



**STRUCTURED EQUITY PRODUCTS AND PORTFOLIO COMPOSITIONS  
OF FINANCIALLY ADVISED INVESTORS**

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## STRUCTURED EQUITY PRODUCTS AND PORTFOLIO COMPOSITIONS OF FINANCIALLY ADVISED INVESTORS

### PURPOSE OF THE STUDY

Purpose in this thesis is to study associations between portfolio compositions and characteristics of financially advised investors who have invested in structured capital guaranteed products. Especially, I try to find out how risk tolerance, awareness of different types of investment instruments, experience of investing, age, gender and value of the total portfolio are associated to proportion of portfolio invested in structured capital guaranteed products and in equity. In addition, I study how the use of multiple advisors from different types of financial institutions is associated to proportions invested in structured capital guaranteed products and in equity. I will also analyze are portfolio compositions of the sample investors dependent of the risk tolerance and associations of risk tolerance and total value of the portfolio to shares invested in other main assets.

### DATA

Data for my thesis is acquired from questionnaires made for clients who have invested in structured capital guaranteed products in the independent Finnish financial intermediary. Final sample is 146 portfolios and investors.

### RESULTS

I will show in this thesis that behavioural biases of the retail investors are associated to proportions of portfolio invested in structured capital guaranteed products and in equity. Especially, my study indicates that awareness of different investment instruments and higher value of the total portfolio have significant associations to lesser share invested in structured capital guaranteed products and larger share invested in equity. I will also illustrate that financially advised clients' portfolios are dependent of their risk tolerance and that the amount of advisors investor utilizes in his investment activity is associated to lower proportion invested in structured capital guaranteed products. As for proportion invested in equity, the association is rather low in multiple regression analysis with several explanatory variables indicating the importance of the awareness of stocks to direct participation to stock market.

### KEYWORDS

Investment behavior, Financial advisory, Portfolio composition, Structured product, Retail investor

## STRUKTUROIDUT SIOITUSTUOTTEET JA SIOITUSNEUVONTAA HYÖDYNTÄVIEN SIOITTAJIEN PORTFOLIOKOKOONPANO

### TUTKIMUKSEN TARKOITUS

Tutkimuksen tarkoituksena on analysoida assosiaatioita portfoliokokoonpanon ja sijoitusneuvontaa hyödyntävien sijoittajien välillä. Erityisesti, tavoitteena on tutkia kuinka riskinsietokyky, eri sijoitustuotteiden tuntemus, kokemus sijoittajana, ikä, sukupuoli tai koko portfolion arvo assosioidaan osuuksiin sijoitettuna pääomaturvatuissa strukturoiduissa tuotteissa ja osakkeissa. Tutkimus analysoi myös onko portfolion kokoonpano riippuvainen sijoittajan riskinsietokyvystä, ja kuinka riskinsietokyky ja portfolion koko arvo ovat assosioituneina muiden pääsijoituskohteiden kanssa.

### DATA

Data tutkimukseen on hankittu pääomaturvattuihin tuotteisiin sijoittaneille asiakkaille tehdyistä kyselyistä itsenäisessä sijoitustuotteita välittävässä yrityksessä, joka työllistää myös tutkijan. Lopullinen otoskoko on 146 portfoliota ja sijoittajaa.

### TULOKSET

Tutkimukseni osoittaa, että yksityissijoittajien käyttäytymishäiriöt assosioidaan osuuksiin sijoitettuna strukturoiduissa tuotteissa ja osakkeissa. Tulokseni indikoivat sijoitustuotteiden tuntemuksen ja suuremman koko portfolion arvon merkitystä assosiaatioissa alhaisempaan osuuteen sijoitettuna strukturoiduissa pääomaturvatuissa tuotteissa ja suurempaan osuuteen sijoitettuna osakkeissa. Osoitan tutkimuksessani myös, että sijoitusneuvontaa hyödyntävien sijoittajien portfoliot ovat riippuvaisia riskinsietokyvystä ja että mitä enemmän sijoittajalla on ulkopuolisia sijoitusasiantuntijoita apunaan sijoitustoiminnassaan, sitä pienempi osuus hänellä on sijoitettuna strukturoiduissa pääomaturvatuissa tuotteissa ja monella muuttujalla ajetun regression perusteella, assosiaatio suurempaan osakeosuuteen on suhteellisen pieni, mikä osaltaan korostaa osaketuntemuksen tärkeyttä osallistumiseen suoraan osakemarkkinoille.

### AVAINSANAT

Portfoliokokoonpano, Sijoittajakäyttäytyminen, Sijoitusneuvonta, Strukturoitu sijoitustuote, Yksityissijoittaja



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# 1 INTRODUCTION

## *1.1 Background and motivation*

STRUCTURED equity products (SEPs) became popular in the 1980s in the US and found their way to Europe in the mid 1990s during a period of low interest rates. Structured equity products are medium-term notes issued by financial institutions and have payments based on the prices of the common stock of another company, a basket of common stocks, a stock index, multiple stock indices, commodity indices or indices which follow some alternative investment strategies (for example 'carry-trade' or 'long-short'). As Baule et al. (2005) highlights, the private investors' benefit from these products is the payoff profile, which he is usually unable to construct by himself from the consisting elements or to buy for the offered price, because of market barriers or transaction costs exists.

Despite the large size and rapid growth of the market for structured products, surprisingly little empirical research has been undertaken. Many of the recent studies (see e.g. Wasserwallen and Schenk, 1996 or Wilkens et al., 2003) concentrates to prising of structured products. These studies suggest that structured products mark the price above their theoretical values and thus favour the issuing institution and the distributor of the products. For this reason, studies in this field suggest that investors' purchases might not be explained by rational behaviour of investors who are aware of the other investment opportunities available in the financial markets (see e.g. Henderson and Pearson, 2007). Especially risk aversion is argued to be important factor in explaining the success of index-linked products (see e.g. Wallmeir and Diethelm, 2008).

To continue from where many earlier studies of structured products conclude, I will shed some light to the suggestion that purchases of structured products might not be explained with rational behaviour of the investors. To best of my knowledge, there is no prior work that would have studied the use of structured products similarly as in my thesis. The unique dataset of my study offers also excellent opportunity to analyze other topical issue in the field of finance: associations between portfolio compositions and characteristics of financially advised investors.

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### ***1.2 Problem statement***

Purpose in this thesis is to study associations between portfolio compositions and characteristics of financially advised investors who have invested in structured capital guaranteed products. Especially, I try to find out how risk tolerance, awareness of different types of investment instruments, experience of investing, age, gender and value of the total portfolio are associated to proportion of portfolio invested in structured capital guaranteed products and in equity. In addition, I study how the use of multiple advisors from different types of financial institutions is associated to proportions invested in structured capital guaranteed products and in equity.

More specifically, I try to answer to following questions in this thesis:

1. Is higher risk tolerance of the investor associated to lower proportion of portfolio invested in structured capital guaranteed products and larger proportion of portfolio invested in equity?
2. Are older people and women associated to larger proportion of portfolio invested in structured capital guaranteed products and lesser proportion invested in equity?
3. Does more experienced investors use relatively less structured capital guaranteed products and relatively more equity in their portfolios?
4. Is investor who is more aware of different investment instruments, more associated to lesser proportion of portfolio invested in capital guaranteed products and larger proportion invested in equity?
5. If the investor uses multiple advisors in his investment activity, is he more associated to larger proportion of portfolio invested in equity and lesser proportion invested in structured capital guaranteed products?
6. Is higher value of the portfolio associated to larger proportion invested in equity and lesser proportion invested in structured capital guaranteed products?

In addition to main research questions mentioned above, I will also analyze how risk tolerance and total value of the portfolio are associated to other main assets in the portfolio and how the duration of the customership to independent financial advisor is associated to proportions invested in structured capital guaranteed products and in equity. I will also analyze are the portfolio compositions of the sample investors dependent of the risk tolerance.

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### ***1.3 Contribution and results***

I will show in this thesis that behavioural biases of the retail investors are associated to proportions of portfolio invested structured capital guaranteed products and in equity. Especially, my study indicates that awareness of different investment instruments and higher value of the total portfolio have significant associations to lesser share invested in structured capital guaranteed products and larger share invested in equity.

Even though my analyzes are partly more descriptive than empiric, I will illustrate that financially advised clients' portfolios are dependent of their risk tolerance and that the amount of advisors investor utilizes in his investment activity is associated to lower proportion invested in structured capital guaranteed products. As for proportion invested in equity, the association is rather low in multiple regression analysis with several explanatory variables indicating the importance of awareness to participating directly to stock market.

Scientifically, I promote the conjectures presented in the earlier studies of structured products that risk aversion explains some of the demand for structured products, and that awareness of other available instruments in the financial markets is associated to lower proportion of portfolio invested in structured products. In addition, studies of financially advised investors' portfolio compositions is rather new and topical subject in finance and the authors of these studies encourage to analyze this subject further with different perspectives (see e.g. Bluethgen et al., 2007) which I do in this thesis.

Practically, I provide worthwhile information about portfolio compositions and characteristics of financially advised investors that marketers and producers of structured financial products can capitalize.

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### *1.4 Limitations of the study*

Limitations of my thesis are mostly concentrated to nature of the data. Sample in my thesis is not representative of the entire population since the sample size is rather small (146 observations in the final sample), most of them male and concentrates only to investors who have invested in structured capital guaranteed products. In addition, sample customers are representing the case company and they are sample customers of advisors from that particular company. However, the sample and observations are unique and the data that I use is not available in any other database. Data is acquired of questionnaires made for clients in Finnish independent financial intermediary. Data is mostly estimates by the customers, most of the data is categorical and many of the estimates are subjective opinions, causing inaccuracies to the data. The questionnaire method is nonetheless effective method to answer questions related to household finance since many individuals have complicated finances and investment accounts in many financial institutions.

Causalities may also exist in the data. As the questionnaire is done in the meeting between advisor and client, current financial situation and portfolio of the client may lead the evaluation of the customer's risk tolerance even though it should be self-assessment of the customer. Moreover, if customer has invested in equity, he is aware of stocks with great likelihood for example. Because causalities might be common in my data, I use the term "association" rather than talking of effects when I analyze results. In addition, comparing results that I find with earlier works is challenging due to the lack of exactly same kind of studies.

In my sample, financial portfolios are a static situation from some point during the last year, which also increases inaccuracy of the data. More ideal data set would follow investors over time, and follow-up dates would be the same in each observation. In addition, the complexity of structured products is making hypotheses formation challenging; they are not fully risk-free investments, and they are typically utilizing derivatives in their structures. In addition, the way that advisors present the investment might have something to do how investor frames the investment to structured capital guaranteed products; does he do it because of safety or because of appealing investment strategy that the index in the product follows.

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### ***1.5 Structure of the study***

The organization of this paper is as follows. The section in question presents the background and motivations for the study, problem statement, main contributions and results and most important limitations of the study.

Section II provides theoretical framework and earlier works that are related to my thesis. Section begins describing basics of structured products, earlier studies' view of the fairness of structured products' pricing and explains why some of the demand for index-linked products might come from behavioural factors of the investors. 2<sup>nd</sup> part in section II concentrates to empiric works of individual investors' portfolio compositions and to how financial advisory is associated to portfolio structures. Section ends in the discussion of the advisory markets including some important implications of the MiFID and short description of the case company.

Section III presents hypotheses that I analyze. I present data and methodology in section IV. 4<sup>th</sup> section includes data mining process, descriptive statistics, and models that I performed in order to test the hypotheses.

Results are discussed and presented in the 5<sup>th</sup> section in the same order as models to test the hypotheses were introduced in the 4<sup>th</sup> section. Summary of the findings, including main descriptive associations and statistics is presented in the end of section V. Section VI concludes and presents ideas for future work. In section VI, I also provide few implications of my findings for marketers and producers of structured financial products.

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## 2 EARLIER WORKS AND THEORETICAL BACKGROUND

In this section, I describe the theoretical background and valid earlier works related to my thesis. First I describe the basics of structured equity products and examine the ‘fairness’ of SEPs’ pricing from previous studies. First part of this section ends to short description of how “cumulative prospect theory” of Tversky and Kahneman (1992), framing and loss aversion relates to index-linked products. Second part of this section concentrates to earlier works of individual investors’ portfolio compositions and to how financial advisory is associated to portfolio structures. Section ends in discussion of the advisory markets including some important implications of the MiFID and short description of the case company.

### *2.1 Structured equity products*

Structured equity derivatives (or products) play an important role in implementation of advanced investment strategies for private investors. Structured products allow access for smaller private investors to strategies that build on long and short transactions in the derivative as well as in the underlying market.

One important feature of structured equity products is that these products are liabilities of the issuing institution and not of the company, whose stock or stocks are the underlying asset. An immediate implication is that the designs of structured products are neither determined nor even influenced by the financing needs and capital structure policies of the company whose stock is the underlying asset (Henderson and Pearson, 2007). Rather, to dynamically hedge the resulting equity exposure, the issuer creates the structured product and then trades in the underlying stock or available derivatives.

The issuing financial institutions will avoid issuing structures that are extremely costly or difficult to hedge. Issuers try to create structured products with payoff profiles they think investors will find appealing, which Breuer and Perst (2007) call by term *behavioural financial engineering*. Therefore, the payoff patterns of the structured equity products contain information

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about the payoff profiles that investors demand. Good examples of behavioural financial engineering can be seen from recently issued structured products that more often utilize some market neutral strategy since the atmosphere at financial markets might be called at least “volatile” at the moment this paper is written.

Two types of payoff patterns can be identified in the structured products. As Burth et al. (2001) defines, products with concave payoff profile can be seen as a combination of a position in the underlying asset (typically a single stock) in combination with a short position on a call option in the same asset (qualitatively similar to the payoff of covered calls). Therefore, the investor buys the underlying asset ‘at a discount’ but at the same time gives up a substantial part of the upside potential.

The other payoff profile – which I examine in this paper – is convex. Typically, convex payoff profile products are so called *capital-protected notes*, *capital guaranteed products* or *index-linked notes*. Stoimenov and Wilkens (2005) define the structure of the *guaranteed product* as a product where the potential loss is limited by a fixed minimum repayment (guarantee). Such a strategy can be replicated through a riskless investment in a combination with one or more call options on a underlying asset (Burth, 2001). Because guaranteed amount will be paid to the investor at maturity of the investment, creating this profile requires the purchase of a risk-free bond with a face value equal to the guaranteed amount. Typically, index-linked products tend to have longer original times to maturity than the products based on individual common stock prices.

The idea of the structured products is that issuing institutions try to engineer payoff profiles available to investors that are difficult to create by investors themselves. Burth et al. (2001) name short selling restrictions, indivisibilities and transaction costs as factors that may keep especially smaller investors from creating structured products themselves. They suggest that, on the other hand, issuing institutions are able to benefit from substantial economies of scale in the process of creating these products and in the management of the positions.

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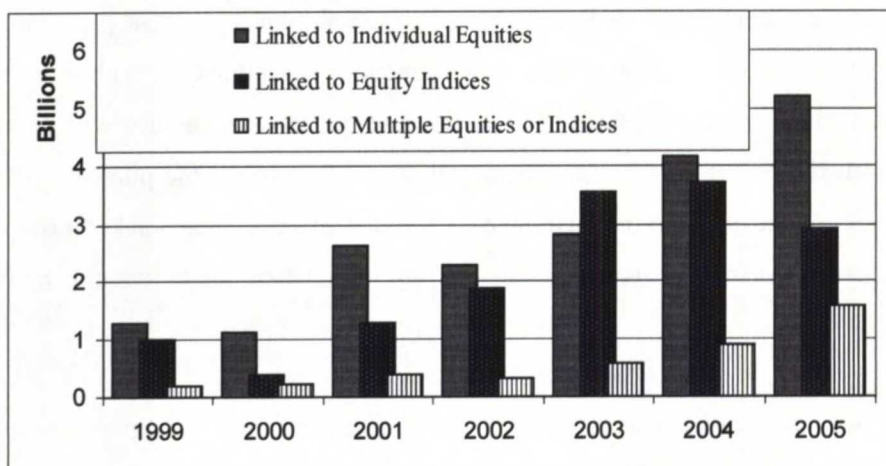
### 2.1.1 Structured equity products' market

As Pratt (1995) noted, financial institutions market structured equity products primarily to retail clients. In the US, since 1992, investors have purchased over \$50 billion of structured equity products from investment banks, suggesting that at least some retail investors include these products in their portfolios in significant quantities (Hendersson and Pearson, 2007). According to Private Banker International (2006), structured products are growing at rates of up to 30 percent annually around the world, and the total net worth of issues was \$295(E230) billion in 2005.

