hochguertel et al. (1997) concluded that personal taxation could be another factor impacting investment decisions. However, personal taxation in China is very different from countries such as the Netherlands or the US, which these two studies examined. The lower taxation policy in China may be an incentive to invest in the stock market for Chinese investors, given the Chinese Taxation Act (2006), with capital gains from stocks being exempt from tax.

Often, three basic investment objectives are considered to be safety, income (dividends), and growth (capital gains). Other factors such as commissions are important

in investment decisions as discussed in Heaton and Lucas (2005). Also trust of security firms and the security industry may also affect investment decisions (McCaffrey and Hart 1998). Therefore, these factors could also be considered as variables that may be related to Chinese investors' stock ownership. However, few studies in China have considered large numbers of variables or factors related to stock ownership, as many of the studies use national survey data which has a limited number of variables. Therefore, this study attempts to overcome the limited number of variables problem by using a more specific survey approach that can consider a larger number of variables, such as the variables discussed above.

Data

This study uses data from a Chinese consumer investment product survey carried out in seven major cities in three regions in China summer 2006, obtained through the Chinese Academy of Agricultural Sciences. The three regions included the east (Shanghai, Suzhou), the west (Xi'an, Chengdu, Lanzhou) and the south (Shenzhen, Guangzhou). In total, 295 questionnaires were filled out, and 37 were excluded from analysis as they were used in pre-testing phase, so 258 final surveys were used as valid respondents. Information regarding Chinese investors' investment product ownership, knowledge and behavior of financial services products, expected investment benefits/objectives, and socio-demographics were gathered. The questions on these subjects were measured mostly using a five-point Likert scale response (1= strongly disagree, … , 5 = strongly agree). However, some binary variables were used such as the dependent variable to own or not own stocks, and investment time length.

Table 3.1 presents characteristics of socio-demographics of the sample, and they are graphically presented in Figure 3.1. Out of the 258 respondents, 54% are male, and about 65% of the respondents do not have any dependent children. Over 90% of the respondents are below the age of 44, while 51% are between 25 and 34. The investing life cycle theory suggests that people under 50 are in their early to mid earning years, and their main investing objective is growth and accumulation of wealth. Income distribution in the sample shows that about 65% of the surveyed are making over 4,000 CNY (Chinese Yuan) per month or about 50,000 CNY per year per family unit. (1 USD $\approx$ 8 CNY in 2006). According to report released by National Bureau of Statistics of China, the average annual individual income levels in the three regions are 30,085 CNY for Shanghai region, 22,116 CNY for Shenzhen region, and 13,626 CNY for Xi'an region, respectively in 2005. This sample may represent the mid to high income population of each region, or official statistics may understate income. Finally, 60% of the respondents have family size of three, and over 80% hold a 2-3 year college degree or higher.

Table 3.2 provides definitions of variables entering in the probit model and means of the variables. The first column lists the variable names, and the second column shows the means of total 258 survey responses. The next two columns compare the means of each variable between investors having no stock ownership and having stock ownership. The last column gives the definition of each variable listed.

For example, the dependent variable is stock ownership, (1= ownership of stocks, 0= no ownership of stocks), and the mean is 0.45. Knowledge of stocks is an independent variable, (1= very little knowledge of stocks, ..., 5= very much knowledge of stocks),

and the sample mean is 2.76, while the mean is 2.31 for investors without stock ownership, compared to the mean of 3.30 for investors having stock ownership.

Methodology

Given that the dependent variable has binary outcomes, to own (Y=1)or not to own stocks (Y=0), a probability model framework can be adapted from an OLS regression:

$$Y = \text{Prob}(Y=1 \mid X = x) = \alpha + X\beta + \varepsilon \qquad \varepsilon \sim N(0,1) \qquad [3.1]$$

However, this simple OLS procedure has a number of econometric problems including: i) heteroskedasticity in the error term because the dependent variable is binary, ii) inaccurate prediction because the predicted probability might be greater than one or less than zero when in reality it must be between zero and one. As well, there can be misleading β estimates, given that most of the variables are based on the Likert scale (1= strongly disagree, 2 = slightly disagree, … , and 5 = strongly agree). This is because the distance between strongly disagree to slightly disagree, and the distance between slightly agree to strongly agree are highly unlikely to be equal, though the model suggests that their effect on the probability of owning stocks is the same.

Therefore, an ordered probit model is used here for estimating the ownership models. Liao (1994) summarized previous literature including Maddala (1986) and Mckelvey and Zavoina (1975) on advantages of ordered logit and probit models over other methods such as OLS, when using discrete ordered data such as survey data. The ordered probit model can be generally specified as:

$$\Phi^{-1}(\gamma) = \alpha_{J-1} - X\beta$$

$$\text{or} \quad \gamma = \Phi(\alpha_{J-1} - X\beta) \qquad [3.2]$$

Where,
Φ^{-1} is the inverse function of the standard normal CDF, i.e., a Z-score,
$\gamma = Prob\ (y \leq J\text{-}1)$ is the cumulative probability of event 1 to J-1,
α is intercept, X and β are vectors of independent variables and corresponding coefficients.

The software SPSS 15.0 is used to estimate the models for Chinese investors' willingness to own stocks. The above equation can be written as:

$$\Phi^{-1}[Prob(not\ Own)] = \alpha_0 - X\beta \qquad [3.3]$$

and $$Prob(Own) = 1 - Prob(not\ Own) \qquad [3.4]$$

Marginal Effect:

From Equation 3.2, the following can be derived:

$$\frac{\partial[\Phi^{-1}(\gamma)]}{\partial x_i} = -\beta_i \qquad [3.5]$$

and $$\frac{\partial(\gamma)}{\partial x_i} = \frac{\partial[\text{Prob(own)}]}{\partial x_i} = \frac{\partial[\Phi(\alpha - x\beta)]}{\partial x_i} = f(\alpha - x\beta)\beta_i \qquad [3.6]$$

Equation 3.5 suggests that β_i can be interpreted as the decrease in Z-score of the probability of not own stocks if x_i is increased by 1. However, this interpretation is not directly intuitive. Equation 3.6 shows that marginal effects on probability of owing stocks is related to β_i, but it also shows that this interpretation can be only analyzed on a per case basis, which is calculated upon a given set of x variable values.

Ordered Probit Model Results

Table 3.3 summarizes the results of the ordered probit model for predicting Chinese investor's willingness to own stocks. The McFadden R^2 of 0.303 is considered a suitable fit for cross sectional survey data (Greene 1997). An alternative model fit measurement is also used, the prediction accuracy ratio, which is similar to accuracy of

prediction method discussed in Malhotra (1984). The ratio is calculated from the number of correctly predicted categories (1 if probability of ownership ≥ 0.5, and 0 if probability of ownership < 0.5) out of the number of observed categories. As a result, the estimated model correctly predicted 75.97% of the dependent variable values, which is reasonably accurate.

The independent variables are categorized to three groups: knowledge and behavior, investment benefits/objectives, and socio-demographics. Ten of the fifteen variables show statistical significance at 10% level, and the magnitudes of coefficients of most of the independent variables show a relatively strong impact on the dependent variable.

Knowledge and Behavior

Knowledge of stocks which is measured in a scale of 1 to 5, and appears to have relatively strong impact (0.416) on an investor's stock ownership decision. The positive sign of the coefficient is as expected and can be interpreted that a consumer with more knowledge on stocks would have more probability to own stocks. The size of the coefficient determines the magnitude of the increase in probability of owning stocks when knowledge of stocks increases. However, as shown in Equation 3.6, the actual change in probability of owing stocks, the marginal probability, can be only analyzed on a per case basis, which is calculated upon a given set of x variable values. Appendix B provides a detailed interpretation of each of the estimated probit coefficients from a marginal probability perspective. It shows that for an average Chinese investor, whose characteristics take on all the mean values of the sample respondents, that a one unit

increase from the mean in the investor's knowledge of stocks would have 15.3% increase in the investor's probability of owning stocks (Section B of Appendix B).

The signs for risk tolerance (0.233), percentage invested in risky asset (0.312), and trust of securities firms and industry (0.217) are as expected (Table 3.3). All of these coefficients show statistical significance, which means a relatively strong influence on the probability of owning stocks. Commission (-0.114) shows a negative sign, which is consistent in that as commission as costs of purchasing stocks rise, consumers are less likely to purchase stocks. Investment time length (-0.304) also shows a negative sign, which means that Chinese investors tend to hold stocks for a shorter term. This is consistent with findings in some other studies such as Green (2003), and Chen et al (2004). Coefficients on commission, and investment time length are not statistically significant at 10% level. Competition between brokerage firms has become very competitive, although the CSRC has a price ceiling of 0.3% on commission charged by brokerage firms, many brokerage firms charge much lower commissions to attract customers.

Investment benefits/objectives

The three potential investment benefits/objectives estimates include capital gains/growth (0.415), dividends/income (-0.157), and safety (0.136) respectively. The sign of the coefficient of capital gains/ growth is as expected, and the estimate shows statistical significance. The two variables dividends/income, and safety show relatively slight impacts on Chinese investors' stock ownership, given the size of the coefficients and statistical insignificance. This may raise some concerns to policy makers, given that investors appear to favor capital gains and associated risks, over safety, and

dividends/income. Excessive risk return objectives by investors could result in unstable markets. The average P/E (price to earnings ratio) of SSE Composite Index at the time the survey was conducted was around 45, while long term P/E of the Dow and S&P 500 were around 15.

Socio-demographics

A number of socio-demographic variables are included in the model. First, coefficients of age (0.220), own housing (0.243), family size (0.504), income (0.354), have dependent children (0.616), and education (0.551) all have positive signs as expected. Age and dependent children are found to be statistically significant. These results indicate that as a Chinese investor becomes older, has a larger family size (from single to non-single), and has children, they are more likely to own stocks. Ownership of a house/apartment (0.203) is also found to be statistically significant, and the sign is as expected. This may indicate that as investors become wealthier, they also choose to own stocks as well as housing in order to add some liquidity and diversification to their portfolio. Income (0.779) and education higher than high school (0.591) show the expected sign and relatively strong impacts on Chinese investors' willingness to own stocks, given the coefficient size and statistical significance.

