Revealed and Stated Investment Decisions Concerning Structured Products

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Abstract
We analyze the investment behavior of private clients concerning structured products. To ascertain their stated and revealed preferences, we use a questionnaire and a field experiment, respectively. The questionnaire is based on behavior finance principles. The real product issuance in the field experiment is comparable to one designed product in the questionnaire – both in its payoff and communication to the clients. The main findings from the questionnaire are that behavioral finance heavily motivates people to invest in structured products for the first time and that gender differences vanish. The last result also appears under true market conditions for the issued product with a comparable payoff to one from the questionnaire. This product however has attracted considerably less first time buyers than expected from the questionnaire. But still a larger fraction subscribed to this product than one observes on average for all other structured products which are issued using traditional technical product information. Finally, the sizes and distribution of the investment amounts turns out to be different in the two set-ups: While the questionnaire participants focus on their annual income situation, wealth is the focal point in the field experiment.

Key Words: Field Experiment, Behavioral Finance, Structured Products, Revealed Preferences, Stated Preferences
JEL Classification: G14, G19, D81, E22,

Acknowledgements
The authors acknowledge the support of T. Hens and P. Wöhrmann, University of Zurich, in designing the questionnaire and providing a first questionnaire analysis. We further acknowledge remarks and feedback from the several questionnaire participants at Zurich Cantonal Bank. P. Vanini acknowledges support by the national center of competence in research „Financial Valuation and Risk Management”.

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1 Introduction

Behavioral finance considers facts from behavioral sciences in the description how investors make decisions and perceive the world around them. Therewith, behavioral finance has gained great importance in finance theory. In contrast to the traditional finance theory, behavioral finance for example makes the fear of an investor to lose its invested capital a subject of discussion. Motives which drives investors in their investments and numerous other insights like the failure of people to apply correctly the law of large numbers constitute
behavioral finance. Do these insights of behavioral finance which sell well in theory also help selling in the practice? To answer this question we will argue with a product which considers behavioral finance in its design and in particular in the way how the product is presented to the public in the product description.

We will address six main purposes. First, we will test whether the product attracts the investors more than a traditional one. Is behavioral finance a selling proposition? Second, we compare on an aggregate level, whether the individuals announcing to buy the behavioral finance product really do so. This comparison contributes to answer the question whether people really do what they say. Answering this question also helps to find out, third, whether surveys are an effective tool for a bank to discover its clients’ needs and motivations. Survey-based clients research is often pursued before launching a new product. Surveys, however, only have the desired effect, if the individuals really do what they announce. Besides addressing whether surveys are an effective instrument we will also look, fourth, at the sample from an efficient point of view. Normally, a large amount of people outside the bank is asked by clients research. Do external people have to be asked or could some of the bank's own employees be asked? Finally, nevertheless a possible objections to surveys the announced investment behavior regarding the behavioral finance product will be at the root of two further purposes. On the one side to examine whether the individuals asked behave rationally as described in the traditional expected utility theory. Or whether they behave consistent within the behavioral finance model For this reason, we will compare on an aggregate level whether the individuals state to buy those products which are consistent with their investment motives announced at an earlier stage. If there is consistency, the real product could directly be designed from the announced motives.

To ascertain the hypothetical investment behavior of potential investors, we use two questionnaires one after the other. The sample in both cases consists of 59 selected employees of a bank. We have selected these employees in a way that they represent the overall bank population structure. The main objective of the first questionnaire is to gain information about what drives the people asked in their investment. For this reason, we apply in the questionnaire the three investment motives of the Kahnemann-Tversky prospect theory (1997). Based on the answers received we calculate for every employee the estimates of the three motives. In the second questionnaire, we then ask the employees how much they would invest in different types of structured financial products. All these products consider the investment motives in different extent. At the same time, one of the products is comparable to the later issued one.

To understand the real investment behavior of investors we analyze real life data. In fact, we analyze the purchases registered when Zurich Cantonal Bank issued a structured product being comparable in its payoff to one from the questionnaire. Furthermore, strong efforts were made to deliver a product description to the client which was as simple and transparent as possible. For analyzing the purchases we build two samples; the clients' sample and the employees' sample. The first sample consists of all the clients the Zurich Cantonal bank has informed about the product by sending the product description. The employees' sample is a sub-sample of this sample which contains the employees obtaining the product description. Similar investment amounts observed in both samples would be a sign that clients research done in-house by asking the own employees suffices to discover the needs and motivation of the bank's clients.