**Figure 1**

#### Number of issues and aggregate proceeds of U.S. structured equity products between 1999 and 2005

The sample consist of all U.S. publicly registered SEPs issued from 1999 through 2005 found in the SEC's EDGAR database for the investment banks identified as issuers of equity-linked notes. The statistics presented below group the SEP issues according to whether the reference asset is an individual common stock, a stock index, or multiple stocks or indexes. For each category, the table presents the total number of issues per year and the total proceeds, in U.S. dollars, paid by investors. Source: Henderson and Pearson, 2007.



Structured equity products evolved from related equity-linked instruments that were first issued in the 1980's. These predecessor instruments were typically issued by non-financial corporations to raise funds, and were underwritten by investment banks in the same way that corporate securities often are (Hendersson and Pearson, 2007.). First 'hot' issues were products linked to single equities or to some equity-index, in US mostly to S&P 500 –index. For example, in 1987, *Fortune* magazine chose MICDs (Market-Index Certificates of Deposits) in its list of "Products



of the year”, on the basis that their downside protection makes participation in the stock market attractive to a larger base of investors. In addition, an investor who already had stock holdings in direct form or through mutual fund or pension fund could use a MICD as put to hedge his direct position (Chen and Kensinger, 1990). Today, the variety of the structures and strategies these products are linked are enormous. Investor can participate in an issue where the return is based on a ‘long-short’ strategy on stocks around the entire world or on a daily followed ‘carry trade’ strategy for example.

Nowadays, there is usually a secondary market for structured products. The issuer usually acts as Over the Counter market maker for its products. However, structured products are not generally meant for active trading and the general presumption is that purchased structured products will not be sold during the investment horizon.

Even though investors are facing increasing supply of different structured products to use in their portfolios, there is a critic that because of large number of products, unclear terms and heterogeneous nomenclature, the market for structured products cannot be called transparent (see e.g. Stoimenov and Wilkens, 2005). One important and topical issue is the valuation and especially, what are the premiums charged by the issuing institutions.

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### 2.1.2 Are structured products 'fairly' priced?

Pricing of structured products is important to examine since it influences hypotheses studied in my thesis. Most empirical studies on structured financial products focus on European markets, and take the approach of comparing prices in the primary or secondary markets to theoretical fair values. The fair values of embedded options are typically estimated based on the implied volatilities of similar publicly traded options.

Generally, structured products seem to be unfairly priced according to earlier works (see table 1 below). Because of unfair pricing, researchers of SEP's pricing conclude that the demand for these products is due to behavioural biases of the investors (see e.g. Wallmeier and Diethelm, 2008).

**Table 1**

#### Average overpricing of the structured products – evidence from earlier studies

Table 1 summarizes findings from earlier studies of the pricing of structured products. Average overpricing is the premium charged by the issuing institution over the theoretical value. 'Unfair' is author's own estimate of the evidence presented in the original study, if the study didn't include any average premium in favour of the issuing institutions.

Study	Market	Average overpricing	Analyzed products
Baule et al. (2005)	Germany	0.66 - 2.25%	Discount certificates
Baubonis et al. (1993)	US	2.5 - 4%	Equity-linked certificates (issued by Citicorp)
Burth et al. (2001)	Switzerland	1.91%	Reverse convertibles and discount certificates
Chen and Kensinger (1990)	US	-0.76 - 6.24%	Market-Index certificates of deposit
Chen and Sears (1990)	US	'Unfair'	SPINs (issued by Salomon Brothers)
Henderson and Pearson (2007)	US	8 %	SPARQS
Hernandez et al. (2007)	International	5.40%	Barrier products
Grünbichler and Wohlwend (2005)	Switzerland	'Unfair'	Structured products (without capital guarantee)
Stoimenov and Wilkens (2005)	Germany	3.63%	Equity-linked structured products
Wallmeier and Diethelm (2008)	Switzerland	3.4 - 6%	Multi-Asset Barrier Reverse Convertibles
Wasserfallen and Schenk (1996)	Switzerland	1.91%	Capital guaranteed products
Wilkens et al. (2003)	Germany	3.04 - 4.20%	'classic' structured products

To summarize the evidence from earlier works, average estimates of the premium in favour of the issuing institution is in most of the studies from 2% to 6%. Some of the works have studied the price differences between products (see e.g. Grünbichler and Wohlwend, 2005 or Stoimenov and Wilkens, 2005). These studies suggest that products that are more complex are more overpriced which supports the conjecture of my thesis and of earlier studies that investors that

are more sophisticated might use relatively less structured capital guaranteed products in the portfolio.

### **2.1.3 Cumulative prospect theory, framing, loss aversion and structured products**

As the premiums charged by the issuing institutions seems to be unfair according to empirical research (see previous chapter), a different stream of literature is devoted to the question why and under what conditions financial innovations are successful. Many of the works tries to find answer to this question from the field of behavioural finance. As this question is rather wide, I will concentrate to analyze theoretical background especially related to index-linked products with convex payoff profile which are the products marketed by the sample investors of this thesis.

“Cumulative prospect theory” of Tversky and Kahneman (1992) provides one aspect to analyze demand for index-linked structured products. As the index-linked securities tend to display positive skewness (Hendersson and Pearson, 2007), investors’ demand for these securities might come from “cumulative prospect theory”. Theory incorporates with transformed probability weights. According to theory, transformed probabilities overweight the distribution’s tails, resulting in a preference for positively skewed securities.<sup>1</sup>

While the preceding theory might explain why some investors are demanding convex payoff profiles, it does not explain why investors chose products structured by financial institutions, and why they do not replicate the structure themselves. Perhaps because of market barriers or transaction costs exist some investors are unable to replicate payoffs of structured products (Baule et al., 2005). However, many investors have access to option markets and could create portfolios resembling the payoff profiles of structured products. However, this is not true if the investor lack of financial sophistication, which again supports the conjecture and hypothesis of my study that more sophisticated investors might use relatively less structured capital guaranteed products in their portfolios.

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<sup>1</sup> Underweighting of high probabilities contributes both to prevalence of risk aversion in choices between probable gains and sure things (Tversky and Kahneman (1992).).

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However, even though the investor's sophistication would be sufficient to replicate the structure of the product, he may still wish to purchase these products from bank for example due to framing and loss aversion. Shefrin and Statman (1993) advance ideas of framing and loss aversion in their work. When purchasing a structured product in the portfolio, an investor might view the return to that investment differently than if he held two assets that may be thought as two separate accounts. An investor might consider worse a loss in either of the separate accounts with gain of identical size in other account than the net change of zero due to the loss-aversion embedded in the value function.

## ***2.2 Financial advice and portfolio compositions***

Orthodox theory describes individuals' portfolio choices with maximizing subjective expected utility under lifetime budget constraints (Savage, 1954). Income is stochastic since endowments (labour income) and asset returns are stochastic. Therefore, in rational world, individuals would calculate optimal plans for consumption, including leisure time, and portfolio composition. Of course, in this kind of world, there would not be role or a model for financial advisory.

Nowadays anyway, many investors facing investment decisions rely on the recommendations of professional financial advisors. For example, a large survey among private investors in Germany in 2003 reveals that more than 80% of respondents consult a financial advisor in advance of investment decision (DABbank, 2004<sup>2</sup>). The same survey finds that more than two thirds of German investors obtain financial advice from their banks' customer representative while 20% rely on an independent financial advisor. ICI research<sup>3</sup> found similar results from the US markets where approximately 80% of mutual fund investors seek professional financial advice when buying mutual fund shares outside retirement plans at work in 2006.

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<sup>2</sup> Bluethgen et al. (2007) and Fischer et al. (2008) referred to this survey in their studies.

<sup>3</sup> Investment Company Institute, Factbook 2006, [www.icifactbook.org](http://www.icifactbook.org).

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Empiric research on the role of financial advisory is narrow. Nevertheless, because of public discussion of the conflicts of interests between advisor and customer and regulative requirements such as MiFID, the subject is studied more intensively nowadays (see e.g. Fischer et al., 2008; Krausz and Paroush, 2002; Ottaviani, 2000). As Fischer et al. (2008) conjectures in their paper, financial advisors could face a conflict of interest when influencing the asset allocation decision of their customers. They argue, that as investors rely on the recommendations of their advisors, their utility maximizing financial advisors might be incited to primarily recommend equity-related products since these products tend to have higher margins than fixed income or savings products. From an investor perspective, the investment recommendations of their advisors might lead to an increased portfolio risk that exceeds their individual risk preferences.

The conjecture from Fischer et al. (2008) might be true for advisors from financial institutions, which have direct stock trading as one of the services. The case however, is a bit different for independent financial intermediaries which do not have direct stock trading as one of the services available, as in the case company of this paper. Therefore, important clients of the intermediaries might suffer from the opposite effect. As the fees for advisors in the independent financial intermediaries are typically paid for sold not-directly-related-equity products (like capital protected notes), equity proportion of these clients' portfolios might decrease.

Krausz and Paroush (2002) develop a theoretical framework of financial advice in the presence of conflicts of interest and information asymmetries between well-informed financial advisors and less-informed investors. In their model advisors have discretionary control over the asset allocation of their clients. Therefore, they suggest that advisors could choose between a risky asset that generates commission income and a risk-less asset that does not, (I discuss the effect of financial advice on portfolio composition more in detail in chapter 2.2.2). Assuming that financial advisors try to maximize their own utility, Krausz and Paroush (2002) conclude that their investment decisions might not necessarily correspond with investors' needs. Ottaviani (2000) who formulated a similar model of financial advice further supports this conclusion. Findings from the study of large dataset from German retail bank by Bluethgen et al. (2007) are on the contrary in line with honest financial advice. They also find that advised clients are older, wealthier, more risk averse and more likely to be female.

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Bluethgen et al. (2007) believe that cognitive errors and costly information acquisition offer a reasonable basis for a theory of financial advice. The cognitive error explanation means that orthodox theory captures preferences over simple lotteries correctly, but individuals make mistakes in more complex situations (Kotlikoff et al., 2001). In these cases, Bluehtgen et al. (2007) believe that a financial advisor could provide valuable services by helping investors to avoid such mistakes.

With costly information explanation, is meant that people make seemingly suboptimal investment choices because they lack of better information. However, they are deciding optimally based on the information available to them. Available information, in turn, is the result of an optimal search process, given the costs of information acquisition. Hence, even though the better information would lead to better results, the costs of acquiring this information are perceived to be larger than the benefits (Bluethgen et al., 2007). In this situation, advisors' contribution is rather clear: gathering and disseminating information to many investors, thus exploiting economies of scale in information production. The time constraints of the customers are probably one of the most important reasons to use financial advice, which Fischer et al. (2008) support in their survey. They asked respondents why they use financial advice and the responses for the large sample indicate that time constraints is the most important reason since almost 84% of the advised customers fully or rather agree to the statement "Without my financial advisor I would have to invest much more time to become acquainted with certain financial issues."

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### **2.2.1 Recent studies find heterogeneity in investors' portfolio compositions**

In the classical framework of the mutual-fund separation theorem, risk preference determines the allocation to the risk-free asset and the market portfolio of risky assets (Tobin, 1958). According to theorem, more risk-averse investors should hold more in their portfolios in the riskless assets. The composition of the risky portfolio should be same for all investors. However, recent empirical evidence suggests that the portfolio structure of individual investors seems to be at odds with theories on portfolio selection and utility maximizing rational behaviour. More like, many recent studies find substantial heterogeneity in individual investors' portfolios.

When examining the question how households or individual investors have divided their portfolios between different asset classes, it is about positive household finance (see e.g. Campbell, 2006). While this is theoretically a straightforward question, the answering to this question is a bit more complicated. One reason is that individuals might be unwilling to reveal all about their financials. For example, a survey from Finnish market reveals that a bit less than 50% of the respondents feel embarrassed to some extent when talking about personal financials with financial advisor (Galkin, 2004). Secondly, many households have complicated finances, meaning that they might have accounts in many different financial institutions that have different tax status and include both mutual funds and individual stocks and bonds. Additionally, even the households that would be willing to provide the data might not know their accurate financial situation. However, the empiric research in this field is rich, and I will next present some of the earlier results.

In his paper, Campbell (2006) outlines the field of household finance. He argues that although many households find adequate solutions to complex investment problems, some households make serious investment mistakes. These mistakes can take variety of forms, out of which Campbell (2006) emphasizes nonparticipation in risky asset markets, underdiversification of risky portfolios and failure to exercise options to refinance mortgages.

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One common feature of the individual investor portfolios is that substantial part of the portfolios include zero amounts of stocks, which is known in finance field as *nonparticipation puzzle* (see e.g. Mankiw and Zeldes, 1991). According to empiric research, the lack of direct stock-market participation has important implications for individual welfare. Cocco et al. (2005) studied the effect of nonparticipation and find that welfare loss can be substantial: from 1.5% to 2% of the consumption in calibrated life-cycle models. Guiso and Jappelli (2005) examined what is the influence of awareness to stock-market participation and suggest that if all investors were aware of stocks (assuming no effects on return and how one should estimate transaction costs when not all investors are aware of stocks), stockownership could even double from its current level. They show that awareness is an important explanation to stockholdings, but they also find that many potential investors without stocks in the portfolio are aware and suggest that there are other impediments for participation in the stock market, for example, participation costs.

Other common investment anomaly of individual investors is that those who participate in the stock market have weakly diversified portfolios (see e.g. Blume and Friend., 1975). Goetzmann and Kumar (2001) studied historical performance of over 40 000 equity accounts during a six-year period (1991–1996) in the U.S. and found that vast majority of investors in their sample were under-diversified. They also found that investors seem to be aware of the benefit from diversification but they appear to adopt “naïve” diversification strategy where they form portfolios without considering properly the correlations among the stocks. Their results are consistent with Rode (2000), who emphasizes the importance of implementation, meaning that investors may realize the importance of diversification, but they may face difficulties in implementing a well-diversified portfolio.

Calvet et al. (2006) concentrate in their analysis to two main sources of inefficiency in the financial portfolio: underdiversification of risky assets and nonparticipation in risky asset markets. In their study, they analyze a unique dataset containing the disaggregated wealth and income of the entire population of Sweden. They find that while a few households are very poorly diversified, the cost of diversification mistakes is quite modest for most of the population. They also document that financially more sophisticated households tend to invest more efficiently and aggressively leading to greater inefficiency costs of portfolio for these households. One interesting finding in their study is that the nonparticipation cost is smaller by

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almost one-half when they take into account that those households not participating would be unlikely to participate efficiently.

Of course, investment behaviour and financial backgrounds (for example total wealth or borrowing constraints) between individuals are different and portfolio compositions change during the life cycle of investor. These are some of the factors that many authors test when they are trying to explain differences in portfolio compositions (see e.g. Guiso et al., 1996). I will next present some of the earlier findings that try to explain the heterogeneity in portfolio compositions.

Bertaut (1998) analyzes the stock market participation decisions of households and find that investors with lower risk aversion, higher wealth and higher education are more likely to invest in equities because their information costs are lower. This finding is in line with Campbell's (2006) conclusion that suggests that poorer and less educated households are more likely to make investment mistakes. Campbell suggests that these mistakes may result also from similar behaviour of same kind of households, meaning that nonparticipating households may be aware of their limited investment skills and the reaction to this is withdrawal from risky markets. The reason why nonparticipation puzzle is interestingly related to my thesis is particularly through risk aversion and investment experience (or awareness of stocks for example) of the sample investors. If more risk averse and inexperienced investors are participating less to stock markets, I try to find out are they associated to higher proportion of portfolio invested in capital guaranteed index loans – sold mainly by the case company – to indirectly and safely participate to financial markets.

Merton (1987) suggests that due to search and monitoring costs investors may hold only handful of stocks in their portfolios; investors may develop a false perception that they can manage their portfolios more efficiently because they don't have to follow too many different stocks, and it is enough to have a thorough understanding of small number of firms. Using a large survey data of large and experienced investors, DeBondt (1998) finds that such a belief is quite common. This kind of behaviour might be also seen in the diversification between different asset classes.

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Many of the earlier studies analyze the portfolio composition in the life cycle context (see e.g. Bertaut and Haliassos, 1997 or Gomes and Michaelides, 2005). These studies concentrate to changes in portfolio composition during the lifetime of the investors. One important factor affecting the portfolio structure is the flexibility in investors' labour decisions for example. In the framework by Bodie et al. (1992), the individual simultaneously determines optimal levels of current consumption, labour effort and leisure and an optimal portfolio composition at each point of time. They show that individual who has more flexibility in choosing how much or how long to work later in life will prefer investing substantially more in risky assets than a person with less flexibility. Thus, their framework explains why younger people may take greater investment risks and larger allocations to risky assets and why investor near retirement may prefer more conservative investment strategies. The underlying rationale is that the longer is the time investor can hold on to his investment, the greater share of the portfolio should be invested to equities. The best explanation to support this advice, according to Jagannathan and Kocherlakota (1996) is the fact that younger people have more years of wages ahead of them than older people.