Summary

In summary, an ordered probit regression model for Chinese investors' willingness to own stocks was developed using the consumer survey data from 258 respondents. Three categories of variables are identified to be related to stock ownership decisions in China including knowledge and behavior, investment benefits/objectives, and socio-demographics.

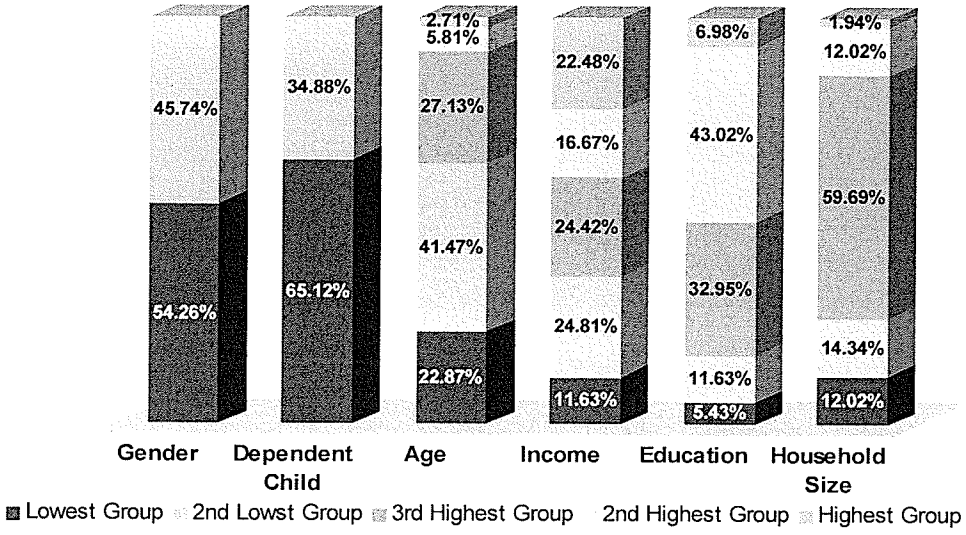
Results show that individual investors were more likely to own stocks if they had more knowledge, higher risk tolerance, higher percentage of assets invested in risky assets, and a higher trust of security firms. Results also showed that investors favored capital gains/growth over dividends and income, and safety. In terms of demographics, investors were more likely to own stocks if they were older, had larger family size, more dependent children, higher income, and education beyond high school.

Investment firms may find this information useful for marketing and investment product design. In addition, the results may be useful for policy makers. For example, investors appear to favor the risk of capital gains, over safety, and dividends/income, and prefer shorter term market transactions, rather than long-term investing. This behavior by investors could result in less stable markets, and less stable and more risky returns.

Table 3.1 Socio-demographics of Sample Respondents of Chinese Consumer Investment Product Survey (N=258)

	Eastern		Western		Southern		Total	
	N	%	N	%	N	%	N	%
Gender								
Male	46	54.8	31	48.4	63	57.2	140	54.3
Female	38	45.2	33	51.6	47	42.7	118	45.7
total	84		64		110		258	
Age								
25 and less	21	25.0	12	18.7	26	23.6	59	22.8
25-34	30	35.7	22	34.4	55	50.0	107	41.4
35-44	27	32.1	25	39.1	18	16.4	70	27.3
45-54	5	5.9	4	6.3	6	5.5	15	5.8
above 55	1	1.2	1	1.7	5	4.6	7	2.7
total	84		64		110		258	
Family Size								
1 person	5	5.9	9	14.1	17	15.4	31	12.0
2 people	13	15.5	8	12.5	16	14.5	37	14.3
3-4 people	53	63.1	42	65.6	59	53.6	154	59.7
5-6 people	13	15.5	4	6.3	14	12.7	31	12.0
7 or more	0	0.0	1	1.6	4	3.6	5	1.9
total	84		64		110		258	
Family Monthly Income (CNY)								
less than 1600	14	16.7	10	15.6	6	5.5	30	11.6
1600-3999	21	25.0	13	20.3	30	27.3	64	24.8
4000-6499	20	23.8	18	28.1	25	22.7	63	24.4
6500-8999	15	17.8	11	17.2	17	15.5	43	16.7
9000 and above	14	16.7	12	18.7	32	29.1	58	22.5
total	84		64		110		258	
Dependent Children under 18 years old								
do not have	48	57.1	41	64.1	79	71.8	168	65.1
have	36	42.9	23	35.9	31	28.2	90	34.9
total	84		64		110		258	
Education Level								
Technical School and lower	3	3.5	8	12.5	3	2.7	14	5.4
High School	5	5.9	16	25.0	9	8.2	30	11.6
2-3 years College	22	26.2	18	28.1	45	40.9	85	32.9
4 years University	49	58.3	19	29.6	43	39.1	111	43.1
above 4 years University	5	5.9	3	4.8	10	9.1	18	7.0
total	84		64		110		258	

Figure 3.1 Socio-demographics of Sample Respondents of Chinese Consumer Investment Product Survey (N=258)



Notes:
a) The Chinese Consumer Investment Survey was conducted in May-Aug 2006 in seven cities and three geographic regions.
b) Categories are defined below from lowest group to highest group, for each specific socio-demographics variable:

	Lowest Group	2nd Lowest Group	3rd Highest Group	2nd Highest Group	Highest Group
Gender	Male	Female			
	54.26%	*45.74%*			
Dependent Children	Do not have	Have			
	65.12%	*34.88%*			
Age	<25	25 -34	35 – 44	45 – 54	>55
	22.87%	*41.47%*	*27.13%*	*5.81%*	*2.71%*
Income (CNY)	<1,600	1,600 – 3999	4,000 - 6,499	6,500 - 8,999	>9,000
	11.63%	*24.81%*	*24.42%*	*16.67%*	*22.48%*
Education	≤ Technical School	High School	2-3 year College	4 year University	Higher
	5.43%	*11.63%*	*32.95%*	*43.02%*	*6.98%*
Family Size	1 person	2 people	3-4 people	5-6 people	7 or more
	12.02%	*14.34%*	*59.69%*	*12.02%*	*1.94%*

Table 3.2 Variable Definitions and Means of Survey Responses (N=258)

Variables	Mean			Definition
	Survey Responses	Not own Stocks	Own Stocks	
Dependent Variable				
Stock Ownership	0.45	0	1	1/0, 1= ownership of Stocks, 0= o/w
Independent Variables				
Knowledge and Behavior				
Knowledge of Stocks	2.76	2.31	3.30	1-5, 1= very little, 5= very much
Risk Tolerance	3.43	3.26	3.64	1-5, 1= very little risk, 5= very much
Investment length	0.57	-	0.59	1/0, 1= long term (>2 yr), 0= o/w
Percentage Invested in Risky Assets	2.35	1.93	2.86	1-5, 1= <10%, 3= 31~50%, 5= >70%
Trust of Securities Firms and Industry	2.80	2.54	3.12	1-5, 1= very little trust, 5= very much
Commission	2.99	3.00	2.97	1-5, 1= very little, 5= very much
Investment benefits/objectives				
Capital Gains/Growth	4.11	4.01	4.28	1-5, 1= very little, 5= very much
Dividends/Income	4.01	4.06	3.94	1-5, 1= very little, 5= very much
Safety	4.49	4.45	4.54	1-5, 1= very little, 5= very much
Socio-demographics				
Age	2.24	2.06	2.46	1-5, 1= <25, 3= 35~44, 5= >55
Own House/Apartment	2.82	2.63	3.06	1-5, 1=0, 2= plan to buy, 3=1, 4=2, 5=>2
Family Size (non Single)	0.88	0.84	0.92	1/0, 1= non single, 0= single
Income More than 1,600 per Month	0.88	0.77	0.94	1/0, 1= >1600, 0= o/w
Have Dependent Children	0.35	0.28	0.43	1/0, 1= have, 0= no
Education (Higher than High School)	0.83	0.77	0.91	1/0, 1= >high school, 0= o/w

Note: o/w = Otherwise.

Table 3.3 Estimates of the Ordered Probit Model: Chinese Investors' Willingness to Own Stocks (N=258)

Parameters	Estimates	S.E.
Knowledge and Behavior		
Knowledge of Stocks	0.416***	0.101
Risk Tolerance	0.233**	0.112
Percentage Invested in Risky Asset	0.312***	0.099
Trust of Securities Firms and Industry	0.217**	0.100
Commission	-0.114	0.090
Investment length	-0.304	0.211
Investment benefits/objectives		
Capital Gains/Growth	0.415**	0.162
Dividends/Income	-0.156	0.151
Safety	0.136	0.147
Socio-demographics		
Age	0.220*	0.123
Own House/Apartment	0.243**	0.110
Family Size (non Single)	0.504	0.342
Income (>1,600/month)	0.354*	0.182
Have Dependent Children	0.616***	0.225
Education (High than High School)	0.551*	0.296
Pseudo R-Square		
Cox and Snell	0.348	
Nagelkerke	0.451	
McFadden	0.303	
Prediction Accuracy	**75.97%**	

Notes:
*a) *, **, *** represents significance level at 10%, 5% and 1%, respectively.*
b) Variables scale: 1= lowest, 5 = highest, 0,1 for cases such as informed acquaintance, investment length, and all socio-demographic variables except for age and own house/apartment.
c) Prediction Accuracy = percentage of correct predicted categories out of actual observed categories.
d) Interpretation of estimates of coefficients:
1. positive coefficients indicate higher probability of owning stocks.
2. for example, β for knowledge of stocks =0.416, and when knowledge of stocks increases by 1 unit, the Z-score will decrease by 0.416, and the associated probability of owning stocks will increase. A more detailed explanation is that when knowledge of stocks increases by 1 unit, Φ^{-1} [prob(not own stocks)]=Z-score[prob(not own stocks)] will decrease(increase) by 0.416, then increase (decrease) in corresponding probability of not owning stocks can be calculated. (1.the model is defined with a "-" sign before β to ensure "+"β will lead to "+" change in probability. 2. dependent variable = 0 if not owning stocks and =1 otherwise).