We find that behavioral finance is a selling proposition to some extent. In particular, the behavioral finance approach motivates women to invest in contrast to the traditional
approach. Further, individuals announce that they intend to buy much more than the buy in reality: Stated values for the investment sizes are 1.7 times higher than observed ones. Surveys, therefore, generate data which should be dealt with due care. A field experience in place of a survey is more effective. In terms of market entry, i.e. the fraction of all clients which bought for the first time a structured product the findings are the following ones: People heavily overstates their willingness to buy structured products compared to what they do under comparable circumstances. But if we compare market entry for the case where the product is described close to what behavioral finance considers to be important with the traditional more technical product description again a significant difference follows: Clients show a much stronger motivation to invest in structured products if they are described in non-technical and transparent way. At the same time, it turn out that the data gained by asking a small amount of the own employees are representative of the clients data. Therefore, it would be more effective and also cheaper for a bank to hold field experience with the own employees instead of the traditional clients research which is based on asking external people in a survey. Finally, our participants in the two questionnaires do not behave rational as described in the traditional expected utility model. We have however to deal with this and also the last finding with due care because they are gained by surveys. The last finding is that individuals state to buy those products which are consistent with their announced motives. This finding supports the industry standard in the design of structured products where a direct approach concentrating on the investment motives is used.

The paper is organized as follows. Section 2 deals with the two questionnaires leading to the stated preferences for the structured products. Section 3 addresses the launch of a structured product in reality which is comparable to one from the questionnaire and draws conclusion from comparing the real with the hypothetical investments. Section 4 concludes.

2 Questionnaire: Stated Preferences

A behavioral finance approach considers the investors investment motives and also their investment topics. Our procedure to design such products and to discover the investors' stated preferences for such products relies on several steps. In doing so, among other things we will find out whether individuals are rational decision makers and whether their behavior is internally consistent in the behavioral finance model.

First, we selected the questionnaire participants. We picked out 59 employees of the Zurich Cantonal Bank, which came from different business units and which also differed in their age, sex and position within the institution. Therewith, we considered that the sample was not biased towards the structure of the overall bank population.\(^1\) Fifty-six employees out of the 59 addressed sent back the questionnaire.

First questionnaire about investment motives

\(^1\) 34 of the 56 participants are men. They are on average 39 years old; the youngest (oldest) participant is 26 (57) years old. 8 participants belongs to the senior management board, 13 to the management board and 35 were employees. Furthermore, the participants are selected to represent all business units, i.e. traders, accountants, IT-engineers, client advisors, controllers, etc.
Second, we formulated the questionnaire, where we asked for the participants' personal data, their wished investment topics and their investment motives. The personal data comprises age, function and sex as well as information about the participants knowledge level and their holding of structured products.

Analyzing the personal data yields findings as expected. A significant larger fraction of men than women possess structured products. Men are also more informed about structured products than women. According to the ratio between information and possession of the last column of Table 1, only every fifth woman who is informed about SP buys them in fact whereas every informed man is also in possession of them.

Possible explanations could be that knowledge already constitute a utility for women whereas men only collect the information for buying the products. However, the different ratios can also indicate that the present products fail to meet the investment motives of women to a larger extent than those of men and/or that the way how structured products are documented and sold is less convincing for women than it is for men.

<table>
<thead>
<tr>
<th></th>
<th>Own SP</th>
<th>Being informed about SP</th>
<th>Ratio between information and possession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>4.5%</td>
<td>22.7%</td>
<td>5.0</td>
</tr>
<tr>
<td>Men</td>
<td>35.7%</td>
<td>46.4%</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Table 1 Gender-related analysis of ownership and level of information about SP

Concerning the investment topics we indicated some topics like SMI, CHF, LIBOR or oil, while the participants could also add any other areas where they wished to invest.

From analyzing the answers we conclude that the bank has to set the investment topics. The participants selected those topics, which were either in line with the home bias or "hot" by the date of the questioning. They also suggested a wide variety of topics by themselves. None of these additional topics were however preferred by a significant part of the participants.