Besides basic life cycle, investors might have other background factors (e.g. gender: see e.g. Barber and Odean, 2001; Dwyer et al., 2002; Maltby and Ruttenford, 2007) that affect significantly the risks they are willing to take with their financial portfolio. One common and understandable is the total wealth of the investor. For example, Cohn et al. (1975) showed that as wealth increases, a higher proportion of portfolio is invested to risky assets and investors exhibit decreasing relative risk aversion. In addition, the source of the wealth has gain attention in earlier studies as a factor affecting to portfolio composition. Using a variety of data sources, Heaton and Lucas (2000) argue that entrepreneurial risk has a significant influence on portfolio choice and asset prices. They show that even though entrepreneurs constitute a high fraction of the stockholding population, households with high and volatile proprietary income hold less wealth in stocks than other similarly wealthy households, perhaps due to higher background risk they face. Consistent with these results, Gentry and Hubbard (2000) find that portfolios of the entrepreneurial households are grossly underdiversified where more than 40% of their portfolios consist of active business assets.

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It is reasonable to assume that as investors learn and gain more experience, it has effects on financial portfolio composition. However, surprisingly little empiric work is done about how investors learn. Recent research suggests that more experienced investors use more sophisticated trading tactics and make fewer behavioural errors (see e.g. Dhar and Zhu, 2006). One of the most widely documented behavioural biases in the field of finance is the disposition effect (see e.g. Grinblatt and Keloharju, 2001; Kaustia, 2004; Odean, 1998), which refers to a tendency to sell previously purchased stocks that have appreciated in price (“winners”) and reluctance to sell those that are trading below their purchase prices (“losers”).

How my paper relates to the disposition effect? If disposition effect makes the investment experience of the stock market uncomfortable, these investors might be tempted to replace stocks in the portfolio with more passive investment instruments, like index-linked products. For example, Dhar and Zhu (2006) find that investors with more investment knowledge are 18%–50% less likely to exhibit disposition effect than investors with less investment knowledge. This might in turn be seen in the financial portfolios of the investors with less investment knowledge who might be tempted to use assets that are more “passive” in the portfolio than investors with more investment knowledge or experience due to uncomfortable experiences from direct stock market trading. Testing and showing this empirically is challenging, but if the results indicate that investors that are more inexperienced have greater proportion of portfolio invested in structured capital guaranteed products, this might be part of the reason for it. For example, an investor who actively trades stocks might switch to an index-linked note after learning that her stock picking skills do not offset the high transaction costs.

It is not surprising that age and experience correlates, and that age and learning processes operate jointly (see e.g. Schroeder and Salthouse, 2004). What is interesting is how these variables affect to investment behaviour. Research in learning suggests that with experience, older investors might accumulate greater investment knowledge and have greater awareness of the fundamentals of investing. Their accumulated knowledge might lead them to make better investment decisions. Thus, accumulated wisdom and experience of investing might lead older investors less prone to behavioural biases. For example, List (2003) find in his study that market experience plays an important role in eliminating an important market anomaly, endowment effect.

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Even though age and experience lead older investors less prone to behavioural biases, age has its cognitive effects that affect investment behaviour. Korniotis and Kumar (2006) examine whether older people make better investment choices as they gain more investment experience, or whether their investment skills decline with age due to adverse effects of cognitive aging. Their empiric results indicate that older and more experienced people hold less risky portfolios, trade less frequently, exhibit stronger preference for diversification and exhibit greater propensity for year-end tax-loss selling. They also find, consistent with psychological evidence, that older investors have worse stock selection ability and poor diversification skills. Their conclusion is that older people use more “rules of thumb” in their investments, but they are less skilful in successfully implementing these rules.

Perhaps some explanation to positive correlation between experience and sophisticated investment behaviour is that as Linnainmaa (2006) argues, investors with less skill learn to exit the stock market. If investors with less skill learn to exit the stock market, they might be tempted to make investments that are more “passive” instead. This conjecture leads to conclusion that less experienced investors or investors who do not have time to actively trade with stocks might be more important investor group in structured products.

As most of the recent research suggests, more experienced investors use more sophisticated investment tactics and make fewer behavioural errors (see e.g. Feng and Seasholes, 2005). It might lead the proportion invested in structured products to be lesser for more experienced investors, assuming that behavioural biases is one of the most powerful explanations to the demand for structures, as for example Henderson and Pearson (2007) argues. However, the interesting part of this conjecture is that as usually these more experienced investors are also the older ones, who according to empiric results, are also more prone for less risky financial portfolios, which in turn might increase the temptation to use capital guaranteed product in the portfolio. To make this conjecture and hypothesis modelling even more complex, the influence of financial advisory recommending the use of structures in the portfolio might have remarkable effect to how investor frames the investment: are those used to reduce the weight of equity proportion in the portfolio, or as to increase riskiness of the bond investments.

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### **2.2.2 Financial advice in determining the portfolio composition**

While there are number of studies on portfolio structures of individual investors (see previous chapter), the empirical research on the role of financial advice in determining the portfolio composition is very scarce. In their studies, analyzing comprehensive portfolio data on customers of a German retail bank, Bluethgen et al. (2007) and Fischer et al. (2008) study the influence of financial advice on the performance and composition of individual investor's portfolios.

Bluethgen et al. (2007) find that individuals who can be assumed to face higher costs of information acquisition and to be more susceptible to cognitive biases are more likely to rely on financial advice. For these investors, they find that financial advice enhances domestic and international portfolio diversification and adds discipline to the asset allocation decision by using model portfolios. Advice is not free and their empiric results suggest that the advice comes at a cost in the form of increased portfolio turnover accompanied by relatively higher transaction fees. However, they argue that it cannot be ruled out that financial advisory provides net benefits to investors and it clearly affects the trading behaviour and portfolio structures of individual investors and households.

Fischer et al. (2008) conclude in their paper that there might be a need for enhanced regulative investor protection. Suggestion leans on their evidence that financial advisors have an incentive to promote equity-concentrated asset allocations that are not commensurate with investors' risk preferences. More specifically, they find advisors lacking insight into clients' risk aversion, which hinders the unsuitability of the asset allocation, and majority of the investors do not even know that they carry an increased portfolio risk. Their regression analysis shows that primarily advisor incentives to sell high-margin products and a systematic underestimation of investor risk aversion determine the unsuitability of the asset allocation.

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While the study by Bluethgen et al. (2007) is in line with honest financial advisory, the study by Fischer et al. (2008) is suggesting that advisors might be more interested in short-term compensation leading to unsuitability of the clients' asset allocation and risk preferences. In addition, the study by Krausz and Paroush (2002) show that actions of utility maximizing advisors will not necessarily coincide with clients' objectives.

Couple of other studies have also referred to financial advisory and its influence on portfolio composition. Findings by Shapiro and Venetia (2001) indicate possible advantages in enlisting professional financial advice, but also describe some limitations of such advices. They found in their study that the disposition effect can be detected from both amateur and professional investors, but the effect is much weaker for professional investors. This result implies that advisors might indeed correct cognitive errors of individual investors. They also discovered that professionally managed investment accounts experienced more activity and better performance in the sample period than independently managed accounts. Professional accounts were also less correlated with the market and more diversified.

Canner et al. (1997) found in their study that popular financial advice on portfolio allocation is both systematic and more complex than indicated by textbook theory. They conclude that explaining popular financial advice is difficult using the model of rational investors. However, the loss from evident lack of optimization is not very great. Particularly, even though the popular advices are below the efficient frontier, the investors following these recommendations lose at most 22 basis points of return. When conjecturing the reasons why popular financial advice differs from the textbook theory, they give interesting viewpoint: "That the advice being offered does not match economic theory suggests that our understanding of investor objectives (as opposed to their ability to reach those objectives) is deficient." This point is highly relevant for the following reason: maybe investors' biases (like loss aversion), are true and treasured parts of their behaviour. So, when financial advisor is consulting her client, should she base her recommendations on Savage's rationality axioms, to some descriptive utility function or to some combination of these two?

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### **2.2.3 Life cycle theory, the design of financial products and the need for advice**

The design of financial products includes many considerations. The list includes mitigation of managerial entrenchment, catering to tax clienteles, and differences in preferences and endowments. Shefrin and Statman (1993) created a behavioural framework in their study that explains the popularity of some financial products and they provide some tools for the design and marketing of new financial products. Their paper describes roles of the four behavioural elements; prospect theory, hedonic framing and behavioural life cycle theory and cognitive errors in the design of some financial products.

The central hypothesis of the behavioural life cycle theory is that individual has different degrees of self-control difficulties associated with either myopia or weakness-of-will (Shefrin and Statman, 1993).). For example, a self-control difficulty may lead people to save less than necessary to finance their rationally determined need during the retirement. Usually, people are aware of self-control difficulties and can take steps to avoid them. Sometimes, financial advisor may need to be consulted to be able to understand rationally current situation that might explain at least some of the demand for financial advisory.

Other important part of the life cycle theory connects especially to the design of structured products. As Shefrin and Statman (1993) describe, individuals who wish to consume more can select stocks with higher dividends and individuals who wish to limit consumption can favour stocks with low dividends in their portfolios. Therefore, retirees, who have no regular labour income, are most likely to favour stocks with high dividends, which helps them consume from their wealth without overconsuming. Consequently, dividend yield in the portfolios of individuals can be expected to be higher in the late parts of the life cycle than in the early parts (Shefrin and Statman, 1984).

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Today, however, the large supply of different structured products adds dimensions to life cycle theory. For example, capital guaranteed products are probably framed as investments that at least maintain the nominal value of the investment (even though these products have the credit risk of the issuer). In addition, as stocks have the risk of price decline; even though stocks usually pay some dividend, older people might consider capital guaranteed products to their portfolios since at least the nominal value of the investment is framed to be at safe. However, these products do not usually pay any dividends and guaranteed value is whittled away by inflation, so the puzzle of the optimal composition of the portfolio is difficult. Is it more important for the investor that accumulated wealth invested is framed to be at safe or is it more important to have some dividend stream for consumption? Perhaps the answer is some combination of these two, added with some other financial instruments without forgetting individual's risk preferences and other factors affecting the financial welfare, taxes for example.

Thaler and Shefrin (1981, 1983) analyze the self-control difficulties related to life cycle theory of the individual investors extensively. Their papers give interesting insights for investments made in structured products and client's need for financial advisory. Thaler and Shefrin<sup>4</sup> assume that the planner has two kinds of self-control techniques that can be used to influence doer's actions. The first one is the exercise of "will", which means greater self-denial of the doer. This however, is assumed to entail some utility cost to the planner; otherwise, the exercise of will would not be problematic. In their model, the utility cost is for the planner who may wish to use the second technique, manipulation of the doer's opportunities. By imposing additional constraints upon doer's opportunities, the planner may limit the damage done when the individual is weak-willed (meaning the use of will power is too costly). In addition, the restriction of a doer's opportunities reduces the temptation, and thus the amount of self-denial to be exercised. Thus, as Thaler and Shefrin conclude, both of these features play an important role in the analysis of dividends.

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<sup>4</sup> For further details of the model, see papers from Thaler and Shefrin.

How can we consider this model in the design of structured products and in customer's need for financial advice? If the customer (the doer) is weak-willed, advisor (the planner) may impose additional constraints upon customer's opportunities. Related to this, I go through two examples:

1) The use of structured product in the portfolio. Consider that customer is considering new investment. He is thinking about direct investment to stock market or an investment to structured product with 3 years maturity. If this customer is weak-willed, investment directly to stock market may give too many opportunities to test will power of the customer: when should investment or part of it to be realized or when one particular stock should be traded for example. In this case for example (if the doer is weak-willed), the planner may impose additional constraints upon customer's opportunities by recommending some structured product to portfolio where the investment strategy is followed mechanically and the will-power of the customer is not "tested" so often.

2) Some techniques may be reinforced externally to secure that some investment strategy will be followed. One good example is pension plan where the payment is deducted automatically from the customer. Some of the customers may do it because of habit, but many would probably not pay sufficient amount of payments to ensure sufficient pension during the plan, if the choice to make the payment was in their own hands.

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### ***2.3 The market for financial advice***

The majority of financial advisers form their revenue on a commission basis, i.e., producers are paying a fee to advisers for distributing their products. Good indication of this can be found from US, where a mere 1 000 of 780 000 persons employed in the securities industry are members of NAPFA (National Association of Personal Financial Advisors) which admits only professionals working with a fee-only compensation<sup>5</sup>. As most of the professionals in the field of financial advisory are paid on a commission basis, these commissions can be interpreted as indirect willingness to pay for advisory services.

So usually, customers are paying indirectly to financial advisor for his service by buying financial products that carry commission charges. Customers might buy products only from sales personnel that offer good service including sound financial advice. However, as Bluethgen et al. (2007) pondered in their study: it remains to explain why most payment for advice is indirect by means of commission. They conjectured that the answer to this question might be the public goods nature of financial advice. They provide also an alternative, and perhaps more obvious interpretation of sales commissions, namely producers paying for distribution.

In general, a major function of sales personnel is to provide information to clients. Others include raising awareness, record keeping, haggling over price, after-sales service, etc. Topical question of the behaviour of the sales personnel is that do they reveal complete and truthful information and how customers can detect untruthful behaviour? Bluethgen et al. (2007) argue that sales personnel choose their revelation strategy depending on the customer's ability to detect untruthful behaviour, either instantaneously or through learning in the long-run.

Ellison (2006) offers in his study of industrial organizations some interesting models for environments in which customers are not fully rational and can be misguided by producers and marketers. The results of his study are connected to this paper, as the attributes and pricing of financial products – especially structured products – are often not transparent (see chapter 2.1.1 and 2.1.2 for further details). For example, by structuring financial engineer can generate a

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<sup>5</sup> Data from the Department of Labor ([www.dol.gov](http://www.dol.gov)) and [www.napfa.org/about/historyofNAPFA.asp](http://www.napfa.org/about/historyofNAPFA.asp).



complex payoff profile, which might be difficult for amateur investor fully comprehend, not to mention unbundling and pricing the product. Complex engineering may be interpreted as “obfuscating” or “shrouding” product characteristics. Hypothesis is supported by Gabaix and Laibson (2006), who argue that confusing financial products create a cross-subsidy from naïve to sophisticated households, and in which no market participant has an incentive to eliminate this cross-subsidy. Their model also shows that producers (and distributors of their products) can capture large fraction of the surplus if consumers are not fully rational. Moreover, perhaps more importantly, they show that imperfectly rational consumers are less likely to switch to a better off and those producer surpluses do not even vanish in highly competitive markets.

Evidence presented above may be easily connected to marketing and creating financial products. Many of the products are sold by financial advisors to nonprofessionals and high margins characterize most products (see e.g. chapter 2.1.2 of pricing of structured products). However, the trend is that legislation (e.g. MiFID), public discussion and demand for transparency of the financial products are decreasing margins paid by investors. For example, according to ICI research, US investors in stock funds, paid fees and expenses on average 2.32 percent of the fund’s assets in 1980, as the same figure in 2006 was 1.07 percent. Another indication of decreasing margins of the financial products can be found from same study by Investment Company Institute (ICI)<sup>6</sup>, which studied where the new cash was invested during 1997 – 2006 in US: results show that the vast majority of new cash flowing to stock funds went to those funds whose expense ratios were below the market-wide average. This might also be an indication of increased financial sophistication of households or increased competition in financial markets.

Perhaps the trend in decreasing margins especially in basic financial products, such as mutual funds, is driving financial institutions to engineer structured products that are more difficult for laymen investors to fully comprehend. In addition, as the distribution of these products can be delegated to financial advisors, the demand for these products might consist of naïve to sophisticated households and structured products might offer the new source for financial institutions to capture surplus from the financial markets.

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<sup>6</sup> Investment Company Institute, Factbook 2006, [www.icifactbook.org](http://www.icifactbook.org).

### **2.3.1 Role of independent financial intermediary, implications of MiFID and description of the case company**

Generally, the main role of independent financial intermediary is the distribution of producers' products, as in the case company Afondo Consulting Oy. In addition, the case company have elements of the financial planning process defined by Ward (2003):

- Establishing and defining the client-planner relationship
- Gathering client data, defining goals and concerns
- Evaluating client financial status, risk and profile
- Developing and presenting financial planning recommendations
- Encouraging client implementation of the selected recommendations
- Monitoring progress and updating the plan/revising strategy

The main difference between professional financial planner and financial product distributor is that main source of revenue for the professional financial planner is the planning fees from consumers, as for financial product distributor it is the commissions from product manufacturer (Ward, 2003). Professional financial planner might be also the distributor, so part of the revenue for these companies might also be in the form of commissions from the product manufacturer.