CHAPTER 4

A STRUCTRUAL EQUATION MODEL OF STOCK OWNERSHIP IN CHINA

Methodology and Data

The data used here is from Chapter 3, and a structural equation modeling (SEM) approach is used here for analyzing the survey data, to identify factors related to individual stock ownership decisions in China. The SEM approach tests for latent constructs between the factors. Since the seminal work of Joreskog (1973), the use of structural equation modeling (SEM) in analyzing multivariate data to identify latent constructs of relationships has become more common. SEM is capable of testing and identifying more complex relationships existing among dependent and independent variables, compared to traditional methods in multivariate analysis, such as linear regression, logistic regression, ANOVA etc. SEM is also generally more useful than the above methods when using a large number of variables and measuring more complex relationships among variables.

For example, in chapter three, stock ownership was based on 15 independent variables. However, the 15 variables may be represented by three key underlying (latent) variables/factors, and the relationship of these three latent variables with the dependent variable can be tested. These latent variables include knowledge and behavior, investment benefits/objectives, socio-demographics. Also, in many real life circumstances, a simple direct relationship modeling method may not correctly reflect the complexity of relationships, though SEM is capable of handling the complexity in modeling of the relationships. It is argued that between these groups of independent variables, some of them may be correlated. Another advantage of SEM is that it is able to

handle a large number of observed variables without the multicollinearity problem sometimes faced by regression models.

Often, the SEM method allows examination of several *a priori* hypotheses. This study considers the following two hypotheses.

Hypothesis 1: An investor's expected investment benefits/objectives may be related to the investor's socio-demographics.

Hypothesis 2: An investor's knowledge and behavior may be related to the investor's socio-demographics. The education level, social network, family ties may all have impacts on the investor's investment knowledge and associated behavior.

In this SEM approach, the dependent variable is stock ownership, and the independent latent variables are knowledge and behavior, investment benefits/objectives, and socio-demographics. The relationships between them are latent constructs, both of which are not observed directly. Confirmatory factor analysis (CFA) is often incorporated in SEM to identify the latent factors. These observable variables, representing latent variables, are called indicators in SEM. This part of analysis that deals with relationships between factors and indicators are often referred to as the measurement model. Path analysis is then used to examine relationships within the independent latent factors, as well as dependency (causal relationship) between the independent factors and the dependent factors. The part of analysis that deals with relationships between dependent variables and latent independent variables is often referred to as the structural model. And the primary focus of a SEM model is on the theoretical constructs, which are presented by the coefficients of the structural model.

The two parts combined, the measurement model and structural model, make up the structural equation model. The structural model connects two vectors of η endogenous variables by means of B matrix. The structural model also links the vector of η endogenous variables to the vector of ξ exogenous variables by means of Γ matrix:

$$\eta = B\,\eta + \Gamma\,\xi + \zeta \qquad [4.1]$$

The measurement model of the endogenous latent variables connects the vector of y observable variables to the vector of η endogenous latent variables by the Λ_y matrix and the vector of error terms, ε:

$$y = \Lambda_y\,\eta + \varepsilon \qquad [4.2]$$

The measurement model of the exogenous latent variables connects the vector of x observable variables to the vector of ξ exogenous latent variables by the Λ_x matrix and the vector of error terms, δ:

$$x = \Lambda_x\,\xi + \delta \qquad [4.3]$$

Relationships between latent constructs are given by structural coefficients (B and Γ). The link between the latent constructs and observable variables are represented by regression coefficients (Λ_y and Λ_x). This implies the relative strengths of direct and indirect relationships between variables. SEM shows the causal relationships among these exogenous variables and endogenous variables. Coefficients for the latent factors and their associated indicators are known as factor loadings, or first order factor coefficients. Factor loadings are the same as factor loadings in a simple factor analysis, which reflect correlations between factors and standardized variables when the estimated factors are orthogonal (uncorrelated). Coefficients for the dependent factor(s) and their

associated factors represent the theoretical constructs, and the regression coefficients are also known as higher order factor coefficients.

The SEM model for this study is developed using software AMOS 5.0 and estimated using maximum likelihood estimation (MLE). Since a number of latent factors are to be identified in SEM, to avoid an unidentified model, each unobserved latent factors is assigned with a metric. A metric can be either a fixed variance of 1, or a fixed regression weight of 1 to the path from the latent variable to one of its indicator variables. The constraint path is generally selected as the one to the indicator variable which has the highest factor loadings in factor analysis (Garson).

The SEM estimates can be reported in unstandardized form or standardized form. For this study, the standardized form is used by standardizing the mean and standard deviation. The unstandardized form is often reported when the relationship is more simple and direct. But since unstandardized beta estimates are dependent on the size and units of the variable, it can be difficult to easily see the impact on the dependent variable.

SEM Model Results

Figure 4.1 shows the SEM model structure and the estimated coefficients that measure the relationships between the variables. The model goodness of fit statistics include the relative Chi-Square (Chi-Square/d.f.) of 2.123, AGFI (Adjusted Goodness of Fit Index) of 0.877, CFI (Bentler Comparative Fit Index) of 0.845, RMSEA (Root Mean Square Error of Approximation) of 0.071. All of these statistics suggest a sufficient fit of the data with the SEM model (Jaccard and Wan 1996, Kline 1998, Schumacker and Lomax 2004). In addition, the stability of the model was tested by using random draws of parts of the sample data, and the results were very similar.

The SEM model here tests the relationship between stock ownership in China, (the dependent variable) and three independent latent factors, knowledge and behavior, investment benefits/objectives, and socio-demographics. Each of the three latent independent factors is estimated by using a number of observed variables (also known as indicators in AMOS). The model estimates are reported in standardized form.

Knowledge and Behavior (0.90)

The coefficient estimate (similar to a correlation coefficient) for the dependent variable and the factor is high at 0.90, and is statistically significant, indicating that knowledge and behavior may be a primary determinant of Chinese individual stock ownership (Figure 4.1). This implies that investors having more knowledge of stocks, higher risk tolerance, higher percentage of assets invested in risky investments, and more trust, appear to be more likely to own stocks.

Knowledge and behavior were estimated by using risk tolerance (0.48), knowledge of stocks (0.67), percentage invested in risky asset (0.66), trust on securities firms and industry (0.52), commission (0.10), and investment time length (0.03). These factor loadings of the indicators (similar to correlation coefficients) are at an adequate level, except for commission, and investment time length. Based on the probit model in Chapter 3, commission and investment time length remain in the model to avoid misspecification of the entire model.

Investment Benefits/Objectives (0.10)

Investment benefits/objectives (0.10) is found to have very minor impacts on individual stock ownership, and the coefficient is not statistically significant at 10% level (Figure 4.1). Investment benefits/objectives considers investors' perceived importance of

expected benefits from capital gains/growth (0.83), dividends/income (0.74), and safety of investment (0.57). This result is consistent with the probit model, which found low explanatory power for dividends/income, and safety.

Socio-demographics (0.43)

The coefficient of socio-demographics is 0.43, and is statistically significant, indicating that the factor shows relatively strong impacts on Chinese investors' stock ownership decisions. Investor age, owning housing, having higher income, having larger family, and raising more dependent children, and having higher education, are linked to owning stocks. Socio-demographics included variables such as age (0.40), own housing (0.69), family size (0.44), monthly income (0.47), have dependent children (0.41), and education (0.19). Factor loadings of the indicators are at an adequate level, except for education. Education remains in the model to avoid model misspecification.

Hypothesis Tests of Relationships between Latent Independent Variables

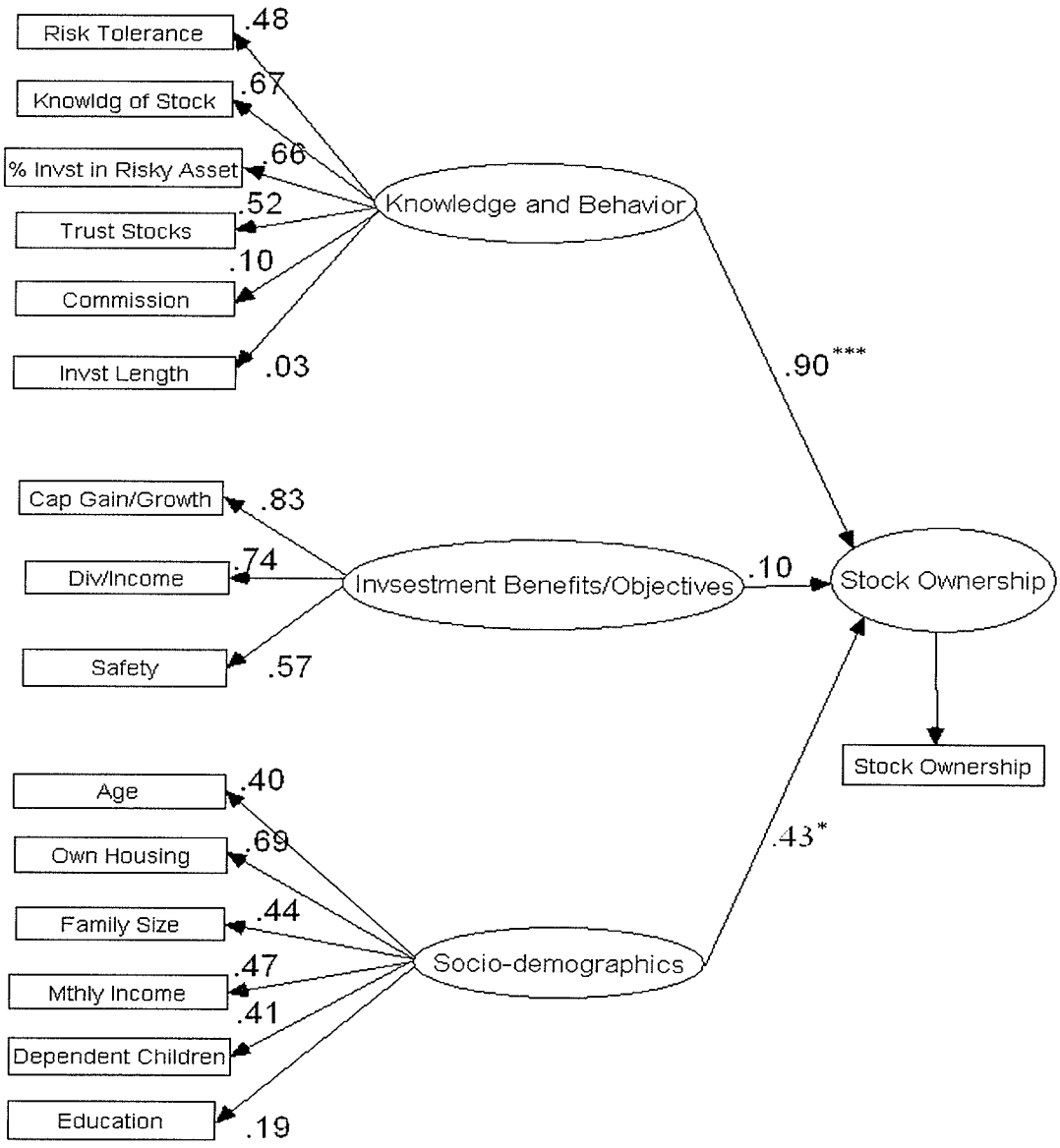
Possible correlations between 1) socio-demographics and investment benefits/objectives, as well as 2) socio-demographics and knowledge and behavior are examined. For hypothesis 1, correlation between socio-demographics and investment benefits/objectives is 0.00 (Figure 4.2). The correlation between socio-demographics and knowledge and behavior is 0.12 (Figure 4.3). Neither of the two relationships were statistically significant at 10% level, indicating that socio-demographics was not likely linked to either investment benefits/objectives, or knowledge and behavior.