Concerning the investment motives we posed questions on risk aversion, loss aversion and gambling (see Appendix) which are the three investment motives of the Kahnemann and Tversky prospect theory. Whereas however risk aversion is already considered in the traditional decision theory and therefore nothing new, loss aversion and gambling are the new key aspects of the prospect theory.

Risk aversion means that a decision maker which faces several alternatives with the same expected value will choose those with the lowest risk. In prospect theory the parameter alpha considers this aversion towards risk.

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2 The readers who are interested in the details of the questionnaire should contact T. Hens or P. Wöhrmann. Both of them are from the Swiss Banking Institute of the University of Zurich.
Figure 1: Estimated parameters of risk and loss aversion as well as gambling of the questionnaire participants.

Loss aversion means that losses loom larger for individuals than corresponding gains. The utility function of the prospect theory considers that in case of a loss, a larger disutility arises than in the classical utility function. The parameter beta measures the degree of loss aversion, see the Appendix for details.

Gambling refers to the tendency of individuals to make decisions on the basis of subjective assessments of probabilities which may be quite different from the objective or true probabilities. Individuals tend to overestimate small probabilities and underestimate moderate and high probabilities. For instance, a risky instrument promising high payoff with small probabilities attracts gamblers which overestimates this small probabilities and therefore will invest large amounts. Parameter gamma stands for gambling.

Estimation and analysis of the investment motives’ parameter

Third, we estimated the motives' parameter for every participant. To derive the parameters we used the gained information in the Kahnemann and Tversky model (see Appendix for the procedure).

We then analyzed the parameter values. We compared the parameter values of our sample with those of the literature. Furthermore, we checked the parameter values with individuals' rational behavior as described in the traditional expected utility theory.

Our estimated parameters are similar to the ones in the literature. Specifically, as Table 2 shows, they are similar to the Kahnemann and Tversky (1979) values. The details of the estimation procedure can be found in the Appendix.

\[^3\] Further, our estimated parameters also fit with those of Camerer and Ho (1994), Wu and Gonzalez (1996).
Risk and loss aversion represent completely different investment motives for an individual, as can be seen from Figure 1. This figure illustrates the estimated values of the three investment motives for every participant; the participants' parameter are ordered according to decreasing risk aversion. Figure 1 shows that in our sample the degree of risk aversion is not related to the one of loss aversion. Furthermore, the individuals behave similar regarding their risk aversion, but strongly differ from each other regarding loss aversion and gambling.

*Are the questionnaire participants rational decision makers?*

Do the questionnaire participants behave as described in the traditional expected utility theory? To answer this question, we look at the value of the parameter for gambling, i.e. gamma. A value of gamma equal to one is sufficient for rationality: the subjective probability corresponds to the objective one. There is no gambling; individuals maximizes their expected utility as described in the traditional expected utility theory. If additionally beta also equals to one, the loss aversion disappears and the utility function of the individual corresponds to the standard one. Figure 1 shows that most individuals in our sample are far from rational decision making as assumed in standard economic theory: 70% of all participants made decisions which led to a gamma values smaller than 0.9.

Our sample further indicates that sex-differentiation in the design of structured product is not necessary because women and men are similar in their motives. They behave almost identically regarding risk aversion and gambling. Furthermore, women are only slightly less loss averse than men; the means are 1.35 compared to 1.64. Since the standard deviation are similar for all three motifs we conclude that is not necessary to design different products for women and men. The age of the participants also has no significant impact on the behavior. There is only a small lower loss aversion as well as a small higher gambling behavior for the over-forty aged individuals than for the under-forty years old ones. The same conclusion follows if we use two further selection criteria: There was no significant difference between young-women and elder-men.

We observe however a difference between men and women in the desired investment time horizon. Women prefer more longer time investments than men do: 70% (55%) of the women (men) wanted to invest up to 7 years whereas only 41% (75%) preferred investments up to one year. Women also show more focused time preferences than men. They select more specifically the maturities of the products whereas men prefer all possible time horizons.

*Design of structured products based on questionnaire’s findings*

In a further step, we designed three different types of structured products based on the knowledge gained in the questionnaire. All three products are characterized by the Swiss Market Index (SMI) as the underlying and by a maturity of 5 years. They differ however regarding the size of capital protection and the participation on SMI returns. The three different products, named with SP1, SP2 and SP3, are described in Table 3 and illustrated in
Figure 4. SP1 is the product with the lowest risk. The payoff at maturity is at least the invested amount at the beginning. In contrast, the participation on the SMI return is relative moderate. Investors featured by a strong loss aversion are the target group of this product. SP3 is dominated by loss aversion and capital protection since capital protection is at its lowest level and the participation on SMI return is most pronounced. SP2 lies between SP1 and SP3 regarding the extent of capital protection and SMI participation.