The business model, especially the way independent investment advisors (or independent financial advisors) form their earnings have gain critics during the last years (see e.g. Krausz and Paroush, 2002 or Fischer et al., 2008). The business model has its problems that might create conflicts between advisor and client. Problems are noticed internationally, and one indication of the increased attention towards investor protection is MiFID directive<sup>7</sup> that came in to force 1.11.2007. I will next discuss some of the most important implications it will have to the business environment of independent financial advisors in Finland, after which I present short description of the case company of this study. It is worth noticing that financial markets in

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<sup>7</sup> Information presented in this paper related to MiFID (Markets in Financial Instrument Directive) are from Financial Supervision (i.e., Finnish Financial Supervision Authority; [www.rahoitustarkastus.fi](http://www.rahoitustarkastus.fi)), Federation of Finnish Financial Services ([www.finanssialankeskusliitto.fi](http://www.finanssialankeskusliitto.fi)) and from the directive 2004/39/EC of the European Parliament and of the Council of April, 21<sup>st</sup> on markets in financial instruments.

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Finland are bank oriented, as for example in the US, nearly 60% of mutual fund sponsors are independent financial advisors (ICI Factbook, 2006).

Before 1.11.2007, general financial advisory and marketing of financial products were not activity under license from Financial Supervision. Today, such activity is under observation of Financial Supervision and the license is either approved or refused by Financial Supervision. The general idea behind the MiFID is that the regulation of producers of financial advisory was specified; procedural commitments were unified, general obligations were defined and multiplied and clients' rights and obligations were specified.

Before going into important implications of MiFID to business environment of independent financial advisors, short description of the case company in this paper is in order. Afondo Consulting<sup>8</sup> acts mainly as a distributor of financial products and specializes in consulting customers in saving and investing. Most important partners and whose products are represented by the company are UBS (Union Bank of Switzerland), Glitnir, Skandia and Carnegie. Revenue for the company is mainly from commissions paid by manufacturers of the sold products. Company has 13 offices in Finland and approximately 60 employees; most of the personnel (~80%) are at sales. Main financial items distributed are structured products (UBS), voluntary pension insurances (Skandia, Fennia), investment insurances (Skandia, Fennia) and financial management solutions (Glitnir, Carnegie). In addition, some funds are sold directly or indirectly inside the insurances. However, direct stock trading is not one of the services offered by the case company.

The turnover of the company has increased rapidly during the last years. Company has about 7 000 customers, out of which approximately 3500 are entrepreneurs. The amount of employees have increased in two years from 25 (3/2006) to 62 (3/2008).

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<sup>8</sup> Information presented of the case company in this thesis is based on the author's knowledge and access to database of the company. In addition, CEO and administrative manager of the company are questioned in the case for confirmations or for supplementary information.

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As for most of the independent financial advisors in Finland, MiFID has important effects on processes and administration of the case company also. Afondo started to prepare to MiFID already in end of year 2006. Main focuses were strengthening of administration and integration of processes. More specifically, company started to develop workings to match requirements on MiFID. For example, company acquired new *customer relationship management* (CRM) system and financial advisors were educated to gather important information (risk profile, current financial portfolio, experience of investing etc.) about clients with fact-finds in the beginning of 2007.

Gathering information about effective or prospective client is one essential part of the MiFID. For example, if the provider of financial advisory is unable to find out sufficient amount of information about client, advisor is not permitted to give any recommendation of service or product. However, if client is interested in the offered service or product, he is obliged to provide information and financial advisor can trust the information provided. So the in the future especially, it might be sensible for clients to be honest when talking with financial advisor. Overall, MiFID might increase the suitability of recommended actions to clients' preferences, as both parties (advisor and client) are obliged to information processing.

One of the topical issues in the field of financial advising is compensation structure of the companies offering financial advisory that is also noticed in MiFID. For example, incentives for advisor from sales are permitted, if:

- Customer gets extensive and fair information about fees before investment service is offered
- Purpose of the incentive is to improve quality of the service and it is not against client's interest

As the incentives of investment advisors will have to be well justified and the customer is entitled to get information about it, it might push independent financial intermediaries to reevaluate their compensation structure. Overall, MiFID might push companies to create incentive systems that aim in the long-term quality of the service. Especially, companies might reward advisors also of the recommendations' suitability to investors' preferences and current financial allocation.

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### 3 HYPOTHESES

This section presents hypotheses that I analyze in my thesis. To the best of my knowledge, there is no earlier work that would have studied the use of structured capital guaranteed products as part of the financial portfolio similarly as in my thesis. After each hypothesis, I present short rationale behind the argument and connect the hypothesis to some earlier work.

**(H1)** *Higher risk tolerance is associated with lower proportion of portfolio invested in structured capital guaranteed products and higher proportion invested in equity.* Hypothesis is based on the suggestion from earlier studies of structured products that the demand for these products might be explained by behavioural biases, especially with risk aversion of the investors (see e.g. Henderson and Pearson, 2007 or Wallmeir and Diethelm, 2008) and that higher risk tolerance is associated to higher proportion invested in risky assets.

**(H2)** *Older people and women are associated to larger proportion of portfolio invested in structured capital guaranteed products and lesser proportion invested in equity.* Hypothesis is to some extent a product of the risk tolerance, especially for women, since in this sample and in earlier empiric studies (see e.g. Bajtelsmit and Bernasek, 1999 or Maltby and Ruttenford, 2007), men are discovered to be more risk tolerant, which can also be seen in the allocation of portfolio between risky and riskless assets.

Related to association between age and proportions invested in equity and capital guaranteed products, for example Bodie et al. (1992) show that individual who has more flexibility in choosing how much or how long to work later in life will prefer investing substantially more in risky assets than a person with less flexibility. Thus, their framework explains why younger people may take greater investment risks and larger allocations to risky assets and why investor near retirement may prefer more conservative investment strategies.

**(H3)** *More experienced investors use relatively less structured capital guaranteed products in the portfolio and relatively more equity.* If the use of structured products is associated to behavioural biases of investors, more experienced investors might be less prone to behavioural

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biases and they might use relatively less SEPs in their portfolios. In addition, recent research suggests that more experienced investors use more sophisticated trading tactics and make fewer behavioural errors (see e.g. Dhar and Zhu, 2006) which might lead more experienced investors to use relatively less structures and relatively more equity in the portfolio.

**(H4)** *Investors who are more aware of different investment instruments use relatively less capital guaranteed products and relatively more equity in their portfolios.* For example, Guiso and Jappelli (2005) show that awareness is an important explanation to stockholdings and as Linnainmaa (2006) argues, investors with less skill learn to exit the stock market. If investors with less skill learn to exit the stock market, they might be tempted to more “passive” and conservative investments instead, like capital guaranteed products.

**(H5)** *More investor uses advisors in his investment activity, higher is the proportion of portfolio invested in equity and lesser is the proportion invested in capital guaranteed products.*

As the other advisor in this sample is the advisor who don't have direct stock trading one of the services available, if the client utilizes other advisors in addition, these might be advisors offering direct stock trading. In addition, Fischer et al. (2008) suggest that financial advisors have an incentive to promote equity-concentrated asset allocations.

**(H6)** *Higher is value of the total portfolio, lesser is the proportion invested in capital guaranteed products and higher is the proportion invested in equity.* This hypothesis is as well probably a consequence of the risk tolerance to some extent. For example, Cohn et al. (1975) showed that as wealth increases, a higher proportion of portfolio is invested to risky assets and investors exhibit decreasing relative risk aversion.

In addition to the hypotheses mentioned above, I analyze the following questions:

- 1) How risk tolerance and total value of the portfolio are associated to other main assets of the portfolio?
  - 2) How the duration of the customership to independent financial advisor is associated to proportions invested in structured capital guaranteed products and equity?
  - 3) Are portfolio compositions dependent of the investors' risk tolerance?
-



## **4 DATA AND METHODOLOGY**

This section concentrates to data and methodology. Section begins with description of the data including data mining process and conditions of the sample. After that, I present methodologies that I used to test hypotheses introduced in the previous section (3).

I acquired data for my thesis from fact-finds made for clients who have invested in structured capital guaranteed products in the independent Finnish financial intermediary. Company has approximately 7 000 customers in Finland and is specialized in consulting customers in investing and savings. One important source of revenue for the company is marketing of structured products to Finnish market. Firm acts as an agent for the structured products of UBS, which is one of the leading financial firms in the world (more detailed description of the case company in chapter 2.3.1).

The particular company is chosen for this research because the author of this study have worked there two years, is well familiar with other consultants and the processes used in the company and has access to database of the case company. This gives a couple of significant advantages for the study. Firstly, I am able to monitor and motivate consultants to give their contribution to the research. Secondly, I can be more confident about results, because consistency checks can be done utilizing information already gathered of customers and sample customer's personal advisor in the company.

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### **4.1 Data**

Data for the research is gathered from the case company. There were few conditions for the sample:

- 1) Customer has made an investment to structured capital guaranteed product, which is index linked (return based on development of some index) and guarantees 100% of the initial investment.
- 2) Nominal value of the initial investment exceeds €50 000.
- 3) Fact-Find<sup>9</sup> includes sufficient amount of information and information is gathered within a year.

Reasons for tailoring the conditions for the sample are material for the reliability of the study. Next, I will justify chosen conditions one by one.

1) Firstly, this study examines how for example risk tolerance and experience of investing are associated to proportion of portfolio invested in capital guaranteed products. This is why it is reasonable to examine people who have these products as one part of the portfolio. Secondly, due to the importance of these investors to the case company, the information of this client group is most efficiently and widely documented.

2) When the value of the investment is significant, it makes decision process more important which in turn gives important information about behavioural factors affecting the choice. Secondly, when the value of the investment is significant the advised solution would have to be designed to client's need. However, this condition does not create any exclusion for the case company's clients since the minimum investment to marketed capital guaranteed products is €50 000.

3) To be able to make statistical calculations and trustworthy conclusions, the amount of information about client has to be sufficient and current.

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<sup>9</sup> Fact-Find is short questionnaire that is made for prospective and effective clients in the case company. Aim of the fact-find is to find out client's financial situation, risk tolerance, experience and sophistication of investing, goals, preferences and current allocation of the financial portfolio.

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#### **4.1.1 Data mining**

Overall, there were 412 customers that have made an investment (initial value at least 50 000€) to structured capital guaranteed product with 100% capital guarantee at the moment this paper was written. However, 57 of these investments were matured or the client had sold the investment. All the investments in structured products have at maximum three-year's maturity in the case company.

The case company started the procedure to gather information about clients with fact-finds in the beginning of 2007 (in April). Therefore, all the scanned fact-finds can be included to the study since the information is at most one year old. From the initial sample size of 355 customers with structured capital guaranteed product/s in the portfolio, 171 fact-finds were scanned to the database of the company. In addition, I collected 12 fact-finds manually from the consultants since these were not scanned to the database of the company at the time this research was executed. From these, 146 had sufficient amount of information for the study. 37 of the fact-finds had to exclude since the financial portfolio of the customer was not reliably documented. The most common reason for this was the reluctance of the customer to provide the information and estimated values of different investments.

There were zero customers in the final sample that would have given full rights for the advisor to make the investment decisions on behalf of the customer. In addition, none of the investors in this sample reported himself as a professional investor.

I gathered following information to excel of the fact-finds:

1. Age
  2. Gender
  3. Sources of financial welfare: a) Salary, b) Investments, c) Heritage or d) Entrepreneurship
  4. Experience of investing: a) less than 1 year, b) 1 – 3 years, c) 3 – 5 years or d) over 5 years
-



5. Awareness of different investment instruments: a) Stocks, b) Funds, c) Index loans and d) Options. Scale is either “yes” or “no” and I calculated the total amount of instruments that are familiar to the client (0 – 4).

6. Risk tolerance (1 – 5). 1 is the lowest risk tolerance and 5 is the highest risk tolerance. 3 stand for risk neutral investor. Risk tolerance is evaluated in the meeting between the advisor and the client, so this is partly a self-assessment of the customer and partly influenced by the discussion with the advisor.

7. Current financial portfolio: client has estimated values in cash, bonds, index loans, investment insurances, real estates, funds, stocks and other investments. If the values of different assets inside the investment bond were clear, I divided these values into corresponding asset classes. Since the value of the pension plan (voluntary + statutory) was not sufficiently documented in many of the fact-finds (responses were either “pension plan made” or “no pension plan”), and due to the rather small sample size, pension plan was excluded of the financial portfolio. The estimates are of the financial portfolio, and the household’s home is excluded of the portfolio for example.

8. Number of advisors client uses in the investment activity.

In addition, I added the duration of the customership from the database of the case company. I calculated it from the date of the first transaction made through the case company.

## 4.2 Descriptive statistics

**Table 2**

### Descriptive statistics

This table gives descriptive statistics of the investors and their portfolios' compositions. Panel A shows statistics of the investors in the sample. Gender and "Over 5 year experience of investing" are calculated from the corresponding dummy variables: if the investor is male, the gender dummy is set to one, otherwise zero and if investor has over 5-year experience of investing, corresponding dummy variable is set to one, otherwise zero. Also, if investor is aware of stocks, funds, index loans or options, the corresponding variable is set to one, otherwise zero. Total is the sum of familiar instruments (0–4) to the investor. Age and duration of customership is in years. Number of advisors represents the total amount of advisors investor use in his investment activity. Panel B shows the portfolio compositions by level of risk tolerance of the investors and of the whole sample. Both the nominal values (in Th. euros) and percentages of the total financial portfolio are represented. Total amount of observations in particular risk tolerance level is represented in the parentheses below the risk tolerance level.

Panel A: Investors, N= 146										
Variable		Mean	Median	Standard deviation	Frequency	% of sample				
Age		52,39	53,50	9,34						
Gender		0,80	1,00	0,40	117,00	80,14 %				
Over 5 year's experience of investing		0,68	1,00	0,47	99,00	67,81 %				
Awareness										
	Stocks	0,64	1,00	0,48	93,00	63,70 %				
	Funds	0,95	1,00	0,23	138,00	94,52 %				
	Index Loans	0,86	1,00	0,35	125,00	85,62 %				
	Options	0,19	0,00	0,40	28,00	19,18 %				
	Total	2,63	3,00	0,90						
Risk Tolerance (1-5)		2,99	3,00	1,01						
Number of advisors		1,68	2,00	0,69						
Duration of customership		5,16	4,00	4,13						
Panel B: Portfolio compositions by level of risk tolerance, N= 146										
Risk Tolerance		Cash	Bonds	Capital guaranteed Index Loans	Investment Insurances	Real Estate	Funds	Stocks	Other	Total
1	Mean	57,50	41,67	137,92	6,67	175,00	3,08	2,92	39,17	463,92
(12)	Median	50,00	0,00	50,00	0,00	200,00	0,00	0,00	0,00	382,5
% of total	Mean	16 %	4 %	35 %	4 %	33 %	1 %	2 %	5 %	
	Median	13 %	0 %	26 %	0 %	31 %	0 %	0 %	0 %	
2	Mean	57,33	22,00	248,00	30,33	220,00	39,33	194,80	0,00	811,80
(30)	Median	0,00	0,00	100,00	0,00	0,00	0,00	0,00	0,00	310
% of total	Mean	11 %	3 %	45 %	3 %	22 %	9 %	7 %	0 %	
	Median	0 %	0 %	38 %	0 %	0 %	0 %	0 %	0 %	
3	Mean	38,05	21,02	172,20	13,81	444,07	122,54	263,39	14,07	1089,15
(59)	Median	0,00	0,00	100,00	0,00	200,00	0,00	0,00	0,00	650
% of total	Mean	8 %	3 %	35 %	2 %	28 %	10 %	12 %	2 %	
	Median	0 %	0 %	29 %	0 %	28 %	0 %	0 %	0 %	
4	Mean	40,54	48,24	153,24	21,89	475,68	142,43	178,05	21,89	1081,97
(37)	Median	0,00	0,00	100,00	0,00	200,00	50,00	100,00	0,00	600
% of total	Mean	4 %	6 %	19 %	2 %	30 %	17 %	19 %	2 %	
	Median	0 %	0 %	17 %	0 %	25 %	9 %	9 %	0 %	
5	Mean	12,50	137,50	373,75	23,75	1025,00	231,88	636,25	125,00	2565,63
(8)	Median	0,00	0,00	180,00	0,00	200,00	210,00	420,00	0,00	1655
% of total	Mean	2 %	4 %	17 %	4 %	20 %	10 %	32 %	11 %	
	Median	0 %	0 %	12 %	0 %	8 %	9 %	32 %	0 %	
Whole sample										
(146)	Mean	42,84	36,20	191,20	19,21	415,75	106,66	226,69	21,30	1059,86
	Median	0,00	0,00	100,00	0,00	150,00	15,00	0,00	0,00	533
% of total	Mean	8 %	4 %	32 %	3 %	27 %	11 %	13 %	2 %	
	Median	0 %	0 %	25 %	0 %	15 %	2 %	0 %	0 %	

Table 2 in the previous page gives the descriptive statistics of the sample investors of my study. I first describe verbally the basic features of the sample of this thesis, and after that I explain the reasons why I omitted variable "Sources of financial welfare" (3.) and why I simplified the variable "Experience of investing" (4.) to either over or under 5 year's experience of investing.