Summary

In summary, a structural equation modeling approach was used to identify the constructs (factors) related to Chinese investors' stock ownership. The three latent factors

included knowledge and behavior, investment benefits/objectives, and socio-demographics. The SEM model results showed that the knowledge and behavior factor was statistically significant and a strong influence on Chinese individual stock ownership. The socio-demographics factor was also found to be statistically significant in explaining stock ownership. The correlation between socio-demographics of stock investors and their investment benefits/objectives regarding stocks was not found to be statistically significant, indicating no relationship between the factors. As well, the correlation between socio-demographics and knowledge and behavior of stock investors was not found to be statistically significant, again indicating no relationship between the factors.

Figure 4.1 Structural Equation Modeling Estimates (Standardized) N=258

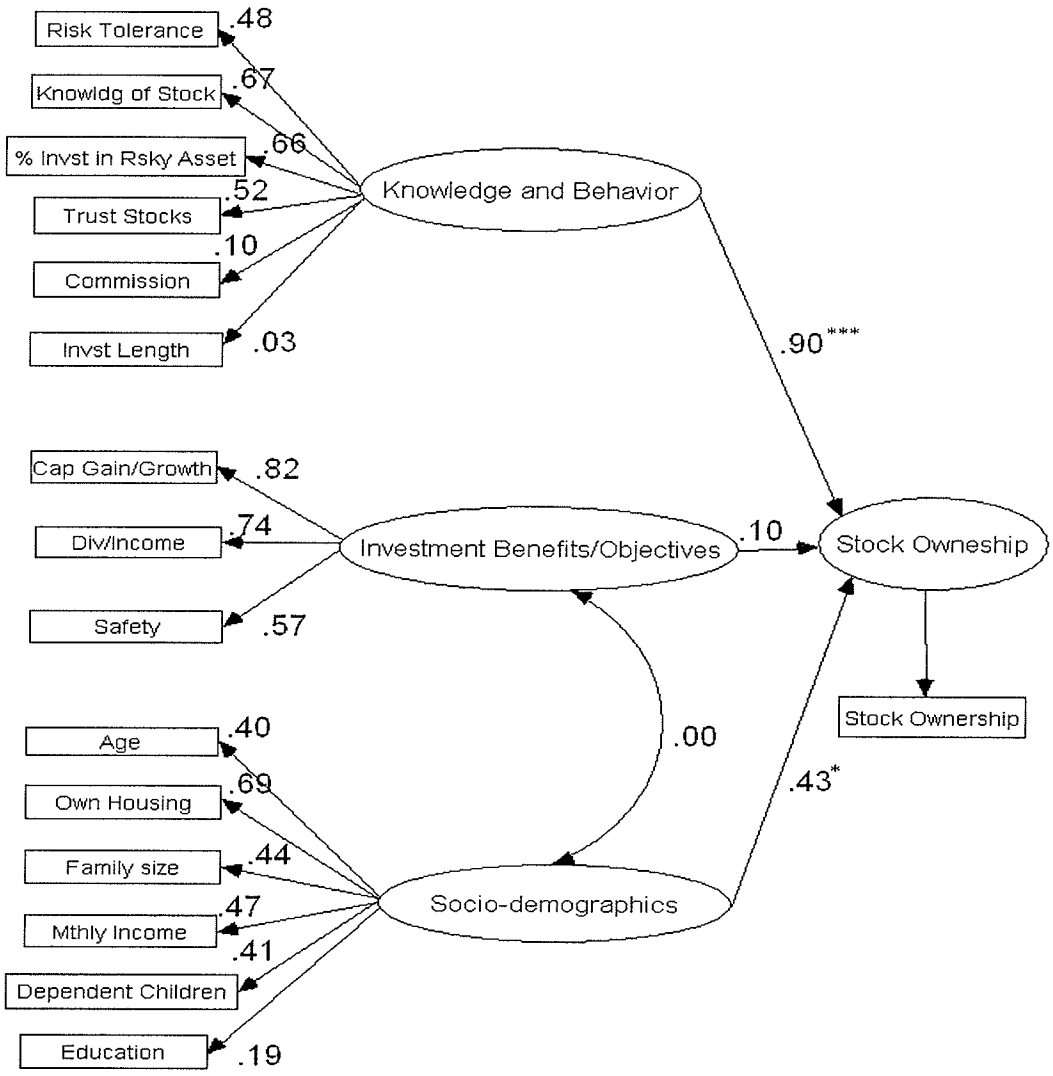


Model Fit Statistics

Chi-Square/d.f.	2.123
AGFI	0.877
CFI	0.845
RMESA	0.071

Notes: 1) The three model fitting statistics suggest an adequate fit between the model and the data.
*2) *, *** represent 10% and 1% level of statistic significance.*

Figure 4.2 Structural Equation Modeling Estimates (Standardized): Hypothesis 1 (N=258)

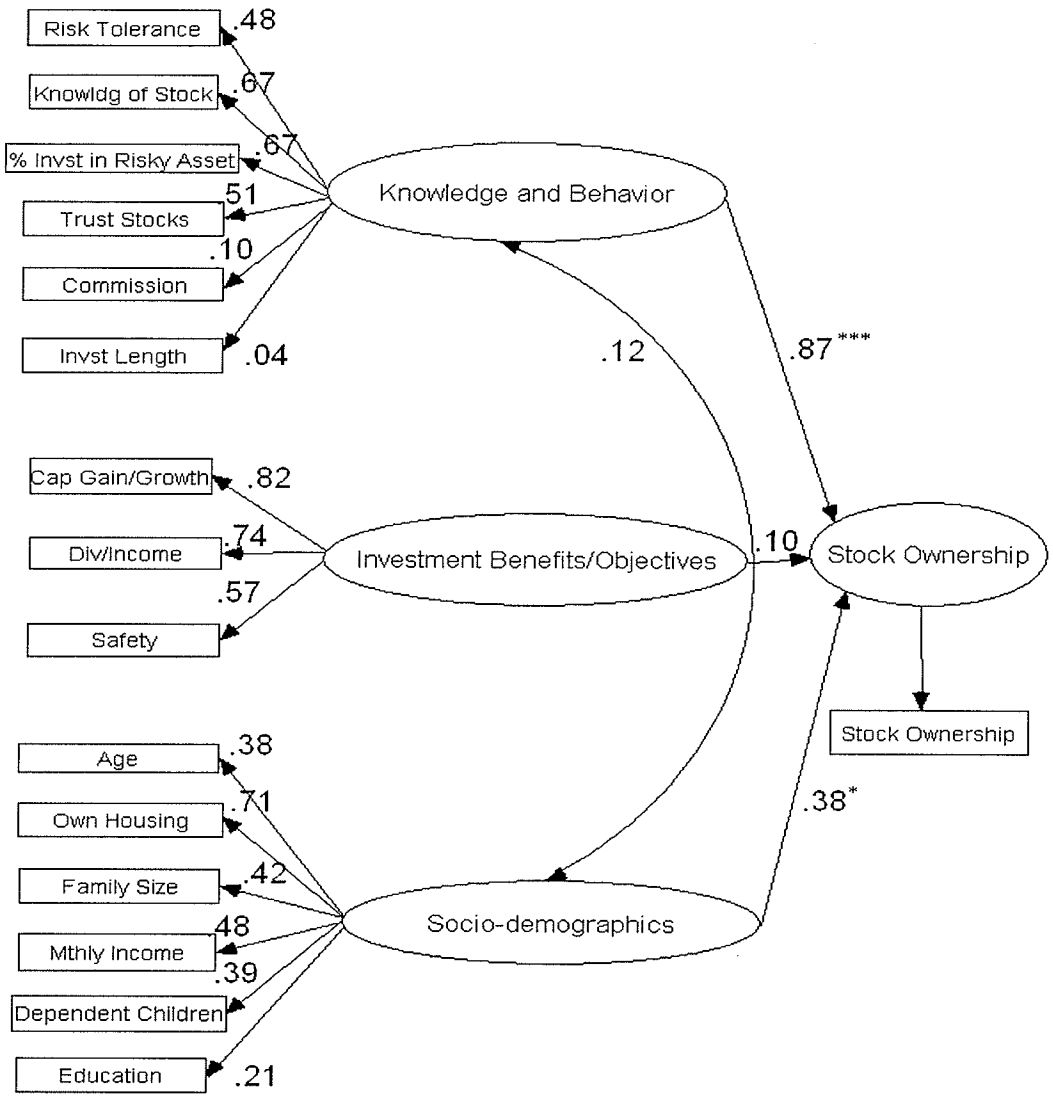


Model Fit Statistics

Chi-Square/d.f.	2.233
AGFI	0.856
CFI	0.793
RMESA	0.074

Notes:
1) Covariance between Investment benefits/objectives and Socio-demographics is 0.002, P-value 0.960.
*2) *, *** represent 10% and 1% level of statistic significance.*

Figure 4.3 Structural Equation Modeling Estimates (Standardized): Hypothesis 2 (N=258)



Model Fit Statistics

Chi-Square/d.f.	2.149
AGFI	0.857
CFI	0.795
RMESA	0.072

Notes:
1) Covariance between Knowledge and behavior and Socio-demographics is 0.043, P-value 0.209.
*2) *, *** represent for 10% and 1% level of statistic significance.*

CHAPTER 5

SEGMENTATION OF INDIVIDUAL STOCK INVESTORS IN CHINA

As part of this study, a two step analysis is used to identify the market segments and consumer profiles for The Chinese stock market investors. First, factor analysis is used to identify latent variables that may affect stock ownership in China. Second, the identified factors are then used in the cluster analysis procedure to classify the segments of investors in the Chinese stock market.