Figure 2: Payoff schemes of the three different products in relation to the SMI return.

<table>
<thead>
<tr>
<th>Name</th>
<th>Capital protection</th>
<th>SMI Participation</th>
<th>SMI returns</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1</td>
<td>100%</td>
<td>50%</td>
<td>0-40%</td>
</tr>
<tr>
<td>SP2</td>
<td>97%</td>
<td>100%</td>
<td>0-40%</td>
</tr>
<tr>
<td>SP3</td>
<td>90%</td>
<td>160%</td>
<td>30% - 60%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%</td>
<td>&gt;60%</td>
</tr>
</tbody>
</table>

Table 3: Characteristics of the three structured products (SP).

Second questionnaire to ascertain the stated preferences for the structured products

We then formulated a second questionnaire to find out the hypothetical purchasing pattern of our participants regarding the designed products. We asked them whether they would invest in these products, or whether they would prefer the money market (MM) outside option. Besides deciding where to invest (MM, SP1, SP2, SP3), they also had to choose the amount of investment in Swiss Francs or as a percentage of the annual salary.4

Do the questionnaire participants behave internally consistent in behavioral finance model?

4 Investments stated as fraction of the annual salary were converted in CHF amount by using the mean salary of the year 2004.
Next, we test for internally consistent behavior of the questionnaire participants in the behavioral finance model. We find that consistency hold by comparing the hypothetical choice made by our participants with their estimated parameters. To do this consistency test of behavioral finance, we construct the trade-off value between loss aversion and gambling-seeking (T), which reads $T = \frac{\text{Beta}}{1 - \text{Gamma}}$. We calculate this trade-off value $T$ for all the three products S1, S2, S3. In case of consistency we have $T(\text{SP1}) < T(\text{SP2}) < T(\text{SP3})$, which means that the $T$-value for all employees which decide for SP1 should be smaller than for those which selects SP2 and so on. The reasoning behind this is that the individuals who choose SP1 - the product with 100 percent capital protection – should logically be featured by a strong loss aversion, i.e. a low value of beta. The low beta value consistently with the individuals who choose SP1 leads to the low trade-off value $T$ for the SP1. The predicted ordering is indeed observed: We get for the trade-off $T$ for SP1, SP2 and SP3 the values $5.86 < 8.64 < 10.2$.

Analysis of the stated investment decisions concerning structured products

Finally, we analyzed the hypothetical purchasing pattern of the participants regarding the designed products. We provide the results in the next section together with the real product data.

The questionnaire participants diversified as classical portfolio theory predicts. Investing in several products were far more attractive for them than investing in a single product. Table 5 shows that 10 percent of the participants invested in all three structured products as well as the money market instrument.

We interpret the diversification as a “interference of investment motives”. Investors are not only driven by one but several investment motives. In fact, there is a main motif which drives the investor. Other motives interfere with the main motif which leads to a dispersive investment decision.

The main motivation of one part of the participants is to participate on the risky stock market returns. In addition, they aim for perfect capital protection. Table 4 shows that 13 percent of the participants invested in SP2 and MM, whose mixture meets best the wishes of having pronounced participation on the risky stock market return supplemented by capital protection. The instrument SP2 features a pronounced participation on the risky stock market returns (100 percent SMI participation), the capital protection of 97 percent is however only almost perfect. Therefore, an additional investment in the money market makes the capital protection more perfect. A further illustration is the zero investment in SP3 and MM. Investing in SP3 brings the largest SMI participation but only a 90% capital level guarantee. The participants do not accept this low capital protection which also cannot be substituted by a money market investment. The reasoning also applies to the zero investment in SP3, MM and SP2.

The other part of the participants shows another behavior. Their main motivation is gambling which leads to SP3 being their leading product. They then add partial capital protection as a further motif by composing SP3 with SP2. SP1 is too distant from the SP3-anchor. Eleven percent of the participants choose the combination of SP3 with SP2.

| Fraction of Investment Decisions | MM: 0% | MM+SP1+SP3: 3% |
Table 4: Participants' investment decisions in three structured products SP1, SP2, SP3 and the money market MM.