Final sample size in my study is 146 and most of the investors in this sample are male (80.14%). Mean value of the financial portfolio is a bit over million Euros. Mean value is biased of few valuable portfolios since the median of the sample investors' total value of the portfolio is half of the average. The mean and median values of the portfolios increase when the risk tolerance of the investor increases, except between third and fourth risk tolerance levels.

Median investor of the sample is over 50 years old male, risk neutral, aware of three investment instruments out of four (stocks, funds and index loans). He uses two investment advisors in his investment activity, has over five year's experience of investing and has been customer to the case company for four years. For my thesis, it is fruitful that the sample customer is utilizing more than one advisor in his investment activity in general, since the purpose of this study is to examine portfolio compositions and characteristics of financially advised investors. In addition, the "other" advisor might be the representative from the bank with direct stock trading as one the services available in most of the cases.

Real estate seems to be the most popular investment target of the sample customers after capital guaranteed index loans. Due to the data available in the case company for this study, it is not surprising that 100% of the investors have structured capital guaranteed product in the portfolio and the amounts invested are significant (minimum investment 50 Th. Euros). After real estate, if measuring with mean proportion of portfolio, equity and funds are the next popular investment assets. The mean proportion invested in bonds is only 4%, and in investment insurances and in other investments even smaller. At this point, it is good to remind that most of the values in different assets are estimates of the customer and that the market atmosphere at the moment this paper was written might be called at least volatile which might also have its effect on portfolio compositions in this sample.

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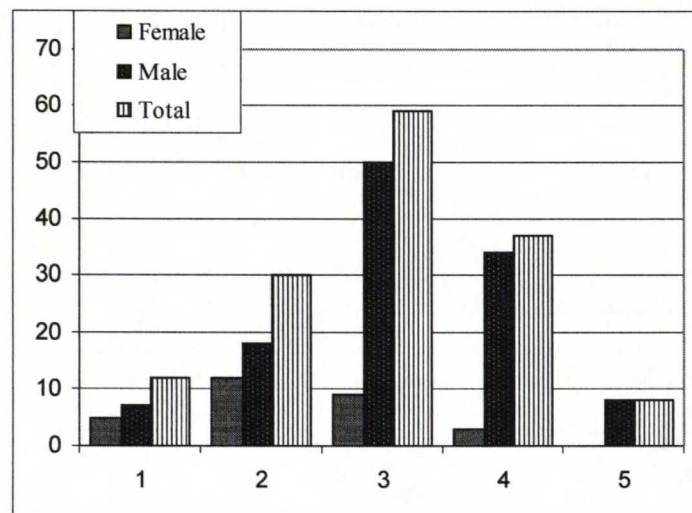
I omitted variable “Sources of financial welfare” (3.) because almost all the investors in this sample were entrepreneurs (82% of the customers’ welfare is mostly from entrepreneurship). In other sources of financial welfare for sample investors (salary for example), the percentage and frequency is too small to be able to make any reasonable statistical analysis. Same reason applies for simplifying experience variable to either over or under 5 year’s experience of investing. For example, only three investors had less than one year’s experience and only six had from one to three year’s experience of investing.

#### 4.2.1 Gender differences, awareness of investment instruments and risk tolerance

**Figure 2**

**Risk profile of the sample**

Figure 2 describes the differences between male and female in risk tolerance. On the horizontal axis is the risk tolerance, one representing the lowest risk tolerance level and five representing the highest risk tolerance. On the vertical axis is the frequency of investors in the risk tolerance levels.  $N = 146$ .



If just concentrating to overall risk profile of the investors in this sample, the distribution is not skewed towards low risk tolerance levels, which indicates that the demand for structured capital guaranteed products might not be explained by risk tolerance or more specifically, by risk aversion. In addition, the mean values of the investments in structured capital guaranteed products are lower for more risk adverse investors (see table 2 in page 37).

The shape of the distribution of the sample investors' risk tolerance supports that the analysis in this thesis concentrates rather to proportions of portfolio than to nominal values of the investments. Slight deficit in my data is the low proportion of female investors in the sample that unfortunately reduces the reliability of the results that I find in gender differences.

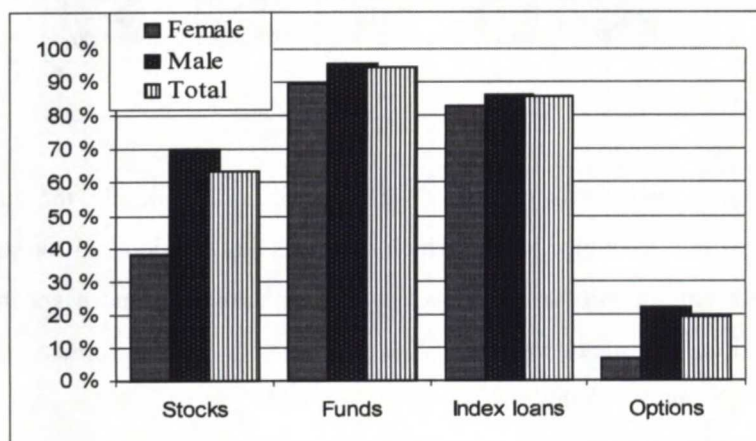
Figure 2 in the previous page pictures well the gender differences in risk tolerance: the distribution of female investors risk profile is clearly skewed to low risk tolerance levels, as for male investors the distribution is a bit skewed to high risk tolerance levels. Thus, if the results suggest that female investors have higher proportion of portfolio invested in capital guaranteed products, the association might be product of the investors' risk profiles.

Besides risk tolerance, there seems to be differences in awareness of different investment instruments between male and female. Male investors seem to be more aware of different instruments than female investors are. Especially, as can be seen from the figure 3 below, the difference is particularly high in the awareness of stocks. In general, investors seems to be well aware of funds and of index loans, most are aware of stocks also, but really few are aware of options. Interesting (and perhaps alarming) finding is that about 14% of the sample is not aware of index loans though they have invested in that instrument.

**Figure 3**

**Awareness of different investment instruments**

Figure 3 shows gender differences in awareness of different investment instruments. On the horizontal axis are the different investment instruments and on the vertical axis is the percentage of investors aware of the particular instrument.  $N = 146$ .



#### 4.2.2 Risk tolerance and portfolio compositions of the sample investors

When looking at averages invested in different investment instruments from table 2 in page 37, portfolio compositions seems to be somewhat in line with risk tolerance (if it means that more risk tolerant investors are associated to higher proportion of portfolio invested in risky assets and lesser proportion invested in conservative assets). For example, the mean percentage of portfolio invested in equity increases somewhat in line with risk tolerance and the mean percentage of portfolio invested in cash decreases as the risk tolerance increases.

However, in some asset classes the proportions of portfolio invested in that particular asset seems to be more randomly segmented. For example, proportion of portfolio invested in real estate or for example to bonds doesn't have any clear association to risk tolerance of the investor (associations of risk tolerance and total value of the portfolio to proportions in different assets is studied with multiple regression analysis in this thesis, see chapters 4.4.1 of methodology and 5.1 for results).

**Table 3**

##### **Risk tolerance and frequency of investments in cash, bonds, index loans, real estate, funds and stocks**

Table 3 gives frequencies of the sample investors in each risk tolerance level that had particular asset in the portfolio. For example, if investor with lowest risk tolerance had cash, bonds, index loans and equity in the portfolio, one was counted to each cell in that particular row. Based on the assumptions of the riskiness of the assets, investments are ranked from left to right (Cash→Stocks). Because the sample size was rather small, I was not able to perform  $\chi^2$  test of independency of this contingency table since at minimum, the frequency in each cell would have to be 5 to be able to perform statistically reasonable analysis. In parentheses is the percentage of investors of corresponding risk tolerance level that had invested in that particular asset. % of total is the percentage of total sample that had invested in that particular asset.

Risk tolerance	Cash	Bonds	Index Loans	Real Estate	Funds	Stocks	Total
1	9 (75,00%)	2 (16,67%)	12 (100,00%)	7 (58,33%)	2 (16,67%)	2 (16,67%)	34
2	14 (46,67%)	5 (16,67%)	30 (100,00%)	12 (40,00%)	12 (40,00%)	10 (33,33%)	83
3	29 (49,15%)	10 (16,95%)	59 (100,00%)	33 (55,93%)	29 (49,15%)	27 (45,76)	187
4	15 (40,54%)	13 (35,14%)	37 (100,00%)	21 (56,76%)	27 (72,97%)	26 (70,27%)	139
5	1 (12,50%)	2 (25,00%)	8 (100,00%)	4 (50,00%)	6 (75%)	7 (87,50%)	28
Total	68	32	146	77	76	72	471
% of total	(46,58%)	(21,92%)	(100,00%)	(52,74%)	(52,05%)	(49,32%)	



Table 3 on the previous page provides interesting descriptive information about investors' risk tolerance and the portfolio compositions. Due to the rather small sample size and the sample characters of this study, it is more insightful to concentrate on percentages of the investors who have invested in corresponding asset at particular risk tolerance level and to ignore investments in capital guaranteed index loans in this context.

Based on information in table 3 in the previous page, percentage of investors that have invested to funds or stocks increases with risk tolerance indicating that portfolio compositions are dependent of clients' risk tolerance<sup>10</sup>. In addition, respectively, percentage of investors that have cash in the portfolio decreases with risk tolerance indicating reasonable association with risk aversion and investments in cash. Another indication of portfolios' compositions being congruent with risk tolerance can be seen analyzing rows by each risk tolerance level separately. For example, in the highest risk tolerance level, percentage of investors investing in riskier assets increases when the assumed riskiness of the investment increases and the behaviour is reverse in the lowest risk tolerance level. Overall, based on this evidence, portfolio compositions seem to be dependent of the clients' risk tolerance in this sample. However, again, percentages of investors that have invested in real estate (which seems to be most popular investment among the investors, measuring in amount of investors that have invested in real estate and in total value of the investments) and bonds are behaving in rather random manner.

Table 3 gives also some perspective to the diversification characteristics of the sample investors' portfolios. Of the whole sample, the average amount of different investment instruments/assets is 3.23 (471/146) and median 3. I excluded investment insurances and other investments of this analysis since it would not be possible to assume anything of the riskiness of these assets. However, median three out of six is not that much when considering that median amount of advisors helping clients with their investments is two. Without any deeper statistical analysis, these results indicate that there is space for improvements in diversification between different asset classes. Underdiversification is widely documented behaviour of the retail investors in the previous studies as well (see e.g. Calvet et al., 2006; Goetzmann and Kumar, 2001; Rode, 2000).

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<sup>10</sup> I will not comment or speculate is the proportions invested in different assets over or under the risk tolerance of the investors, and model portfolios are not used in the case company or in this study.

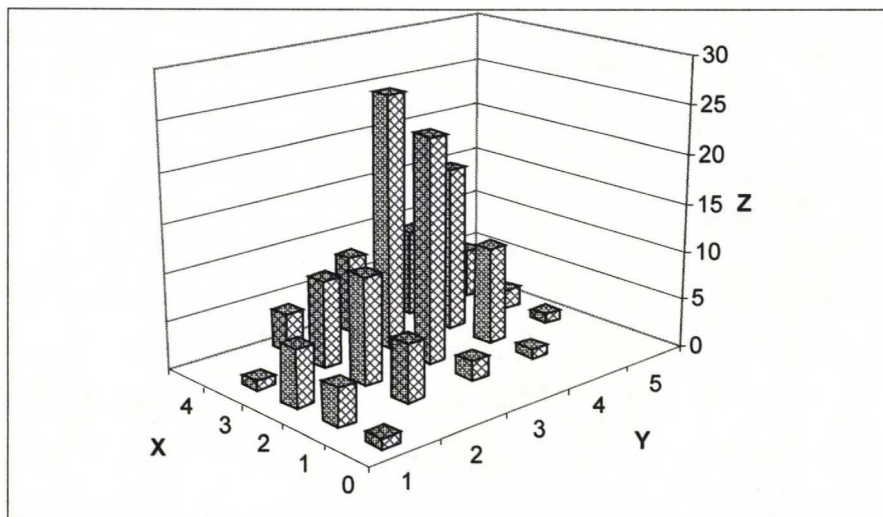
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I find interesting figures when comparing the number of different assets in the portfolio between different risk tolerance levels. Both risk tolerance levels 4 and 5, the median is four assets in the portfolio and the median is three for other risk tolerance levels. Even though the sample size is rather small, the result indicates that even though investor might be more risk averse, he might hold less efficiently diversified portfolio (when measuring in number of different assets/instruments). However, this conjecture might be explained to some degree by the association between awareness of different investment instruments and risk tolerance or by decreasing relative risk aversion (see e.g. Cohn, 1975) of the investors. But, the question that might arise from this characteristic of this sample is that if the investor is aware of diversification benefits of different assets (aware of stocks for example), it might make easier for the investor to use also stocks in the portfolio and thus, increase the risk tolerance of the investor (see figure 4 below). Association between awareness and risk tolerance is supported in earlier works also: for example, Calvet et al. (2006) document that households that are financially more sophisticated tend to invest more efficiently and aggressively and Bertaut (1998) find that investors with higher risk tolerance, higher wealth and higher education are more likely to invest in equities since their information costs are lower.

**Figure 4**

**Awareness of investment instruments and risk tolerance**

Figure 3 pictures the association between the amount of familiar investment instruments to the investor (0–4) and risk tolerance. On the X-axis is the amount of familiar instruments (0–4) and on the Y-axis is the risk tolerance (1–5) of the investors in the sample. Z represents the frequency of investors in that risk tolerance level.  $N = 146$ .



### 4.3 Correlations between explanatory variables

To be able to construct reasonable models for regressions and to explain results found from the sample in my thesis, it is important to study correlations between explanatory variables. Correlations provide also insightful descriptive information of the data.

**Table 4**

#### Correlation matrices of explanatory variables

Table 3 gives the correlations between explanatory variables used in the regressions. Panel A provides correlations between main explanatory variables that will be used in the regressions. Amount of familiar instruments is the total number of investment instruments that are familiar to the client (0–4). Individual instruments that are familiar to the investors in the sample were excluded of the Panel A to make matrices more informative. Panel B provides correlations between individual instruments and total amount of familiar instruments (0–4) to the investors in the sample.

Panel A: Correlation matrix between main explanatory variables, <i>N</i> = 146								
	<i>X</i> <sub>1</sub>	<i>X</i> <sub>2</sub>	<i>X</i> <sub>3</sub>	<i>X</i> <sub>4</sub>	<i>X</i> <sub>5</sub>	<i>X</i> <sub>6</sub>	<i>X</i> <sub>7</sub>	<i>X</i> <sub>8</sub>
	<i>Amount of familiar instruments</i>	<i>Risk tolerance</i>	<i>Number of advisors</i>	<i>Duration of customership</i>	<i>Age</i>	<i>Gender</i>	<i>Total value of portfolio</i>	<i>Over 5 year's experience</i>
<i>X</i> <sub>1</sub>	1,00							
<i>X</i> <sub>2</sub>	0,44	1,00						
<i>X</i> <sub>3</sub>	0,21	0,30	1,00					
<i>X</i> <sub>4</sub>	0,26	0,12	-0,32	1,00				
<i>X</i> <sub>5</sub>	0,03	-0,04	0,01	0,02	1,00			
<i>X</i> <sub>6</sub>	0,25	0,32	0,10	0,11	0,03	1,00		
<i>X</i> <sub>7</sub>	0,28	0,21	0,34	0,10	0,11	0,16	1,00	
<i>X</i> <sub>8</sub>	0,39	0,29	0,20	0,18	0,14	0,21	0,25	1,00

Panel B: Correlation matrix between instruments that are familiar to investors, <i>N</i> = 146					
	<i>X</i> <sub>1</sub>	<i>X</i> <sub>2</sub>	<i>X</i> <sub>3</sub>	<i>X</i> <sub>4</sub>	<i>X</i> <sub>5</sub>
	<i>Amount of familiar instruments</i>	<i>Aware of stocks</i>	<i>Aware of funds</i>	<i>Aware of index loans</i>	<i>Aware of options</i>
<i>X</i> <sub>1</sub>	1,00				
<i>X</i> <sub>2</sub>	0,70	1,00			
<i>X</i> <sub>3</sub>	0,34	-0,06	1,00		
<i>X</i> <sub>4</sub>	0,59	0,14	0,16	1,00	
<i>X</i> <sub>5</sub>	0,70	0,30	0,12	0,20	1,00

Panel A provides important information for the models that I construct to test hypotheses in this thesis. Clearly, awareness of different investment instruments is positively correlated almost with all explanatory variables (with age the correlation was only 0,03). Intuitively, it is not surprising that risk tolerance is most remarkably correlated with awareness of different investment instruments (see also figure 4 in page 43).



Panel B in table 4 in the previous page gives also intuitively reasonable figures of correlations. Correlations between investment instruments indicate that the investor sophistication might be divided to investors who only know funds and to investors who know also stocks. Of options, the awareness is rare and the awareness of index loans has a self-explanatory feature in this sample.