In addition to the growth in The Chinese stock market during the last two decades in terms of the market capitalization, the number of stock trading accounts has grown from less than 500,000 in 1991 over 100 million by the end of May 2007 (China Securities Depository and Clearing Corporation Ltd). With China's rapid growth and large growth potential in the size of the investor base, it is interesting to understand more about the Chinese stock investors, e.g. who they are, what factors affect their stock purchasing decisions, what socio-demographic characteristics do they have, and what investment preferences do they have.

Methods and Data

The data used here is the same dataset as in earlier chapters. The variables considered in the earlier chapters are also used in the factor analysis to identify the latent factors affecting the Chinese investors' stock ownership. The factor analysis results are then used as input for the cluster analysis to classify the market segments of individual investors in The Chinese stock market.

Green (2003) reviewed results of a survey conducted by Research Institute of the Shenzhen Stock Exchange in 2001, conveying individual investors in Chinese stock market. It was based on 2,500 survey respondents, and found that Chinese individual investors are relatively young (17% of Chinese investors over age of 55 vs. 27% of U.S. investors over age of 55). The author described the relatively younger investors as "often extremely sophisticated in their use of computers and trading strategies. They are certainly not fools in need of institutions."

The Shenzhen Stock Exchange survey also showed that the investors tend to prefer short-term investments, that length of trade is much shorter compared to in the US or Europe, and speculating on stock price fluctuation is found to be a major investing strategy used by the investors. Barber and Odean (2000) concluded that active trading would lower investors' return. Lastly, the author also found out that the individual investors are very concentrated in the well developed regions of China. Shanghai, Guangdong Province, and Jiangsu Province have the largest number of trading accounts, accounting for 33% of all trading accounts in China.

Factor Analysis Methodology

Factor analysis is a multivariate statistical procedure for identifying interrelationships among similar variables, and the commonality is captured in a factor. For example, an investor may want a definition of a risky stock from their financial adviser. The adviser may describe risk in a number of dimensions such as the potential of losing money, a stock with higher than normal price fluctuation, a thinly traded stock with wide bid – ask spread and low trading volume, a company operating in a country of political instability, or a company having a lot of debt. If such dimensions were found to

have commonality through a statistical relationship, then they might be considered to represent a factor called "risk".

Sometimes concepts such as risk can be difficult to identify, define, or observe. However, factor analysis can be used to empirically identify these concepts or latent variables. A latent variable can be defined as variables that are not directly observed but are rather inferred (through a mathematical model) from other variables that are observed and directly measured. Since usually the factors useful for characterizing a set of variables are not known in advance, factor analysis can help identify these latent variables (Norusis 1994, 2005). In marketing research, use of factor analysis is one of the more popular and widely used statistical applications. Appropriate use of factor analysis has the advantage in that much of the information contained in data is represented by a smaller number of latent or unobservable factors (Stewart 1981).

The factor analysis model can be generally expressed mathematically as:

$$X_i = \lambda_1 F_1 + \lambda_2 F_2 + \ldots + \lambda_k F_k + \varepsilon_i \qquad [5.1]$$

in specific,

$$X1 = \lambda_{11} F_1 + \lambda_{12} F_2 + \ldots + \lambda_{1k} F_k + \varepsilon_{1i}$$
$$\ldots$$
$$\ldots$$
$$Xn = \lambda_{n1} F_1 + \lambda_{n2} F_2 + \ldots + \lambda_{nk} F_k + \varepsilon_{ni}$$

where X_i are standardized observed variables, F_i are latent factors affecting X_i, ε_i is an error term, which is also a factor but is unique and uncorrelated with other factors, and λ_i are called factor loadings, which are correlations between factors and standardized variables when the estimated factors are orthogonal (uncorrelated).

After factors (F) are identified, values of a new set of variables (the estimated factors) can be computed for further analysis, such as in cluster analysis. This process is known as factor scoring and can be specified as:

$$F_j = \gamma_1 X_1 + \gamma_2 X_2 + \ldots + \gamma_n X_n \qquad [5.2]$$

in specific,

$$F1 = \gamma_{11} X_1 + \gamma_{12} X_2 + \ldots + \gamma_{1n} X_n$$
$$\ldots$$
$$\ldots$$
$$Fk = \gamma_{k1} X_1 + \gamma_{k2} X_2 + \ldots + \gamma_{kn} X_n$$

where γ_i are factor score coefficients. Generally not all γ_i are significantly different from zero, as only a set of X_i may characterize one factor F_j and another set of X_i may characterize another factor F_k.

The software SPSS 15.0 is used for conducting the factor analysis. The principal axis analysis method is used as the extraction method to identify the initial estimated factors. The principal axis analysis method (also known as principle factor analysis or common factor analysis) is preferred for purposes of identifying causal relationships between variables and factors (Garson). The other type of common used extraction method is principal component analysis, however, principal component analysis is more of a common practice for reducing the number of variables, and is less appropriate to observe latent constructs or factors (Widaman 1993).

However, it should be noted that the percentage of total variance explained by the identified factors using principal axis analysis would be lower than if the principal component analysis method was used. The principal axis analysis accounts for the common variance (correlation) of variables, whereas the principal components analysis accounts for all the common and unique (specific plus error) variance. Nevertheless, Wilkinson et al. (1996) concluded that for most datasets, the two approaches will lead to similar substantive conclusions.

The varimax rotation procedure is used to produce the rotated factor loading matrix. The varimax method is an orthogonal rotation method that minimizes the number

of variables that have high loadings on each factor. The rotation procedure simplifies the interpolation of the factors. The regression method is then used for computing factor scores.

Cluster Analysis Methodology

Cluster analysis is aimed at identifying subgroups of individuals in a population with homogenous characteristics within each subgroup, while between subgroups, variations of the characteristics are maximized (Garson). Each subgroup is called a cluster. For example, among internet users, there may be individuals seeking information such as scholars, buyers and sellers, and news readers. They may be found to be related through cluster analysis, and referred to as a subgroup called "information seekers." Online gamers, online gamblers, and online music users could be considered to be another subgroup called "entertainment seekers."

In this study, identified clusters of Chinese investors may represent different market segments of individual Chinese investors, in the Chinese stock market. Also, preferences on the use of information sources by each potential cluster will be examined. When markets are segmented into subgroups through cluster analysis, this allows for more efficient use of resources by marketers and provides guidelines of how to best identify and target investors of specific market segments and needs (Johnson 1998).

There are a number of statistical methods and models for cluster analysis. For this study, the software SPSS 15.0 is used to perform the cluster analysis, and the TwoStep cluster procedure is used. The TwoStep cluster method has two steps 1) pre-cluster the observations into many small sub-clusters, 2) cluster the sub-clusters resulting from pre-cluster step into the desired number of clusters. It can handle both continuous and

categorical variables. It can also determine the number of clusters by AIC (Akaike Information Criterion) or BIC (Schwarz Bayesian Criterion).

Factor scores from the factor analysis are used in the cluster analysis to determine the number of clusters and assigned cluster membership to each case. Aaker et al. (2001) discusses the use of factor scores to conduct cluster analysis, and identifying and profiling each cluster by looking back at the contribution of individual variables to the factor scores.

Factor Analysis Results

Table 5.1 summarizes the factor analysis results. The factor loadings measure the correlations between factors and standardized variables when the estimated factors are orthogonal (uncorrelated). The bottom of Table 5.1 shows summary statistics of the factor analysis. Bartlett's test of sphericity rejects the hypothesis that the correlation matrix is an identity matrix, indicating that correlations between observed variables exist. Therefore, they may share commonality and characteristics of the latent variables. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.688. Both measures indicate that the data are appropriate for conducting factor analysis (Norusis 1994, 2005).

The principal axis analysis method was used to identify the three factors. The criteria used for determining the number of factors include Kaiser's eigenvalue criterion, scree plot, and comprehensibility. Eigenvalues are total variance explained by each factor. Kaiser's eigenvalue rule suggests that factors with eigenvalues greater than one should be considered. Varimax rotation was used to generate the rotated factor matrix. Factor loadings greater than 0.4 are reported, which is often a level at which factor loadings are

reported (Garson). Overall, the three estimated factors explained 32.8% of the total variance of the 23 variables used to measure Chinese investors' stock ownership.

Investment benefits/objectives (factor 1) includes variables related to importance of capital gain/growth, importance of dividends/ income, and importance of safety. This factor was found to be the most important facto, as it explains 12.4% of the total variance of the 23 variables. Knowledge and behavior (factor 2) is made up of the individual variables of knowledge of stocks, percentage invested in risky assets, risk tolerance, and trust of securities firms and industry. This factor explains 11.6% of the total variance of the 23 variables. The socio-demographics (factor 3) consists of variables such as own housing, income, family size, have dependent children, and age. This factor accounts for 8.8% of the total variance of the 23 variables, so was the least important of the three factors in explaining total variance. The factor analysis reduced the number of variables related to Chinese investors' stock ownership from 23 observed variables to the above three latent factors. The factor scores computed from the factor axis analysis model were used as inputs for the cluster analysis in the next step.