Risky products tend to be more attractive for the questionnaire participants than investing in the safe accounts. The attractiveness of risky products appears in the decision where to invest as well as in the invested amount (see Table 5\(^5\)). The most preferred product by the participants is SP2; 33 percent of the total investment decisions and even 43 percent of the total investment sum account for SP2.

The more risky the products are, the more extreme are the investment amounts. The tendency to invest more the larger the participation at the stock market return applies to all questionnaire participants until a certain turning point. At this turning point which lies somewhere between SP2 and SP3, the participants start to fear the reduction of capital protection which triggers their loss aversion. A segmentation into two types of investors takes place; the one which is dominated by its loss aversion and the gambling investor. The loss averse investor now slowly reduces its engagement or exits completely. The gambler however starts investing. The risky instrument, SP3, promises high payoff with small probability. The gambler overestimating this small probabilities invests large amounts. This segmentation into small and huge investment amounts enforces the increase in variability of the more risky investments, which is shown by the last column of Table 5, i.e., standard deviation of mean investment amount in CHF. The numbers of the last column of Table 5, i.e., standard deviation of mean investment amount in CHF, show that the more risky the investments are, the broader the standard deviation of the invested amounts become. For SP3 the standard deviation is even larger than the mean invested amount.

<table>
<thead>
<tr>
<th>Products</th>
<th>Investment decision</th>
<th>Investment amount</th>
<th>Mean investment amount in CHF(^6)</th>
<th>Standard Deviation of mean investment amount in CHF</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM</td>
<td>16%</td>
<td>11%</td>
<td>1.00</td>
<td>0.78</td>
</tr>
</tbody>
</table>

\(^5\) The second column of Table 5, i.e., investment decision, lists how much of all the total investment decisions by the participants accounted for each single product. The third column, i.e., investment amount, and the fourth column, i.e., mean investment amount in CHF, represents the invested amount in percentages and absolute terms respectively.

\(^6\) The average does not consider the three employees which did not make any investment. Therefore, concretely, it is the mean non-zero investment amount in CHF.
More (female) participants committed to buy structured products compared with the situation at the first questioning. At the first questioning only 23 percent of the participants had already bought structured products whereas now 63 percent of them committed to buy one or several of the three proposed products. In the meantime also the sizable difference between women and men possessing structured products (see Table 1) evaporated. In addition, the invested amounts in all three structured products between women and men were comparable: Women’ investments were on average 82 percent of men’ ones.

3 Product Launch: Revealed Preferences

In real life, a structured product with a comparable payoff to one from the questionnaire was issued and we could discover the investors revealed preferences. Since further not only the two products but also the circumstances behind the two investment decisions and product information design were comparable we can compare the hypothetical and real investment behavior. This comparison will allow us to answer the following three questions:
- Do people do what they say?
- Are a bank’s employees data representative for clients research?
- Is behavioral finance a selling proposition?
First of all however, we will describe the issued product and the behavioral finance approach we used to present the product in the product description.

Characteristics of the issued product

Around one year after the questionnaire period the Zurich Cantonal Bank issued a product, which was called ZinSMI and which is comparable to the product SP1 from the questionnaire. The ZinSMI is featured by a 5 year maturity, 100% capital protection and 50% participation at the SMI returns. The participation is caped at 4.5% per annum and there is an annual floor guaranteed coupon of 1.5% which is only introduced for taxation reasons. Hence, besides these two features, the launched real product is identical to SP1. Although the participation of SP1 was with 50% larger than for ZinSMI, the latter one offered a non-zero floor coupon guarantee. All in all, ZinSMI and SP1 are comparable.

The behavioral finance based product description (behavioral finance product framing)

We considered insights from psychological an experimental economic sciences in the product description to catch the investors attention. Behavioral finance is more than loss aversion of

<table>
<thead>
<tr>
<th></th>
<th>SP1</th>
<th>SP2</th>
<th>SP3</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>28%</td>
<td>33%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26%</td>
<td>43%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.65</td>
<td>2.28</td>
<td>1.52</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td>1.23</td>
<td>1.59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Investment decisions and investment amount (percentages and absolute terms) in the different products.