#### ***4.4 Methodology***

I performed main part of the empiric research in this thesis with multiple regression analyses. Next, I will present multiple regression analyses performed in this study. After the initial regressions were performed, I did few robustness checks of the initial models with test of differences in two means and tested are portfolio compositions dependent of the risk tolerance with  $\chi^2$  test of independency. These models are presented at the end of this section.

##### **4.4.1 Multiple regression analyses**

The assumption behind multiple regression analysis is that dependent variables are normally distributed. Proportions invested in different assets are not exactly normally distributed since usually the proportions are weighted to low proportions. However, since the dependent variables I regressed in this thesis are continuous, positive and between 0–1, the light violation of the assumption of distribution's normality does not create any serious statistical bias. In addition, the purpose of the analyses is to find associations between variables, not obvious effects.

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Generally, the multiple regression models with  $k$  explanatory variables are expressed in the following way:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \varepsilon_i$$

where

$\beta_0$  =  $Y$  intercept

$\beta_1$  = slope of  $Y$  with variable  $X_1$  holding variables  $X_2, \dots, X_k$  constant

$\beta_2$  = slope of  $Y$  with variable  $X_2$  holding variables  $X_1, \dots, X_k$  constant

...

$\beta_k$  = slope of  $Y$  with variable  $X_k$  holding variables  $X_1, X_2, \dots, X_{k-1}$  constant

$\varepsilon_i$  = random error in  $Y$  for observation  $i$

and hypotheses,

$H_0 = \beta_1 = \beta_2 = \dots = \beta_k$  (No linear relationship between the dependent and the explanatory variables)

$H_1 =$  At least one  $\beta_j \neq 0$

This chapter proceeds as follows: starting from next page, I first present the tested hypothesis/hypotheses, after which I describe the model/s used to answer to the hypothesis/hypotheses.

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**(H1)** *Higher risk tolerance is associated with lower proportion of portfolio invested in structured capital guaranteed products and higher proportion invested in equity and (H6) Higher is value of the total portfolio, lesser is the proportion invested in capital guaranteed products and higher is the proportion invested in equity.*

Models performed:

$$i) Y_{IL} = \beta_0 + \beta_1 X_{TVi} + \beta_2 X_{RTi} + \varepsilon_i$$

and,

$$ii) Y_e = \beta_0 + \beta_1 X_{TVi} + \beta_2 X_{RTi} + \varepsilon_i$$

where

$Y_{IL}$  = proportion of portfolio invested structured capital guaranteed products

$Y_e$  = proportion of portfolio invested in equity

$X_{TVi}$  = total value of the portfolio (in Th. euros) of investor i

$X_{RTi}$  = risk tolerance (1–5) of investor i

In addition, I performed same model for the proportions invested in cash ( $Y_C$ ), in bonds ( $Y_B$ ), in funds ( $Y_F$ ), and in real estate ( $Y_R$ ).

**(H2)** *Older people and women are associated to larger proportion of portfolio invested in structured capital guaranteed products and lesser proportion invested in equity.*

Models performed:

$$i) Y_{IL} = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{Gi} + \varepsilon_i$$

and,

$$ii) Y_e = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{Gi} + \varepsilon_i$$

where

$Y_{IL}$  = proportion of portfolio invested structured capital guaranteed products

$Y_e$  = proportion of portfolio invested in equity

$X_{Ai}$  = age in years of investor i

$X_{Gi}$  = dummy variable of investor i's gender (1 = male, 0 = female)

---



**(H3)** *More experienced investors use relatively less structured capital guaranteed products in the portfolio and relatively more equity.*

Models performed:

$$i) Y_{IL} = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{EXi} + \varepsilon_i$$

and,

$$ii) Y_e = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{EXi} + \varepsilon_i$$

where

$Y_{IL}$  = proportion of portfolio invested structured capital guaranteed products

$Y_e$  = proportion of portfolio invested in equity

$X_{Ai}$  = age in years of investor  $i$

$X_{EXi}$  = dummy variable of the experience of investor  $i$  (1 = over 5 year's experience of investing, 0 = fewer than 5 year's experience of investing)

Intuitively, age and experience of investing might be highly correlated with each other, which might reduce the explanation of the variables in this model. However, in this sample, the correlation seems to be rather low (see table 4 in page 44), and without age in the regression, the model would not be statistically sound.

**(H4)** *Investors who are more aware of different investment instruments use relatively less capital guaranteed products and relatively more equity in their portfolios.*

Models performed:

$$i) Y_{IL} = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{ASi} + \beta_3 X_{AOi} + \varepsilon_i$$

and,

$$ii) Y_e = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{ASi} + \beta_3 X_{AOi} + \varepsilon_i$$

where

$Y_{IL}$  = proportion of portfolio invested structured capital guaranteed products

$Y_e$  = proportion of portfolio invested in equity

$X_{Ai}$  = age in years of investor  $i$

$X_{ASi}$  = dummy variable of the awareness of stocks of investor  $i$  (1 = aware, 0 = not aware)

$X_{AOi}$  = dummy variable of the awareness of options of investor  $i$  (1 = aware, 0 = not aware)

---

I excluded awareness of funds or index loans of the model since almost all the investors in this sample were aware of both instruments (see table 2 in page 37). In addition, as the aim of this test is to study associations between sophistication and proportions of portfolio invested in equity and in capital guaranteed products, awareness of stocks or options are more suitable variables to this purpose. However, I performed regressions with total number of familiar investment instruments in the following way:

$$i) Y_{IL} = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{TNI} + \varepsilon_i$$

and,

$$ii) Y_e = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{TNI} + \varepsilon_i$$

where

$Y_{IL}$  = proportion of portfolio invested structured capital guaranteed products

$Y_e$  = proportion of portfolio invested in equity

$X_{Ai}$  = age in years of investor i

$X_{TNI}$  = total amount of familiar investment instruments to investor i (0–4)

**(H5)** *More investor uses advisors in his investment activity, higher is the proportion of portfolio invested in equity and lesser is the proportion invested in capital guaranteed products.*

Models performed:

$$i) Y_{IL} = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{DRi} + \beta_3 X_{ADi} + \varepsilon_i$$

and,

$$ii) Y_e = \beta_0 + \beta_1 X_{Ai} + \beta_2 X_{DRi} + \beta_3 X_{ADi} + \varepsilon_i$$

where

$Y_{IL}$  = proportion of portfolio invested structured capital guaranteed products

$Y_e$  = proportion of portfolio invested in equity

$X_{Ai}$  = age in years of investor i

$X_{DRi}$  = duration of the customership of client i to the case company in years

$X_{ADi}$  = total amount of advisors investor i uses in his investment activity

Model gives also some guidance to the association between duration of the customership to the case company and proportions of portfolio invested in capital guaranteed products and in equity.

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#### 4.4.2 Test of differences in two means

I performed tests of differences in two means in order to validate the results from the initial models. I did the tests after the initial regressions as a robustness check of the initial models and results in hypotheses that were appropriate to test with pooled-variance  $t$  test.

Generally, if assuming that the samples are randomly and independently drawn from populations that are normally distributed and that the population variances are equal, a pooled-variance  $t$  test can be used to determine whether there is a significant difference between the means of the two populations.

Proportions invested in different assets are not exactly normally distributed since usually the proportions are weighted to low proportions. However, since the dependent variables I regressed in this thesis are continuous, positive and between 0–1, the light violation of the assumption of distribution's normality does not create any serious statistical bias. In addition, the purpose of the analyses is to find associations between variables, not obvious effects.

Where the test of differences in two means is used as a robustness check, the hypotheses are that there is no difference in means of two independent populations:

$$H_0 = \mu_1 = \mu_2 \text{ and,}$$

$$H_0 = \mu_1 \neq \mu_2$$

The test statistic  $t$  follows distribution with  $n_1 + n_2 - 2$  degrees of freedom.

Pooled-variance  $t$  test for the difference in two means is

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{S_p^2 \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

---



where

$$S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{(n_1 - 1) + (n_2 - 1)}$$

and

$S_p^2$  = pooled variance

$\bar{X}_1$  = mean of the sample taken from population 1

$\bar{X}_2$  = mean of the sample taken from population 2

$S_1^2$  = variance of the sample taken from population 1

$S_2^2$  = variance of the sample taken from population 2

$n_1$  = size of the sample taken from population 1

$n_2$  = size of the sample taken from population 2

#### **4.4.3 $\chi^2$ test of independency – are portfolio compositions dependent of risk tolerance**

The aim of the test is to provide some answer to the following hypotheses:

$H_0$  = The two categorical variables are independent

$H_1$  = The two categorical variables are dependent

I used test of independency in this thesis to analyze whether the portfolio structures of sample investors are dependent of the risk tolerance. To be able to perform statistically reasonable analysis, I had to do two simplifications to the data:

1. Investment insurances, other investments and structured capital guaranteed products were excluded of this analysis. Firstly, it is impossible to assume anything about how risky investments investment insurances and other investments are. Secondly, capital guaranteed products create systematic bias to the analysis, since all the investors in this sample have invested in capital guaranteed products. Even after excluding these products, there is a chance that they still create bias to the results.

---

2. Frequency in each cell would have to be at least five, so I had to simplify risk levels. First and second levels were connected and fourth and fifth levels were connected.

**Table 5**

**Contingency table of frequencies invested in main assets and risk tolerance after simplifying the data**

This table describes the frequencies in each cell after I had done the simplifications to the data. 1<sup>st</sup> and 2<sup>nd</sup> risk tolerance levels and 3<sup>rd</sup> and 4<sup>th</sup> risk tolerance levels were connected to be able to perform statistically reasonable  $\chi^2$  test of independency. Frequency in each cell is the number of investors that have invested in that particular asset. The expected frequency in each cell is the product of its row and column total divided by the overall sample, this figure is presented in the parentheses below the observed frequency. Investments were ranked based on assumed risk level of the investment from left (cash) to right (stocks).

Risk tolerance	Cash	Bonds	Real Estate	Funds	Stocks	Total
1 & 2	21 (14,60)	7 (7,08)	18 (16,81)	14 (16,81)	11 (15,70)	71
3	29 (26,32)	10 (12,76)	33 (30,31)	29 (30,31)	27 (28,31)	128
4 & 5	16 (25,08)	15 (12,16)	25 (28,88)	33 (28,88)	33 (26,98)	122
Total	66	32	76	76	71	321

To test null hypothesis of independence against the alternative that there is a relationship between the two categorical variables, I used following equation to compute the test statistic:

$$\chi^2 = \sum_{Allcells} \frac{(f_o - f_e)^2}{f_e}$$

where

$f_o$  = observed frequency in a particular cell of the  $r * c$  contingency table

$f_e$  = theoretical frequency expected in a particular cell if the null hypothesis of independence was true

Test statistic follows approximately chi-square distribution with degrees of freedom equal to the number of rows in the contingency table minus 1 times the number of columns in the table minus 1.

And if,

$\chi^2 > \chi^2_U \rightarrow$  reject the null hypothesis; otherwise do not reject the  $H_0$ .

## 5 RESULTS

This section presents results from the multiple regression analyses, from the  $\chi^2$  test of independency and from the robustness tests made for the initial results. Results are presented and discussed in the same order as the models to test the hypotheses were introduced in the previous section (4). In addition, I performed one additional multiple regression, and this is presented after the initial regressions. If I made robustness test, I present results after the initial models. At the end of this section, I present summary of the main findings including main descriptive associations and statistics.

### 5.1 Associations of risk tolerance and total value of the portfolio

**Table 6**

**Results from regressions performed to test hypotheses (H1) and (H6)**

This table gives regression results of the multiple regressions performed to test hypotheses (H1) *Higher risk tolerance is associated with lower proportion of portfolio invested in structured capital guaranteed products and higher proportion invested in equity* and (H6) *Higher is value of the total portfolio, lesser is the proportion invested in capital guaranteed products and higher is the proportion invested in equity*. Dependent variables are  $Y_{IL}$  (proportion of portfolio invested in structured capital guaranteed products) and  $Y_e$  (proportion of portfolio invested in equity). *P-values* of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Regressions to test hypotheses (H1) and (H6), $N= 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{TVi}$ , total value of the portfolio (in Th. Euros)	-0,00005596 (0,00002484) ***	0,19045195	0,00003014 (0,00293348) ***	0,16051506
$X_{RTi}$ , risk tolerance (1-5)	-0,06095960 (0,00210327) ***		0,05736499 (0,00021307) ***	

Results indicate that risk tolerance and total value of the portfolio are significantly associated to proportions invested in capital guaranteed products and in equity. Based on this sample, as the risk tolerance and value of the total portfolio increases, lesser is the proportion invested in structured capital guaranteed products and higher is the proportion invested in equity.



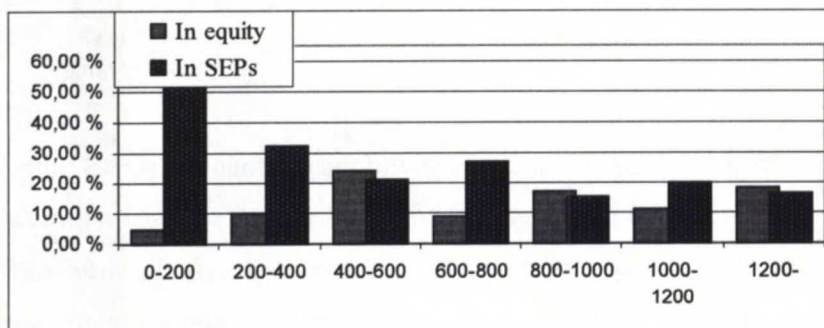
Associations of the risk tolerance and of total value of the portfolio to proportions invested in different assets might be explained with decreasing relative risk aversion of the investors. This argument is well studied and supported in the previous studies (see e.g. Campbell, 2006 or Cohn et al., 1975). In addition, some explanation to the association might be the entry costs to the equity markets. Sule (2006) showed in his study that in the presence of entry costs, stockholding is concentrated at the upper end of the wealth distribution. With an entry cost, he suggests that small savers are left with only conservative investment assets, such as bank accounts, money market funds and bonds. In figure 5 below, I divided the sample by value of the portfolio to thresholds and calculated means of proportions invested in capital guaranteed products and in equity to each interval. Figure 5 supports the argument that entry costs have effect on stock market participation, if the value of the portfolio is assumed as a product of the total wealth.

As can be seen from the figure 5 below, associations of value of the total portfolios to equity proportion and proportion invested in structured capital guaranteed products is mostly consequence of the changes in portfolio compositions of the investors in the lower end of the value distribution. Clearly, after value of the portfolio reaches 600 Th. Euros, proportions invested in structured capital guaranteed products or in equity start to behave more randomly. Before that threshold however, the associations are rather powerful. In addition to relative risk aversion, perhaps one explanation to this is that banks generally have some threshold to portfolio's value after they offer private stock brokerage service for the client.

**Figure 5**

**Proportions in structured capital guaranteed products and in equity divided to value intervals**

Figure 5 pictures mean proportions invested in structured capital guaranteed products (SEPs in the figure) and in equity that are calculated from investors' portfolios in each interval separately. On the X-axis is total value of the portfolio divided to intervals, and on the Y-axis is the mean percentage invested in structured capital guaranteed products or in equity.  $N = 146$ .



The conjecture that banks' thresholds might have effect on portfolio compositions has a couple of intuitively rationale explanations. Firstly, if investor's value of the portfolio is not sufficient to individual brokerage service, investor might be sceptical that his stock picking skills will offset the transaction costs of direct stock trading. The association might be especially true for less sophisticated investors; for example, Linnainmaa (2006) argues that they learn to exit the stock market easier. Secondly, after the client's total value of the portfolio is high enough, perhaps financial institutions start target the marketing especially to this group of investors. In addition, Campbell (2006) suggests that poorer and less educated households are more likely to make investment mistakes and argues that nonparticipating households might be aware of their limited investment skills and reaction to this is withdrawal from risky markets.

Interesting pattern of the figure 5 in the previous page is that the proportions invested in capital guaranteed products or in equity, starts behaving more randomly after the value exceed 600 Th. Euros. If the investors in this sample were rational and if the structured products unfairly priced, the proportion of portfolio invested in SEPs might decrease rather constantly as total value of the portfolio increases. The rationale behind this is that if structured products marketed by sample investors include substantial premiums, the euro amount of this expense would increase as value of the portfolio increases. However, the reason why proportion does not decrease constantly might be that the sample in this thesis consists of retail investors and structured products might be difficult for amateur investors fully comprehend, not to mention unbundling and pricing the product (see e.g. Stoimenov and Wilkens, 2005). In addition, the equity proportion starts to behave randomly after the 600 Th. thresholds. Perhaps one explanation is that after total value of the portfolio exceeds certain big enough amount, investors become negligent to some extent to the proportions of portfolio invested in different assets. Alternatively, if the financial portfolio is big enough, the estimates of the values invested in different assets might be more inaccurate since wealthy investors might use more advisors in their investment activity, and they might have more accounts and consultants in different financial institutions. Guiso et al. (2003) provide backup for the stock market participation and equity proportions' random behaviour in their study. They show at the individual level, households' participation correlates robustly with wealth and education, which have only small effects, however, on the asset share invested in equity.