Cluster Analysis Results

With factor scores from factor analysis, followed the AIC (Akaike Information Criterion), the SPSS 15.0 TwoStep cluster procedure classified the 258 respondents into four clusters.

Summary of the Four Clusters of Investors

Table 5.2 shows the profile of the four clusters of individual investors in China. Cluster 1 is the older wealthy investors (WO), making up 78 of the 258 survey respondents. The WO are the group that most likely to own stocks. The WO are generally

older, and with high wealth. Cluster 2 is the autonomous young and mid-aged wealthy investors (WYM), making up 51% of the 258 sample respondents. The WYM are the group that most likely to own real estate. And the WYM are relatively young, and have the most wealth. Cluster 3 is the family value constrained older investors (CO), and they are the group that most likely to own life insurance, and they make up 46 of the sample respondents. The CO are of oldest age, and have largest family size. Cluster 4 is the financially constrained young investors (CY), and they account for 83 of the respondents. The CY mostly are not likely to own stocks. They are also the youngest, and have the least wealth. Additional details of each of the four clusters are shown below.

Older Wealthy Investors (WO) N=78

Table 5.3 shows the four clusters of investors, based on different types of investments they own. The older wealthy investors (WO) have highest percentage of investors owning stocks and investment funds. Over 83% of the WO indicated having stocks, and 30% owning investment funds. Table 5.4 shows the four clusters of investors, based on their demographic characteristics. The main aspects that distinguish the WO from the other three clusters may be related to the following in terms of demographics. About 15% of the WO are over 45 years old. More than 80% of them own houses/apartments, and 27% of them possess more than one property. Around 46% of them have cars. About 90% of the WO have at least 2 years college education, and 13% of them have education higher than 4 years university.

Table 5.5 shows the four clusters of investors, based on the three stock ownership factors. Among the four clusters, on average WO have slightly lower investment benefits/objectives. WO generally indicated having a good understanding of stocks and

can take moderate risk. The have the highest trust of the security firms and the security industry among the four clusters. Financially, they have above average income level, and ownership of housing. This is consistent with the summaries of the 2001 Shanghai Stock Exchange survey results in Green (2003). They also indicated holding highest trust and most positive attitudes towards security firms and security industry in China.

Autonomous Young and Mid-aged Wealthy Investors (WYM): N=51

Table 5.3 shows that ownership of stocks in the autonomous young and mid-aged wealthy investors (WYM) is found to be around 50%, and about 77% of the WYM own real estate, which is the highest among the four groups. Table 5.4 shows that the WYM have the highest wealth and education level. All of them are under 45, 57% of them are between 25 to 34, and 30% of them are between 35 to 44. Table 5.5 shows that in general, the WYM have higher investment benefits/objectives, also they have considerable knowledge of stocks, and they can take on considerable risk. Most of them also indicated distrusting security firms and the security industry in China. In sum, the WYM have highest autonomy when making investing decisions.

Family Value Constrained Older Investors (CO): N=46

Table 5.3 shows that about 54% of the family value constrained older investors (CO) indicated owning stocks, and 43% of them owning life insurance, which is the highest among the four groups. Table 5.4 shows that the CO have highest percentage of higher aged people among all four clusters, while over 21% of the CO are over 45 years old. Most of them have one house/apartment but most have no cars. They generally have a large family size, and various income levels. Table 5.5 shows that the CO indicated low investment benefits/objectives. They do not have very strong desire or particular

preference on capital gains/growth, dividends/income, or safety. On average, they have some knowledge of stocks, medium risk tolerance, and they trust security firms and security industry. The CO might also choose to own stocks if they feel that the market condition is favorable.

Financially Constrained Young Investors (CY): N=83

Table 5.3 shows that about 99% of the financially constrained young investors (CY) indicated not owning stocks. Some of them modestly invest in life insurance and investment funds. Table 5.4 shows that 86% of the CY are found being under 35 years old, and 90% of them without children. While 57% of them indicated having family size of three, and 47% having a house/apartment, it may be inferred that the some of the CY are newly graduated, mostly single, and some live with their parents. Constrained financially, around half of the CY do not have extra savings for buying a house/apartment or contributing to investments, with most of their income being spent, while the other half may be burdened with a mortgage payment, especially given the soaring housing prices in China during past few years. For example, average housing price in Shenzhen increased more than 42% for the first half of year 2007, compared to 19% over the same period during 2006 (Guangdong Province Bureau of Statistics).

Table 5.5 shows that on average, the CY have low knowledge of stocks, and lowest risk tolerance. Also, they indicated that safety is a very important investment benefits/objective, but on the other hand, they are eager for capital gain. Therefore, to attract the CY to invest in stocks, expected return would likely have to be relatively high.

Summary

Factor analysis indicated that in order of importance from variance explained, investment benefits/objectives, knowledge and behavior, and socio-demographics were the most important factors among Chinese investors. Using the factor scores obtained from the factor analysis, cluster analysis was used to classify Chinese individual investors into four subgroups. Among the four clusters, the older wealthy investors (WO) appeared to be most likely to own stocks, and they prefer investing for less than a two year investment time horizon. The autonomous young and mid-aged wealthy investors (WYM) appeared to be most likely to own real estate. The family value constrained older investors (CO) were found to be most likely to own life insurance, and the financially constrained young investors (CY) seemed to be least likely to own stocks.

Results from this study may help firms in defining their markets, in terms of selecting consumer segments, in order to better target their customers. Results could also help firms to have more cost efficient marketing, and have better targeting to the needs of individual segments of investors, and higher customer satisfaction.

Table 5.1 Factor Analysis Results: Chinese Investors' Investment Product Survey (N=258)

Observed Variables	Factor 1	Factor 2	Factor 3
Factor 1: Investment Benefits/Objectives			
Capital Gains or Growth	0.789		
Dividends or Income	0.750		
Safety	0.462		
Factor 2: Knowledge and Behavior			
Knowledge of Stocks		0.616	
Percentage Invested in Risky Asset		0.585	
Risk Tolerance		0.587	
Trust on Securities Firms/Industry		0.496	
Factor 3: Socio-demographics			
Own House/Apartment			0.715
Income			0.451
Family Size			0.447
Have Dependent Children			0.436
Age			0.415

Summary Statistics	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO MSA)	0.651
Bartlett's Test of Sphericity: Approx. Chi-Square	653.4***
Total Variance Explained by the Three Factors	32.8%
Total Variance Explained by Factor 1	12.4%
Total Variance Explained by Factor 2	11.6%
Total Variance Explained by Factor 3	8.8%

Notes:

1) Extraction method is principal axis analysis, Rotation procedure is varimax with Kaiser normalization in SPSS 15.0.

2) Factor loadings measure correlation between factors and individual variables if factors are orthogonal (uncorrelated), e.g. factor loading of the variable capital gain/growth is 0.787, which show relatively high correlation between the variable and the factor1. Here only factor loadings > 0.4 are reported, which include 12 of the 23 observable variables.

3) KMO MSA and Bartlett's Test of Sphericity are measures of sample adequacy for conducting factor analysis, both measures here indicated that the data are appropriate for conducting factor analysis.

4) The percentage of total variance explained by the five factors using principal axis analysis would be lower than if the principal component analysis method was used. The principal axis analysis account for the common variance (correlation) of variables, whereas the principal components analysis account for all the common and unique (specific plus error) variance.

Table 5.2 Characteristics of the Four Clusters of Individual Chinese Stock Investors (N=258)

	Cluster 1 (WO)	Cluster 2 (WYM)	Cluster 3 (CO)	Cluster 4 (CY)
Owning Investments	• Highest % respondents own stocks	• Half of respondents own stocks	• Half of respondents own stocks	• Most of respondents do not own stocks
		• Highest % own real estate	• Highest % own life insurance	• Few of respondents own other investments
Demographics	• Higher % of mid and old aged	• Relatively young	• Highest % of older aged	• Youngest
	• High wealth	• Most wealth	• Average wealth	• Least wealth
			• Largest family	
			• High % have dependent children	
Compare By Three Factors	• Lowest investment benefits/objectives	• Very demanding for capital gains	• Low investment benefits/objectives	• Very demanding for safety
	• Highest trust of security firms and industry	• Lowest trust of security firms and industry	• Average trust of security firms and industry	• Average trust of security firms and industry
	• Most knowledge of stocks			• Low risk tolerance

Notes:
1) WO=Older Wealthy Investors, WYM=Autonomous Young and Mid-aged Wealthy Investors, CO=Family Value Constrained Older Investors, CY= Financially Constrained Young Investors.
2) Cluster Analysis is conducted in SPSS 15.0 under TwoStep Cluster procedure.
3) Details of characteristics of the four clusters are shown in Table 5.3, 5.4, and 5.5, respectively.

Table 5.3 Cluster for Owning Different Types of Investment: Percentage of Sample Respondents of Chinese Investors' Investment Product Survey (N=258)

		Cluster 1 (WO)	Cluster 2 (WYM)	Cluster 3 (CO)	Cluster 4 (CY)	Total
Own Stocks	No	16.7	51.0	45.7	98.8	55.0%
	Yes	83.3	49.0	54.3	1.2	45.0%
Own Investment Funds	No	70.5	78.4	71.7	78.3	74.8%
	Yes	29.5	21.6	28.3	21.7	25.2%
Own Real Estate	No	78.2	23.5	84.8	94.0	73.6%
	Yes	21.8	76.5	15.2	6.0	26.4%
Own Bonds	No	84.6	92.2	87.0	94.0	89.5%
	Yes	15.4	7.8	13.0	6.0	10.5%
Own Life Insurance	No	71.8	56.9	56.5	68.7	65.1%
	Yes	28.2	43.1	43.5	31.3	34.9%
Total % of Sample		30.2	19.8	17.8	32.2	100%
Number of Respondents		78	51	46	83	258

Notes:
1) WO=Older Wealthy Investors, WYM=Autonomous Young and Mid-aged Wealthy Investors, CO=Family Value Constrained Older Investors, CY= Financially Constrained Young Investors.