To maintain data confidentiality with the following field experiment section, the data are normalized to 1 for the mean investment in the money market account. For data confidentiality reasons of the field experiment (see section 3), we already use here relative values of the mean investment amount in CHF and the standard deviations both in absolute terms. All these amounts are normalized to 1 for the absolute mean investment in the money market account.
investors leading to financial products with capital protection. It is also about describing and selling products using facts from behavioral sciences about people’s perceptions and decision making under uncertainty.

The product description was written without any technical jargon and also without any mathematical formulae. We also omit any probabilistic statements. Therewith we considered the insights from psychological an experimental economic sciences that people fail to correctly apply the laws of probability theory and instead of this creating new "laws" without any mathematical foundation. Rabin (1998) observed that people fail to apply the Law of Large Number correctly but instead of this they create a so-called "Law of Small Numbers".

We described the product using a top down approach. On the top level, we described the investment motives and the investment topic in a catchy way considering that on this level the client will be attracted by the product or put it aside. On the next level, we explained the functioning of the product in more detail. Examples illustrated the functioning. Next, we summarized chances and risks. Finally, we closed with the legal and compliance issues.

The circumstances behind the hypothetical and real investment decisions

The circumstances are comparable behind the hypothetical and the real investment decisions. Both decisions took place in June, the questionnaire was in 2005 and the issuance of the ZinSMI in 2006. Hence, income cash flow streams, such as any bonus payments, can be considered to be similar. Furthermore, economic growth as well firm profits were comparable and positive in both years. We therefore expect no significant income bias in the two setups. Third, the market conditions were also similar. The interest rates for Swiss Franc bonds in June 2005 were at 1.8% and at 2.32% a year later. Compared to the high interest periods at the beginning of the nineties with rates around 7%, the interest rate environment at both dates was stable at a very low level. The same applies to other key macroeconomic variables such as inflation and the unemployment rate.

However, some circumstances, like the communication process, the equity risks and the mental situation for a decision to be taken, were different in the two set-ups. In the sum they may have negatively influenced the market entry of the ZinSMI.

Whereas a multistage communication process with the participants took place in the questioning period, the bank once sent a mass mailing to a properly selected clients segment. The mail comprised the product fact sheet together with the detailed product description and a switch recommendation where the bank recommended to its clients with maturity bonds to switch. This switch recommendation which may have positively influenced the market entry of the ZinSMI was not given at the questioning. However because the mass mailing is less binding than the repeated questionings we expect that the market entry for the ZinSMI will be lower than the SPI one. We expect this result although the higher equity risk in the real case may have positively influenced the market entry of the ZinSMI.

The market conditions for the Swiss stocks grouped in the SMI in the two set-ups were different. In June 2005, the SMI showed an almost risk less linear upward move in the near past. Contrary, in May 2006 the SMI fell from 8,100 points to 7,100 points and regained to 7,700 points by the end of June. In the real product launch period, therefore, the equity risk might have reinforced the loss aversion, i.e. a motif which is prominently captured by the ZinSMI.
The mental situation for an investment decision to be taken was unequal: the participants in the questionnaire only mentally dealt with the given products whereas in the real case the bank could not control that potential investors would only focus on the offered product. Whereas at the questioning the participants only concentrated on investing in the three structured products and the money market outside options the bank offered the ZinsSMI but could not control that the potential investor would only mentally deal with this product. Maybe, they also had just received information from other structured products.

The so-called menu effect (see Rabin (1998)) also indicates that the ZinSMI market entry of the ZinSMI will be lower than the one of SP1 observed by the questioning. This effect describes that the availability of additional options (or menus) affects the choice which would have been taken in the absent of these additional alternatives. In other words, the availability of SP2 and SP3 will affect the decision between SP1 and the money market investment, i.e, the real situation. In the latter case the investor might have chosen to invest in the money market because SP1 being too risky to him. However, having the possibilities to additionally invest in SP2 and SP3, as in the questionnaire case, the investor might decide for SP1, because this products appears because of the other two products not that risky anymore to him.

**Revealed versus stated investment decisions: Do people do what they say?**

To find out whether people do what they announce we compare on an aggregate level the results from the ZinSMI subscription with those in the questionnaire regarding exclusive investments in SP1. The questionnaire participants were employees of the issuing bank. For comparing purposes, we therefore have built a sub sample of the ZinSMI-buyers which contains the bank's employees subscribing for the ZinSMI.