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Multiple regression (see table 6 on next page) that I performed to other main assets confirms the associations of risk tolerance to proportions invested in that particular asset that were introduced in chapter 4.2.2 descriptively: higher risk tolerance is significantly associated to lower proportion in cash and in higher proportion in funds. Moreover, there seems to be random associations between proportions invested in real estate or in bonds. Total value of the portfolio seems to be most positively associated to proportion invested in real estate indicating that as value of the total portfolio increases, real estate becomes more important investment in the sample investors' portfolios. The value of the total portfolio is negatively associated to proportion invested in cash; as the value of the portfolio increase, the proportion invested in cash, most liquid asset, decreases. In the earlier studies, findings indicate that real estate is in the dominant role in the portfolios of middle-class households, and liquid assets for poorer households, which are in line with associations that I find in my analysis (see e.g. Campbell, 2006).

Based on this thesis' sample investors, the association between portfolio composition and risk tolerance is evident. However, I believe that generally, the financial risk tolerance is more often the product of portfolio's total value and awareness of different investment instruments. Firstly, many earlier studies find that investors with higher risk tolerance, higher wealth and higher education are more likely to invest in riskier assets (see e.g. Bertaut, 1998). And, as Cohn et al. (1975) showed, when the wealth of the investor increases, a higher proportion of portfolio is invested in risky assets and investors exhibit decreasing relative risk aversion. In addition, by analyzing survey of consumer finances in US from year 2001, Campbell (2006) shows that wealthy households are willing to take greater risk in their portfolios. Secondly, as the assessment of the risk tolerance in this sample is done in the meeting with the advisor, the current financial portfolio of the customer might lead the assessment of the risk tolerance.

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**Table 7****Regressions with total value of the portfolio and risk tolerance to the proportions in other main assets**

This table gives regression results of the multiple regressions performed to other main assets. Dependent variables are  $Y_C$  (proportion of portfolio invested in cash),  $Y_B$  (proportion of portfolio invested in bonds),  $Y_F$  (proportion of portfolio invested in funds) and  $Y_R$  (proportion of portfolio invested in real estate).  $P$ -values of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Regressions to $Y_C$ (cash), $Y_B$ (bonds), $Y_F$ (funds) and $Y_R$ (real estate), $N= 146$				
Explanatory variable	$Y_C$		$Y_B$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{TVi}$ , total value of the portfolio (in Th. Euros)	-0,00001369 (0,05297690) *	0,08465491	-0,00000382 (0,47971535)	-0,00419367
$X_{RTi}$ , risk tolerance (1-5)	-0,03107820 (0,00404184) ***		0,00875972 (0,28549508)	
Explanatory variable	$Y_F$		$Y_R$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{TVi}$ , total value of the portfolio (in Th. Euros)	-0,00000894 (0,32599351)	0,04038171	0,00005682 (0,00045516) ***	0,06980480
$X_{RTi}$ , risk tolerance (1-5)	0,03872660 (0,00552603) ***		-0,01817576 (0,45003100)	

## 5.2 Associations of age and gender

**Table 8**

**Results from regressions performed to test hypothesis (H2)**

This table gives regression results of the multiple regressions performed to test hypothesis (H2) *Older people and women are associated to larger proportion of portfolio invested in structured capital guaranteed products and lesser proportion invested in equity*. Dependent variables are  $Y_{IL}$  (proportion of portfolio invested in structured capital guaranteed products) and  $Y_e$  (proportion of portfolio invested in equity). *P-values* of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Regressions to test hypothesis (H2), $N= 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{Ai}$ , age in years	0,00075980 (0,73483920)	0,03675674	-0,00280171 (0,10216441)	0,03920811
$X_{Gi}$ , dummy variable of gender (1 = male, 0 = female)	-0,14278163 (0,00705838) ***		0,09286148 (0,02082305) **	

### Robustness test and discussion of the results

I performed the pooled-variance  $t$  test (see chapter 4.4.2 for further details) to the differences in two means of proportions invested in structured capital guaranteed products and in equity based on gender of the investor. The  $t$  statistic of the differences in means invested in equity is 2,731, which confirm the association indicated by the initial model. In addition, the  $t$  statistic of the differences in means invested in capital guaranteed products is -2,269 which is also in line with the association indicated by the initial model.

Multiple regression and the robustness test performed indicates that females are associated to higher proportion of portfolio invested in structured capital guaranteed products and lesser proportion of portfolio invested in equity. Results are consistent with earlier findings from gender differences that indicate that women take less risk than men (see e.g. Dwyer et al., 2002 or Maltby and Ruttenford, 2007). Unfortunately, low proportion of females in this sample reduces the statistical reliability of the indicated association.

Age however, seems to be rather weakly associated to proportions invested in structured capital guaranteed products or in equity. The association is however, clearly more powerful for proportions invested in equity. The low association that I find is in line with framework by Bodie et al. (1992) who show that individual who has more flexibility in choosing how much or how long to work later in life will prefer investing more in risky assets than a person with less flexibility. The nature of the data might also have its explanation to rather low association between age and proportion invested in equity: most of the sample, investors are over 50 years old and some of them already retired. In addition, as suggested by Korniotis and Kumar (2006), age has its cognitive effects that affect investment behaviour. Thus, they conclude that older people use more “rules of thumb”, but they are less skilful in successfully implementing these rules in their investments.

Recent studies of changes in portfolio composition and life cycle of the investor have found also suggestions of behaviour that is bit contrary to the common intuition that older people should hold less equity in their portfolios. For example, Farhi and Panageas (2007) conjectured in their paper that contrary to common intuition, an investor might find it optimal to increase the proportion of financial wealth held in stocks as she ages and accumulates assets, even when her income and the investment opportunity set are constant. They base their suggestion to agent’s ability to time her retirement, which introduces an option-type character to the optimal retirement decision, and this option is most relevant for individuals with a high likelihood of early retirement, that is, individual with high wealth levels. As the portfolios of this sample might be assumed as portfolios of the investors from high wealth levels, it might lower the association between age and proportion invested in equity.

In addition, according to Jagannathan and Kocherlakota (1996), best explanation to greater share of younger people’s portfolios invested in equity is the fact that they have more years of wages ahead of them than older people do. In addition, as most of the owners of the sample portfolios might be considered as investors from high wealth levels, perhaps forthcoming wages do not have that significant effect on investment behaviour.

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### 5.3 Associations of experience of investing

**Table 9**

**Results from regressions performed to test hypothesis (H3)**

This table gives regression results of the multiple regressions performed to test hypothesis (H3) *More experienced investors use relatively less structured capital guaranteed products in the portfolio and relatively more equity*. Dependent variables are  $Y_{IL}$  (proportion of portfolio invested in structured capital guaranteed products) and  $Y_e$  (proportion of portfolio invested in equity). Experience of investing is a dummy variable that is set to one, if the investor had longer than 5 years experience of investing, otherwise to zero. *P-values* of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Regressions to test hypothesis (H3), $N = 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{Ai}$ , age in years	0,00160769 (0,47099396)	0,06583503	-0,00336819 (0,04904994) **	0,06297625
$X_{EXi}$ , experience of investing (1 = over 5 , 0 = fewer than 5 years)	-0,15449731 (0,00065026) ***		0,10268396 (0,00283430) ***	

#### Robustness test and discussion of the results

I performed the pooled-variance  $t$  test (see chapter 4.4.2 for further details) to the differences in two means of proportions invested in structured capital guaranteed products and in equity based on experience of investing of the investor (over or fewer than 5 years). The  $t$  statistic of the differences in means invested in equity is -0,5258 and the  $t$  statistic of the differences in means invested in capital guaranteed products is -0,0461 which indicates a bit different results than the ones from the initial regressions. Based on this robustness test with two means, the difference in proportions invested in structured capital guaranteed products or in equity would not differ statistically with investors that have over or less than five-year's experience of investing. For example, one tailed  $P$ -value of the differences in means invested in equity is only 0,2999.

Results from the initial regressions and robustness checks give contradictory evidence of the association between experience of investing and proportions invested in capital guaranteed products and in equity. Perhaps in this case, the order in which I performed the tests should have been other: first the tests of differences in two means, and if it shows significant associations, after that the multiple regressions.

In this case, the test of differences in two means gives a better approximation of the associations. One reason is that, as age is regressed in the same model, it might reduce the association power of experience. Secondly, as I am testing how the proportions differ, test of differences in two means is a better approximation.

Recent studies suggest that accumulated wisdom and experience of investing might lead older investor less prone to behavioural biases (see e.g. Feng and Seasholes, 2005 or List, 2003). Evidence of my empiric tests of sample investors' portfolios indicates however a bit different associations. Firstly, if we consider investing in equity as an indication of sophisticated behaviour, in this sample older people are associated more to lower proportion of portfolio invested in equity. Secondly, even if investor would have over five year's experience of investing, the proportions invested in structured capital guaranteed products or in equity do not have statistical difference between investors with less than five year's experience of investing. As suggested by Korniotis and Kumar (2006), even though age and experience should lead older investors less prone to behavioural biases, age has its cognitive effects that affect also investment behaviour. In addition, their empiric results indicate that more experienced investors hold less risky portfolios, which is in line with the indicated associations from my analysis.

One reason for bit different results is that experience of investing in years is a categorical variable in this thesis and that duration of investing experience might not be the best measure of sophistication, more specifically, investor's self-assessment of his investment experience might be inaccurate. For example, investor might think she has over five year's experience because she has had money invested in three real estates for ten years. The problem is that we might consider investor with much shorter experience more sophisticated if the experiences accumulated are from direct stock trading for example. Perhaps for this reason, the awareness of different investment instruments is a better variable and measure of investor's sophistication.

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## 5.4 Associations of awareness

Table 10

### Results from regressions performed to test hypothesis (H4)

This table gives regression results of the multiple regressions performed to test hypothesis (H4) *Investors who are more aware of different investment instruments use relatively less capital guaranteed products and relatively more equity in their portfolios*. Panel A provides results of the regressions with awareness of stocks or options as a dummy variables (1 = aware, 0 = not aware) and Panel B with total amount of familiar instruments (0–4). Dependent variables are  $Y_{IL}$  (proportion of portfolio invested in structured capital guaranteed products) and  $Y_e$  (proportion of portfolio invested in equity). *P-values* of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Panel A: Regressions to test hypothesis (H4) with awareness of stocks or options, $N = 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{Ai}$ , age in years	0,00033565 (0,87757948)	0,09495046	-0,00228880 (0,13032982)	0,25387851
$X_{ASi}$ , awareness of stocks (1 = aware, 0 = not aware)	-0,17006648 (0,00016846) ***		0,20666329 (2,809E-10) ***	
$X_{AOi}$ , awareness of options (1 = aware, 0 = not aware)	-0,03009539 (0,57674136)		-0,01316140 (0,72403342)	
Panel B: Regressions to test hypothesis (H4) with total amount of familiar instruments, $N = 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{Ai}$ , age in years	0,00073406 (0,74468733)	0,02736991	-0,00285549 (0,08900524) *	0,07882779
$X_{TNi}$ , amount of familiar instruments	-0,05714269 (0,01534810) **		0,05942070 (0,00075750) ***	



**Robustness test and discussion of the results**

I performed the pooled-variance  $t$  test (see chapter 4.4.2 for further details) to the differences in two means of proportions invested in structured capital guaranteed products and in equity with clients that were aware of stocks and not aware of stocks. The  $t$  statistic of the differences in means invested in equity is -7,045 which confirms the association indicated by the initial model. In addition, the  $t$  statistic of the differences in means invested in capital guaranteed products is 4,254, which is also in line with the association indicated by the initial model.

Clearly, awareness is strongly associated to proportions of portfolio invested structured capital guaranteed products and in equity. Again, the association is strongest for equity proportion, but also for the proportion invested capital guaranteed products, awareness has a statistically significant association. Results are in line with earlier works, which study effects of awareness to portfolio composition. For example, Guiso and Jappelli (2005) argued in their study that if all investors were aware of stocks, stockownership could even double from its current level. Nevertheless, as they suggested there are many potential investors in this sample also without stocks in the portfolio that are aware (22 out of 93, ~24%) and this suggests that there are other impediments for participation in the stock market, for example participation costs. Study by Guiso et al. (2003) supports the effect of participation costs. They studied stockownership of the households in major European countries over time; they find that higher participation was brought by lower participation costs. Vissing-Jorgensen (2002) categorizes participation costs as fixed entry costs, fixed and variable transaction costs and per period trading costs. She suggests that strong structural dependence in participation and stock holding decisions is an evidence of participation costs, but does not estimate those costs. With structural dependence, she means that participation in a given period is more likely if the household participated in the previous period. Using panel data on households' indirect stockholdings she finds that lagged participation is a very significant determinant of current participation.

In this sample, awareness of stocks seems to be associated most powerfully to proportions invested in structured capital guaranteed products and in equity. One reason for this might be the structural dependence in participation. Another reason might be that the time it takes to understand the basic functioning of the stock markets – to learn how to follow price movements,

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how to trade, how assess risk and return relationships for optimal portfolio – could be considered as a cost to entry the equity markets. If investors do not have time to become sufficiently aware of the basic functioning of the stock markets, it might make the participation less tempting. In fact, Sule (2006) thinks time spent acquiring information as an opportunity cost of time (wage), and that this cost is paid only once over the entire life cycle of the investor (if ever).

The association between equity proportion and awareness of stocks has clearly some causality since if the investor has invested in stocks it is rather obvious that he might also be aware of stocks and as unfortunately most of the variables in my thesis, awareness is also subjective opinion. Perhaps better estimation of the association between proportion invested in equity and awareness might be some variable of the level of awareness that is measured with questionnaire related to different investment instruments for example. In addition, as the equities might have been the most successful asset class during the last years, it might have its effect on higher equity proportions if investor is aware and have invested in stocks for many years. As Kaustia and Knüpfer (2007) find by studying IPO subscriptions, personally experienced returns have clear impact on future actions. Since I have not controlled past returns of the assets in this thesis in any way, and the expectations customers have on returns of the structured products might be heterogeneous, controlling these variables would increase the representativeness of my study.

Awareness of different investment instruments is also powerfully associated to proportion invested structured capital guaranteed products, which should not have that powerful causality problem as with proportion invested in equity. Results indicate that if investor is aware of stocks or more aware he is of different instruments, more significantly he is associated to lesser proportion of portfolio invested in structured capital guaranteed products. As the premiums documented in the recent studies indicate, pricing of structured products might be unfair (see e.g. Grünbichler and Wohlwend, 2005), and investors' purchases might not be explained by rational behaviour of investors who are aware of the other investment opportunities available in the financial markets (see e.g. Henderson and Pearson, 2007). However, all the investors in this sample have invested in structured capital guaranteed product but the proportion is lesser if the investor is more aware of other investment instruments available in the financial markets.

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There are couple of intuitively rationale explanations to association between awareness and proportion invested in structured capital guaranteed products. Firstly, if investor is more aware of different investment instruments, he might be more capable to replicate the structure of the capital guaranteed products. Secondly, awareness might be product of advisors' educating their clients, and as the sample investors have usually more than one advisor they utilize in their investment activity, the recommendations by other than the case company's advisors might concentrate to other assets than structured products. As the structured products can be considered passive investments, it might be difficult for advisor from bank for example, to recommend structured product to the portfolio since it would make future transactions with this proportion of portfolio more difficult. Thus, advisor might be more tempted to recommend "structured solution" where the structure is replicated with investment in bond, and in investments in equity and derivatives for example. This way, the money invested in these assets can be used more easily for future transactions that create revenue than if it was invested in structured products.

### 5.5 Associations of the use of multiple advisors in investment activity

**Table 11**

**Results from regressions performed to test hypothesis (H5)**

This table gives regression results of the multiple regressions performed to test hypothesis (H5) *More investor uses advisors in his investment activity, higher is the proportion of portfolio invested in equity and lesser is the proportion invested in capital guaranteed products.* Duration of customership is in years, and the amount of advisors is the total number of financial advisors investor uses in his investment activity. Dependent variables are  $Y_{IL}$  (proportion of portfolio invested in structured capital guaranteed products) and  $Y_e$  (proportion of portfolio invested in equity). *P-values* of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Regressions to test hypothesis (H5), $N= 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{Ai}$ , age in years	0,00729797 (0,72568093)	0,17142295	-0,00268952 (0,10421633)	0,10335141
$X_{DRI}$ , duration of customership	-0,01458743 (0,00383013) ***		-0,00159821 (0,68494044)	
$X_{ADI}$ , amount of advisors	-0,16622457 (0,00000010) ***		0,08814291 (0,00024928) ***	



**Robustness test and discussion of the results**

I performed the pooled-variance  $t$  test (see chapter 4.4.2 for further details) to the differences in two means of proportions invested in structured capital guaranteed products and in equity with clients that utilized more than one advisor in their investment activity and with clients utilizing just one advisor (from the case company). The  $t$  statistic of the differences in means invested in equity is -3,750 which confirms the association indicated by the initial model. In addition, the  $t$  statistic of the differences in means invested in capital guaranteed products is 5,336, which is also in line with the association indicated by the initial model.