2) Cluster Analysis is conducted in SPSS 15.0 under TwoStep Cluster procedure.

3) For example, 16.7% of WO (13 out of 78) do not own stocks, and 55% of total sample (142 out of 258) do not own stocks, 51% of WYM (26 out of 51) do not own stocks, 45.7% of CO (21 out of 46) do not own stocks, 98.8% of CY (82 out of 83) indicated do not own stocks.

Table 5.4 Cluster for Socio-demographics: Percentage of Sample Respondents of Chinese Investors' Investment Product Survey (N=258)

		Cluster 1 (WO)	Cluster 2 (WYM)	Cluster 3 (CO)	Cluster 4 (CY)	Total
Own House	No	11.5	5.9	21.7	26.5	17.1
	Plan to Buy One	7.7	3.9	8.7	21.7	11.6
	Have One	53.8	41.2	56.5	47.0	49.6
	Have Two	21.8	35.3	4.3	3.6	15.5
	Have More than Two	5.1	13.7	8.7	1.2	6.2
Own Car	No	41.0	21.6	63.0	60.2	47.3
	Plan to Buy One	12.8	15.7	13.0	19.3	15.5
	Have One	41.0	49.0	21.7	20.5	32.6
	Have Two	3.8	11.8			3.5
	Have More than Two	1.3	2.0	2.2		1.2
Age	<25	10.3	13.7	4.3	50.6	22.9
	25-34	38.5	56.9	39.1	36.1	41.5
	35-44	35.9	29.4	34.8	13.3	27.1
	45-54	10.3		15.2		5.8
	>55	5.1		6.5		2.7
Family Size	1 person	9.0	17.6	2.2	16.9	12.0
	2 people	17.9	15.7	6.5	14.5	14.3
	3 to 4 people	61.5	56.9	65.2	56.6	59.7
	5 to 6 people	7.7	9.8	23.9	10.8	12.0
	more than 7 people	3.8		2.2	1.2	1.9
Mthly Income (CNY)	<1,600	11.5	2.0	23.9	10.8	11.6
	1,600-3,999	15.4	17.6	26.1	37.3	24.8
	4,000-6,499	24.4	19.6	26.1	26.5	24.4
	6,500-8,999	21.8	15.7	15.2	13.3	16.7
	>9,000	26.9	45.1	8.7	12.0	22.5
Education	≤ Technical School	2.6		10.9	8.4	5.4
	High School	7.7	3.9	19.6	15.7	11.6
	2-3 years College	41.0	25.5	34.8	28.9	32.9
	University	35.9	58.8	34.8	44.6	43.0
	≥ 4 years University	12.8	11.8		2.4	7.0
Total		30.2	19.8	17.8	32.2	100%
Number of Observation		78	51	46	83	258

Notes:
1) WO=Older Wealthy Investors, WYM=Autonomous Young and Mid-aged Wealthy Investors, CO=Family Value Constrained Older Investors, CY= Financially Constrained Young Investors.
2) Cluster Analysis is conducted in SPSS 15.0 under TwoStep Cluster procedure.

Table 5.5 Comparison of Four Market Segments Regarding Three Stock Ownership Factors: Sample Respondents of Chinese Investors' Investment Product Survey (N=258)

	Cluster 1 (WO)	Cluster 2 (WYM)	Cluster 3 (CO)	Cluster 4 (CY)	Total
Factor 1: Investment Benefits/Objectives					
Capital Gains/Growth	4.128	4.490	3.978	4.301	4.229
Dividends/Income	3.795	4.353	3.696	4.169	4.008
Safety	4.218	4.667	4.543	4.614	4.492
Factor 2: Knowledge and Behavior					
Knowledge of Stocks	3.423	2.608	2.674	2.265	2.756
Percentage Invested in Risky Assets	2.628	2.412	2.891	1.747	2.349
Risk Tolerance	2.513	2.608	2.413	2.265	2.434
Trusts on Security Firms/Industry	3.295	2.098	2.783	2.771	2.798
Factor 3: Socio-demographics					
Own House/Apartment	3.013	3.471	2.696	2.313	2.822
Monthly Family Income	3.372	3.843	2.587	2.783	3.136
Family Size	2.795	2.588	3.174	2.651	2.775
Have Dependent Children	0.423	0.392	0.609	0.108	0.349
Age	2.615	2.157	2.804	1.627	2.240
Number of Observation	78	51	46	83	258

Notes: 1) WO=Older Wealthy Investors, WYM=Autonomous Young and Mid-aged Wealthy Investors, CO=Family Value Constrained Older Investors, CY= Financially Constrained Young Investors.
2) Cluster Analysis is conducted in SPSS 15.0 under TwoStep Cluster procedure.
*3) Variables with * are binary and other variables are on 1-5 Likert scale.*

CHAPTER 6

SUMMARY

China's financial markets and consumer income has been growing quickly over the past ten years at around 10 percent. China entering the WTO in 2001 has also allowed more foreign securities firms and foreign investment funds to enter the Chinese financial markets. The objective of this study was to identify the factors related to Chinese individual stock ownership decisions, as well to identify the market segments and consumer profiles. This study covered 258 consumers in seven major cities in China. Ordered probit model analysis, structural equation modeling, factor analysis, and cluster analysis were used to analyze the data.

The probit model results showed that individual investors were more likely to own stocks if they had more knowledge, higher risk tolerance, higher percentage of assets invested in risky assets, and a higher trust of security firms. Results also showed that investors favored capital gains/growth over dividends and income, and over safety. In terms of demographics, investors were more likely to own stocks if they were older, had larger family size, more dependent children, higher income, and education beyond high school.

The structural equation modeling results indicated that three latent factors may affect stock ownership decisions in China. These included knowledge and behavior, investment benefits/objectives, and socio-demographics. The knowledge and behavior factor was found to be statically significant and have a primary influence on Chinese individual stock ownership. The socio-demographics factor also showed a statistic significant relationship with stock ownership.

Factor analysis indicated that in order of importance, investment benefits/objectives, knowledge and behavior, and socio-demographics were important factors among Chinese investors. Using the factor scores obtained from the factor analysis, cluster analysis was used to classify Chinese individual investors into four subgroups. Among the four clusters, the older wealthy investors (WO) appeared to be most likely to own stocks, and they prefer investing for less than a two year investment time horizon. The autonomous young and mid-aged wealthy investors (WYM) appeared to be most likely to own real estate. The family value constrained older investors (CO) were found to be most likely to own life insurance, and the financially constrained young investors (CY) seemed to be least likely to own stocks.

The factor analysis and cluster analysis results of this study may provide implications that help investment firms and policy makers to better understand the factors influencing stock ownership in China, and classifications of the market segments. This information may be useful for investment firms for planning, investment product design, and developing marketing strategies, in terms of market segmentation.

The study indicated that Chinese individual stock owners tend to hold stocks for a relatively short period of time rather than long-term investing. Results also found that Chinese stock investors tend to focus on capital gains, rather than dividends/income. This could be partially because capital gains in China are tax free, based on the Chinese Tax Act (2006). It is possible that Chinese investors desire for short-term investing and capital gains could be associated with some market instability or less stable long-term returns. Some of the information from this study may be of interest to policy makers for investment policy and regulation of Chinese capital markets.

REFERENCES

Aaker, D. A., V. Kumar, and G. S. Day, 2001, *Marketing Research.* 7th Edition, NJ: John Wiley and Sons, New York.

Arrondel, L., and B. Lefebvre, 2001, Behavior of Household Portfolios in France: The Role of Housing, *Review of Income and Wealth* 47, (4): 489-514.

Barber, B.M. and T. Odean, 2000, Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors, *Journal of Finance* 55, 773-806.

Bris, A., W.N. Goetzmann, and N. Zhu, 2003, Efficiency and the Bear: Short Sales and Markets Around the World, *Journal of Finance* 62, (3): 1029-1079.

Friedman, M., and L.J. Savage, 1948, The Utility Analysis of Choices Involving Risk, *Journal of Political Economy* 56, (4): 279-304.

Garson, G. David. Factor Analysis. *Statnotes: Topics in Multivariate Analysis.* Retrieved 07/09/2007 from http://www2.chass.ncsu.edu/garson/pa765/statnote.htm.

Green, S., 2003, *China's Stockmarket: A guide to Its Progress, Firms and Prospects*, Profile Books Ltd, London.

Greene, W.H., 1997, *Econometric Analysis*, Upper Saddle River, NJ: Prentice Hall Inc.

Haliassos, M., and C.C. Bertaut, 1995, Why Do so Few Hold Stocks?, *The Economic Journal* 105, (432): 1110-1129.

He, X., and Y. Cao, 2007, Understanding High Saving Rate in China, *China and World Economy* 15, (1): 1-13.

Heaton, J., and D. Lucas, 2005, Market Frictions, Savings Behavior, and Portfolio Choice, *Macroeconomic Dynamics* 1, (1): 76-101.

Hochguertel S., R. Alessie, and A. van Soest, 1997, Saving Accounts versus Stocks and Bonds in Household Portfolio Allocation, *Scandinavian Journal of Economics* 99, (1): 81-97.

Hubbard, R.G., 1985, Personal Taxation, Pension Wealth, and Portfolio Composition, *The Review of Economics and Statistics* 67, (1): 53-60.

Jaccard, J. and C.K. Wan, 1996, *Lisrel Approaches to Interaction Effects in Multiple Regression*, Thousand Oaks, CA: Sage Publication.

Johnson, D.E., 1998, *Applied Multivariate Methods for Data Analysts*, Brooks & Cole Co. Duxbury Press.

Joreskog, K.G., 1970, A General Method for Estimating a Linear Structural Equation System, in Arthur S. Goldberger and Otis Dudley Duncan, eds., *Structural Equation Models in the Social Science*, New York: Seminar Press, 85-112.

King, M.A. and J.I. Leape, 1987, Asset Accumulation, Information, and the Life Cycle, NBER Working Paper 2392.