Associations between the amounts of advisors investor uses in his investment activity and proportions invested in structured capital guaranteed products and in equity are significant. More there is advisors helping investor, higher is the proportion invested in equity and lower is the proportion invested in structured capital guaranteed products. Results support the argument by Fischer et al. (2008) that financial advisors have an incentive to promote equity-concentrated asset allocations. However, association is probably also due to the nature of the sample, since if the client is utilizing only one advisor, he is the representative of the case company, and if the client is utilizing more than one advisor, he might be representative offering stock trading with great likelihood.

Multiple regressions indicates that duration of customership is significantly associated to lower proportion of portfolio invested in structured capital guaranteed products. Finding is interesting since the customership is to the company selling structured capital guaranteed products. However, as the case company offers also other instruments to investors and company started to mark structured products to Finnish markets in 2003, so even though the customership has began for example 10 years ago, structured products are offered to clients first time in 2003.

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### 5.6 Multiple regressions with total value of portfolio, risk tolerance, awareness of stocks, experience and amount of advisors

I performed this regression in order to enlighten and to be more capable to compare results from the initial regressions.

**Table 12**

#### Results from multiple regressions performed to enlighten results from the initial models

This table gives regression results of the multiple regressions performed with following explanatory variables: total value of the portfolio, risk tolerance, awareness of stocks, experience and amount of advisors investor uses in his investment activity. As in the initial regressions, experience of investing and awareness of stocks is set to dummy variables. Dependent variables are  $Y_{IL}$  (proportion of portfolio invested in structured capital guaranteed products) and  $Y_e$  (proportion of portfolio invested in equity). *P-values* of the coefficients are in the parentheses. Adj  $R^2$  is the adjusted R square of the model. \*\*\*, \*\* and \* stands for corresponding statistical significances 1%, 5% and 10% of the coefficients.

Regressions to enlighten the initial results, $N = 146$				
Explanatory variable	$Y_{IL}$		$Y_e$	
	Coefficient	Adj $R^2$	Coefficient	Adj $R^2$
$X_{TVi}$ , total value of the portfolio (in Th. Euros)	-0,00003985 (0,00313412) ***	0,24272110	0,00001846 (0,06072723) *	0,29186285
$X_{RTi}$ , risk tolerance (1-5)	-0,03234010 (0,11823689)		0,02779114 (0,06878407) *	
$X_{ADI}$ , amount of advisors	-0,07012100 (0,02200641) **		0,02650212 (0,23665773)	
$X_{EXi}$ , experience of investing (1 = over 5 , 0 = fewer than 5 years)	-0,05177700 (0,23800517)		-0,00539986 (0,86698394)	
$X_{ASI}$ , awareness of stocks (1 = aware, 0 = not aware)	-0,06712645 (0,13685743)		0,15711960 (0,00000488) ***	

Results of multiple regressions with various explanatory variables give interesting insights to the associations that I found from the initial models. Total value of the portfolio is statistically associated to both proportion invested in structured capital guaranteed products and in equity; more valuable the portfolio, higher is the proportion invested in equity and lesser is the proportion invested in structured capital guaranteed products. Perhaps, higher value of the

portfolio affects the risk tolerance of the investor. This might be true especially in this sample, since the assessment of the risk tolerance is done in the meeting with the advisor. Therefore, current financial portfolio and its total value might lead the assessment of the risk tolerance creating some causality to the data.

However, as already suggested, total value of the portfolio might have its effects on portfolio composition also through the supply of the financial services. Firstly, if value of investor's portfolio is not sufficient to individual brokerage service, investor might be sceptical that his stock picking skills will offset the transaction costs of direct stock trading. Secondly, after the client's total value of the portfolio is high enough, perhaps financial institutions start target the marketing to these clients especially. These conjectures are intuitively easy to accept, and consequently those reduce the costs of information acquisition for the wealthier investors. As Bluethgen et al. (2007) find, individuals who can be assumed to face higher costs of information acquisition and to be more susceptible to cognitive biases, are more likely to rely on financial advice. And for these investors, they find that financial advice enhances diversification and adds discipline to the asset allocation. Thus, it might explain why association between values of the total portfolio to portfolio composition is mostly consequence of the changes in portfolio compositions of the investors in the lower end of the value distribution.

In line with initial models, the variable for experience of investing that I use in this thesis has insignificant association to proportions invested in equity and in structured capital guaranteed products. The amount of advisors seems to be associated significantly to lower proportion invested in structured capital guaranteed products, as for proportion invested in equity, the association is low. These results indicate that perhaps advisors do not generally have incentives to promote structured products in the portfolios, and findings emphasize the importance of awareness of stocks to proportion of portfolio invested in equity. If investing in structured products is due to the behavioural biases of the investors as suggested by earlier works (see e.g. Wallmeir and Diethelm, 2008), enlisting professional advice might reduce the proportion invested in structured products. Suggestion is in line with findings by Shapiro and Venetia (2001). Results from their study imply that advisors might indeed correct cognitive errors of individual investors. They also find that professionally managed accounts experienced more activity and better performance in the sample period than independently managed accounts.

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Professional accounts were also less correlated with the market and more diversified. Therefore, as the structured products can be considered as a passive investment instruments, finding by Shapiro and Venetia (2001) that professional accounts experienced more activity supports my suggestion that advisors do not generally have incentives to promote these products to retail investors' portfolios.

Most powerful association for the proportion invested in equity seems to be with awareness of stocks. Even though remarkable association may result from causality of the data to some extent, awareness seems to be most influential variable in participation to stock markets. Overall, associations between awareness and total value of the portfolio to proportions invested in equity and in structured capital guaranteed products are supported by earlier works also: for example, Calvet et al. (2006) document that financially more sophisticated households tend to invest more efficiently and aggressively and Bertaut (1998) find that investors with higher risk tolerance, higher wealth and higher education are more likely to invest in equities since their information costs are lower.

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### ***5.7 Result of the $\chi^2$ test of independency – are portfolio compositions dependent of risk tolerance***

To test null hypothesis of independence against the alternative that there is a relationship between the two categorical variables, following test statistic was computed to test whether there is dependency between risk tolerance and portfolio composition:

$$\chi^2 = \sum_{Allcells} \frac{(f_o - f_e)^2}{f_e}$$

where

$f_o$  = observed frequency in a particular cell of the  $r * c$  contingency table

$f_e$  = theoretical frequency expected in a particular cell if the null hypothesis of independence was true

In this sample,  $\chi^2 = 12,40$  and  $P$ -value is 0,1342.

And if,

$\chi^2 > \chi^2_{8} \rightarrow$  reject the null hypothesis; otherwise do not reject the  $H_0$ .

In this sample, the portfolio composition seems to be independent of the risk tolerance of the investor.  $P$ -value of the test statistic is 0,1342, indicating however some dependency, but not statistically significant at any level. However, as the sample size is rather small, I had to simplify the classification of the data, and as the portfolios in this sample all include structured capital guaranteed product, it might create systematic bias to the test. In addition, the distance between different assets is constant and categorized which might also simplify the test too much. In addition, ranking the investments based on available information is challenging. To be able to make more reasonable statistical analysis, sample size would have to be larger and information about what is inside the assets deeper. However, low statistical indication of dependency between risk tolerance and portfolio composition added with descriptive support (chapter 4.2.2) is in line with suggestion from Bluethgen et al. (2007) that financial advice adds discipline to asset allocation decisions of retail investors.

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### ***5.8 Summary of findings***

Median investor in the sample of my study is over 50 years old risk neutral male, who is aware of stocks, funds and index loans but the awareness of options is rare. He uses two investment advisors in his investment activity, has over five year's experience of investing and has been customer to the case company for four years.

Mean value of the portfolio is a bit over million Euros. After index loans, most popular investment target among the sample investors is real estate, and after that, if measuring with mean proportion of portfolio, equity and funds comes next. Descriptively analysing, portfolio compositions seems to be in line with risk tolerance of the sample investors: generally, more risk tolerant investors are associated to higher proportion of portfolio invested in risky assets and lesser proportion invested in conservative assets and behaviour is reverse for more risk adverse investors. However, for example, proportions of sample investors' portfolios invested in real estate are more randomly segmented.

I performed also  $\chi^2$  test of independency to analyze whether portfolio composition is dependent of the risk tolerance of the investor. After few necessary simplifications I did to the data to be able to perform statistically reasonable analysis, results indicate some dependency, but not statistically significant at any level (*P-value* is 0,1342). To be able to make more reasonable statistical analysis, sample size would have to be larger and more information about what is inside the assets deeper.

Even though the sample size of this thesis is rather small, descriptive statistics indicate that there is space for improvements in diversification between different asset classes. Underdiversification is widely documented behaviour of the retail investors in the previous studies as well (see e.g. Calvet et al., 2006; Goetzmann and Kumar, 2001; Rode, 2000). Particularly, results indicate that even though investor might be more risk averse, he might hold less efficiently diversified portfolio that is line with earlier studies. For example, Calvet et al. (2006) document that financially more sophisticated household tend to invest more efficiently and aggressively.

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Earlier works of structured products' pricing suggest that the success of these products might be explained with risk aversion of the investors (see e.g. Henderson and Pearson, 2007 or Wallmeier and Diethelm, 2008). The distribution of the investors' risk profiles in this sample is not skewed towards low risk tolerance levels and in addition, the mean values of the investments in structured capital guaranteed products are lower for more risk adverse investors. These results indicate that the demand, if measured in nominal amounts invested, might not be explained by risk aversion. However, I find association between proportions of portfolio invested in structured capital guaranteed products and risk aversion of the investors, which is in line with previous studies' conjectures that risk adverse investors are more tempted to convex payoff profiles.

Value of the total portfolio is statistically associated to proportions invested in structured capital guaranteed products, in real estate, in cash and in equity: the more valuable is the sample investor's portfolio, higher proportion of portfolio is invested in real estate and in equity, and lesser proportion is invested in structured capital guaranteed products and in cash. Risk tolerance seems to have same kind of associations to proportions invested in different assets but there is no statistical association to proportions invested real estate, and as the risk tolerance of the investor increases, higher proportion of portfolio is associated to investments in funds.

When dividing mean proportions invested in structured capital guaranteed products and in equity to intervals by value of the total portfolio, associations of value of the portfolio to proportions invested in capital guaranteed products and in equity are mostly consequences of the changes in portfolio compositions of the investors in the lower end of the value distribution. I believe that in addition to relative risk aversion of the investors, some explanation to this is that banks generally have some threshold to portfolio's value after they offer private stock brokerage service for the client. Rationale behind this argument is that total value of the portfolio might have its effect on portfolio composition through the supply of financial services. Firstly, if value of the investor's portfolio is not sufficient to individual brokerage service, investor might be sceptical that his stock picking skills will offset the transaction costs of direct stock trading. Secondly, after the value of client's portfolio exceeds certain threshold, perhaps financial institutions start target the marketing to these clients especially. Consequently, this reduces the costs of information acquisition for the wealthy investors.

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Perhaps as a product of the risk tolerance, female investors are more powerfully associated to higher proportion of portfolio invested in structured capital guaranteed products and lesser proportion invested in equity than male counterparts are. Results are consistent with earlier findings from gender differences, which indicate that women take less risk than men (see e.g. Maltby and Ruttenford, 2007). However, due to the low proportion of females in the sample, statistical reliability of this association is rather low. Age however, seems to be rather weakly associated to proportions invested in structured capital guaranteed products or in equity. The association is however, clearly more powerful for proportions invested in equity. The nature of the data might have its explanation to low association: most of the sample, investors are over 50 years old and some of them already retired. In addition, some recent studies have introduced an suggestion that investor might find it optimal to increase the proportion of financial wealth held in stocks as she ages and accumulates assets, even when her income and investment opportunity set are constant which is bit contrary to the common intuition (see e.g. Farhi and Panageas, 2007).

Clearly, awareness of different investment instruments is strongly associated to lower proportion of portfolio invested in structured capital guaranteed products and larger proportion in equity. Results are in line with earlier works, which study effects of awareness to portfolio composition (see e.g. Guiso and Jappelli, 2005). Perhaps the explanation behind this strong association is the structural dependence. Vissing-Jorgensen (2002) find that lagged participation in a given period to equity markets is a very significant determinant of current participation. Another reason might be that if investors do not have time to become sufficiently aware of the basic functioning of the stock market, it might make the participation less tempting.

The variable that I use in this thesis for experience of investing has insignificant association to proportions invested in equity and in structured capital guaranteed products. However, the amount of advisors investor utilizes in his investment activity seems to be significantly associated to lower proportion invested in structured capital guaranteed products, as for proportion invested in equity, the association that I find from multiple regression with several explanatory variables is rather low. Results indicate that advisors do not generally have incentives to promote structured products, and that advisors and investors use variety of instruments to build portfolios.

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## 6 CONCLUSIONS AND FUTURE WORK

My thesis supports the association between behavioural biases and higher proportion of portfolio invested in structured capital guaranteed products. Association is suggested in many earlier studies of structured products' pricing (see e.g. Henderson and Pearson, 2007 or Wallmeier and Diethelm, 2008), but to the best of my knowledge, my paper is the first one to shed some light to this question empirically. In addition, my study indicates by analyzing unique dataset that awareness and wealth are associated clearly to portfolio compositions of retail investors that are in line with previous studies in that area (see e.g. Calvet et al., 2006 or Guiso and Jappelli, 2005).

My study also contributes to studies of financially advised investors' portfolio compositions, which is rather narrowly analyzed subject in finance literature, but gaining more attention all the time (see e.g. Bluethgen et al., 2007 or Fischer et al., 2008). Descriptively and empirically analyzing I illustrate that financially advised investors' portfolios are dependent of their risk tolerance and that amount of advisors investor utilizes in his investment activity is associated to lower proportion invested in structured capital guaranteed products, as for proportion invested in equity, the association is rather low in multiple regression analysis with several explanatory variables. Findings indicate that advisors do not generally have incentives to promote structured products and those emphasize the importance of awareness to larger equity proportion.

Main deficits in my thesis are related to data and to characteristics of structured products that unfortunately reduce the reliability of the results. Main limitations are rather small sample size, which concentrates only to investors who have invested in structured capital guaranteed products, low proportion of females in the sample, causalities that may be common, subjective estimations, and challenges related to define the purpose of the investment to structured capital guaranteed products. However, as the purpose in my thesis is to find associations and not obvious effects, I manage to take these challenges in to account in my analysis. In addition, the problems with subjectivity in evaluation of risk tolerance and with complicated characters of structured products for example are presumably present in the future studies also. I hope that my thesis provides some pointers how to overcome these challenges.

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Practically, my thesis provides couple of worthwhile implications to marketers and producers of structured financial products. Risk profile of the investors of structured capital guaranteed products is normally distributed and the nominal amounts invested are higher for more risk tolerant investors indicating that investors with high risk tolerance also demand these products. This supports the importance of the underlying index as part of the portfolio's diversification properties. Nevertheless, the proportion of these products in the portfolio is larger for more risk adverse investors. Therefore, when advisor is recommending the use of structured product, for risk tolerant investor the recommendation should concentrate to modest proportion and the strategy of the index should provide diversification benefits for the investor. As for more risk adverse investor, the proportion can be higher, and safety or liquidity of the investment might be more important factors behind the purchase decision than the underlying strategy of the index.

Structured products offer interesting possibilities for future studies. I will next present few of them that came in to mind during the research process. Firstly, it would be insightful to analyze what is the premium investor would be willing to pay of the purchased product and compare that to actual or to theoretical value of the product. The importance of this kind of study is that legislation is aiming to increase the transparency of financial products and investors are entitled to get information about incentives nowadays. To be able to create revenue from the financial markets, it is inevitable to evaluate what is the price investors are willing to pay and what services or characters they appreciate the most. Secondly, since the returns in structured products are often calculated using distracting formulas and even more complicated strategies, for example averages of the index returns that follows carry-trade strategy, it offers challenges for future researchers to be able to model these with reliable assumptions of the volatility when evaluating the premiums of the products. Thirdly, executing similar kind of study as mine with more representative, accurate and extensive data-set without excluding investors based on types of products they have in portfolio would provide important information of the success of different types of financial instruments and behaviour of the retail investors.

Changes in legislation, particularly, implications of the MiFID directive will also provide interesting subjects to study in future works. For example, what implications does it have on incentive systems of the financial institutions and/or to premiums of the financial products?

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