Kline, R.B., 1998, *Principles and Practice of Structural Equation Modeling*, NY: Guilford Press.

Kuijs, L., 2005, Investment and Saving in China, World Bank Policy Research Paper Series No. 3633.

Liao, T.F., 1994, *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models*, Thousand Oaks, CA: Sage.

Loayza, N., K. Schmidt-Hebbel, and L. Serven, 2003, Saving in Developing Countries: An Overview, *The World Bank Economic Review* 14, (3): 393-14.

McCaffrey D.P., and D.W. Hart, 1998, *Wall Street Polices Itself: How Securities Firms Manage the Legal Hazards of Competitive Pressures*, NY: Oxford University Press.

McKelvey, R.D., and W. Zavoina, 1975, A Statistical Model for the Analysis of Ordinal Level Dependent Variables, *Journal of Mathematical Sociology* 4: 103-20.

Maddala, G.S., 1986, *Limited-Dependent and Qualitative Variables in Econometrics*, Cambridge: Cambridge University Press.

Malhotra, N.K., 1984, The Use of Linear Logit Models in Marketing Research, *Journal of Marketing Research* 21, (1): 20-31.

Modigliani, F., and S.L. Cao, 2004, The Chinese Saving Puzzle and the Life-Cycle Hypothesis, *Journal of Economic Literature* 42, (1): 145 -70.

Norusis, M. J., 1994, *SPSS Professional Statistics 6.1*, Chicago: SPSS.

Norusis, M.J., 2005, *SPSS 14.0 Base User's Guide*, Upper Saddle River, NJ: Prentice Hall.

Paxson, C., 1990, Borrowing Constraints and Portfolio Choice, *The Quarterly Journal of Economics* 105, (2): 535-43.

Schumacker, R.E., and R.G. Lomax, 2004, *A Beginner's Guide to Structural Equation Modeling*, Second Edition, Mahwah, NJ: Erlbaum and Associates.

Stewart, D.W., 1981, The Application and Misapplication of Factor Analysis in Marketing Research, *Journal of Marketing Research* 18, (1): 51-62.

Widaman, K.F., 1993, Common Factor Analysis Versus Principal Components Analysis: Differential Bias in Representing Model Parameters?, *Multivariate Behavioral Research* 28: 263-311.

Wilkinson, L., G. Blank, and C. Gruber, 1996, *Desktop Data Analysis SYSTAT*, Upper Saddle River, NJ: Prentice-Hall.

Appendix A List of Qualified Foreign Institutional Investors (QFII) in China

Number	Name of QFII	Approval Date	Investment Quota (USD 100 million)
1	UBS AG	23-May-03	8
2	Nomura Securities Co., Ltd.	23-May-03	3.5
3	Morgan Stanley & Co. International Limited	5-Jun-03	4
4	Citigroup Global Markets Limited	5-Jun-03	5.5
5	Goldman, Sachs &Co.	4-Jul-03	3
6	Deutsche Bank Aktiengesellschaft	30-Jul-03	4
7	The Hong Kong and Shanghai Banking Corporation Limited	4-Aug-03	4
8	ING Bank N. V.	10-Sep-03	3.5
9	JPMORGAN CHASE BANK.	30-Sep-03	1.5
10	Credit Suisse (Hong Kong) Limited	24-Oct-03	5
11	Standard Chartered Bank(HongKong)Limited	11-Dec-03	0.75
12	Nikko Asset Management Co., Ltd.	11-Dec-03	4.5
13	Merrill Lynch International	30-Apr-04	3
14	Hang Seng Bank	10-May-04	1
15	Daiwa Securities SMBC Co. Ltd.	10-May-04	0.5
16	Lehman Brothers International(Europe)	6-Jul-04	2
17	Bill & Melinda Gates Foundation	19-Jul-04	1
18	INVESCO Asset Management Limited	4-Aug-04	2.5
19	ABN AMRO Bank N.V.	2-Sep-04	1.75
20	Société Générale	2-Sep-04	0.5
21	Templeton Asset Management Ltd.	14-Sep-04	N/A
22	Barclays bank PLC	15-Sep-04	0.75
23	Dresdner Bank Aktiengesellschaft	27-Sep-04	0.75
24	Fortis Bank SA/NV	29-Sep-04	5
25	BNP Paribas	29-Sep-04	2
26	Power Corporation of Canada	15-Oct-04	0.5
27	CALYONS.A.	15-Oct-04	0.75
28	Goldman Sachs Asset Management International	9-May-05	2
29	Martin Currie Investment Management Ltd.	25-Oct-05	1.2
30	Government of Singapore Investment Corporation Pte Ltd.	25-Oct-05	1
31	AIG Global Investment Corp	14-Nov-05	0.5
32	Temasek Fullerton Alpha Investments Pte Ltd	15-Nov-05	1
33	JF Asset Management Limited	28-Dec-05	1.5
34	The Dai-ichi Mutual Life Insurance Company	28-Dec-05	1

35	DBS Bank Ltd.	13-Feb-06	1
36	AMP Capital Consumers Limited	10-Apr-06	2
37	The Bank of Nova Scotia	10-Apr-06	1.5
38	KBC Financial Products UK Limited	10-Apr-06	1
39	La Compagnie Financierr Edmond de Rothschild Banque	10-Apr-06	1
40	Yale University	14-Apr-06	0.5
41	Morgan Stanley Investment Management Inc.	7-Jul-06	2
42	Prudential Asset Management(Hong Kong)Limited	7-Jul-06	2
43	Stanford University	5-Aug-06	0.5
44	GE Asset Management Incorporated	5-Aug-06	2
45	United Overseas Bank Limited	5-Aug-06	0.5
46	Schroder investment Management Limited	29-Aug-06	2
47	HSBC Investments (Hong Kong) Limited	5-Sep-06	2
48	Shinko Securities Co. Ltd	5-Sep-06	0.5
49	UBS Global Asset Management(Singapore) Ltd	25-Sep-06	2
50	Sumitomo Mitsui Asset Management Company, Limited	25-Sep-06	2
51	Norges Bank	24-Oct-06	N/A
52	Pictet Asset Management Limited	25-Oct-06	N/A

Data update: 2007-05-31

- Chinese Security Regulatory Committee (CSRC)
- http://www.chinawithqfii.com/

Notes:

QFII are Qualified Foreign Institutional Investors that must qualify:

1) Fund Management Companies: 5 years experience, assets under management > US$10bn;

2) Insurance and securities firms: 30 years experience, paid-in capital > US$1bn, Assets under management > US$10bn;

3) Commercial Banks: Rank top 100 in total asset value, Assets under Management > US$10bn to invest in China's Class-A Shares and other financial instruments as approved by Chinese Security Regulatory Committee (CSRC).

4) China Securities Regulatory Commission has approved the QFII qualification of 52 institutions with the foreign exchange quota of USD 9.995 billion. In 2006, 18 enterprises received the approval for QFII qualification and claimed the foreign exchange quota of USD 3.4 billion. In 2005, 7 enterprises received the approval for QFII qualification and claimed the foreign exchange quota of USD 2.22 billion.

Appendix B Marginal Probability Interpretation of Probit Model

Section A – Illustration of Constructing Marginal Probability of Owning Stocks

Variable Name	Base = Mean	Family Size (0.504)	Knowledge of Stocks (0.416)			
Change in Variable from Mean		1 to 0	3 to 1	3 to2	3 to 4	3 to 5
Predicted Z-score	0.5970	1.101	1.429	1.013	0.181	-0.235
Difference in Z	-	0.504	0.832	0.416	-0.416	-0.832
Probability (NOT Owning Stocks)	72.47%	86.45%	92.35%	84.44%	57.18%	40.72%
Probability (Owning Stocks)	27.53%	13.55%	7.65%	15.56%	42.82%	59.28%
Difference in Probability (Owing Stocks) from *Base Case*		-13.98%	-19.87%	-11.97%	15.29%	31.76%

Section B – Marginal Probability of Owning Stocks by Changing Variable Values from Sample Mean

Mean / Variables	β	X=0	X=1	X=2				X=3				X=4			
		0 to 1	1 to 0	2 to 1	2 to 3	2 to 4	2 to 5	3 to 1	3 to 2	3 to 4	3 to 5	4 to 1	4 to 2	4 to 3	4 to 5
Knowledge and Behavior															
Knowledge of Stocks	0.416***							-19.9	-12.0	15.3	31.8				
Risk Tolerance	0.233**							-9.3	-4.9	5.4	11.2				
% Invested in Risky Asset	0.312***			-9.4	11.3	23.6	35.8								
Trust Firms/Industry	0.217**							-12.4	-6.8	7.7	16.0				
Commission	-0.114							8.1	3.9	-3.7	-7.1				
Investment length	-0.304		10.9												
Investment Benefits															
Capital Gains or Growth	0.415**											-24.3	-19.9	-12.0	15.3
Dividends or Income	-0.156											17.5	11.3	5.5	-5.0
Safety	0.136											-11.8	-8.3	-4.4	4.7
Socio-demographic															
Age	0.220*			-6.5	7.3	15.3	23.5								
Own House/Apartment	0.243**							-11.7	-6.3	7.7	16.1				
Family Size (non Single)	0.504		-14.0												
Income (>1,600/month)	0.354*		-11.3												
Have Dependent Children	0.616***	23.2													
Education (>High School)	0.551*		-15.4												

Notes:

1. Section A shows two examples of step-by-step transformation of change in variable from mean to change in probability of willingness to hold or own stocks, for example, a non-single investor (0) has 13.98% more probability of holding or owning stocks than a single investor has. To show this, when family size changes from 1 to 0, predicted Z-score will increase by 0.504 (β family size = -0.504) to 1.101. The corresponding probability of which is the probability of not holding or owning stocks, then subtract the probability from 1 to get probability of holding or owning stocks 13.55%, which decreases by 13.98% from base case probability of 27.53%.

2. Marginal effect in probit models can be only discussed on a per case base, here base case is chosen as a hypothetical investor with all same characteristics as measured by sample mean,

3. Section B lists each explanatory variable's marginal effect on probability of the hypothetical investor's willingness to hold or own stocks.