Our findings are clear, people do not what they announce in many respects. Less people actually invest in a product as people announce in a comparable sample. Whereas in the questionnaire 12% of the asked employees announced to make an investment, only 7% of all the target bank's employees invested in the ZinSMI. We have however in mind, that seven percent is a very high fraction. The discrepancy between acting and announcing is in particularly huge concerning the first time buyers of a structured product, i.e. the market entry. The questioning showed that 86% of the employees announcing to make an investment did not possess a structured product before. In real life, 27% of the ZinSMI-buyers being employed at the bank opened a security account, which means that they bought a structured product for the first time. Further, the bank's employees invested large amount in real life but no such amounts were announced in the questionnaire.

<table>
<thead>
<tr>
<th>Sample</th>
<th>ZinSMI®</th>
<th>SP1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction of investors</td>
<td>6%</td>
<td>7%</td>
</tr>
</tbody>
</table>

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8 Even 48% of the questionnaire participants invest in SP1 combined with other structured products offered in the questionnaire like SP2 for example.

9 If we consider the questionnaire participants which invested in SP1 combined with other structured products offered in the questionnaire, like SP 2 for example, then the market entry for SP1 is 92%.
Table 6: Comparison of ZinSMI and SP1 figures against the background of different samples. For confidentiality reasons of the ZinSMI data, we use relative values for the investment amounts. We normalized the respective amount of SP1 to 1.

We see two possible explanations that the real invested amount is larger than the announced one. First, the chance that bank's wealthy employees are addressed by the mass mailing is much larger than that they are part of the small questionnaire sample. The other explanation considers an aspect of the questionnaire procedure. The questionnaire participants knew that the results will be presented to them at the end. Although those results were still anonymous, the amounts being far out of the average amount became transparent to the audience. We guess that this disclosure deterred possible rich individuals to announce a large investment amount.

The sizes of the real and announced investments vary also strongly when the rare, extreme events are not considered. If we remove the extreme high investment amounts, i.e. the investments which are an order of magnitude larger than the mean investment, then in average, the absolute invested amount was 1.7 times higher than the announced one in the questionnaire.

We believe that the investors had different indicators in mind by allocating the investment amount: The employees in the questionnaire focused on their income situation, the employees subscribing for the real investment however their wealth situation.

The reason is that the questionnaire participant knows that he/she is not investing real money. Carefully analysing the wealth situation is costly. It is therefore simpler and without any efforts to use income as a possible indicator for the investment amount. In contrast, the costs of analyzing the wealth situation before making a real investment decision are negligible compared to the consequences.

Analyzing the distributions around the mean in the two set-ups underpins the explanation of the different indicators for the investment amount. The SP1 investments arising from the questionnaire are bell-shaped distributed around the mean whereas the ZinsSMI investments are bipolar or in other words U-type shaped. This U-shaped investment amount distribution stems from the bipolar wealth distribution in the sample which again results from the bipolar

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\[ \text{Market entry}^{10} = \frac{\text{number of individuals investing in SP and possessing no SP before}}{\text{number of individuals investing in SP}}. \]

where SP stands for structured product.
age distribution of people in the sample, i.e. the mass of investors groups around the age of 30 to 40 years and between 55 and 65 years.

Are a bank’s employees data representative for clients research?

To investigate this question we compare on an aggregate level the results from the ZinSMI subscription regarding two samples: The clients sample and the employees sample. The latter is a sub sample of the clients sample which contains the bank's employees subscribing to the ZinSMI. Similar results in both samples would be a sign that the bank could ask its own employees in a field experience instead of doing expensive clients research. Furthermore, we compare the results from the clients sample of the ZinSMI subscription with those from the questionnaire. Similar results in this case would even indicate that the bank only would have to ask its own employees.

We find that clients research can be done by asking the own employees. The employees have however be asked in a field experience and not in a questionnaire. This representativeness apply although the employees sample is much smaller than the actual ZinSMI buyers sample. The questionnaire sample size is only 3% of the ZinSMI size.

The reason is that clients and employees behave similar regarding subscribing the ZinSMI. The fraction of investors and also the fraction of those investing the first time in a structured product is similar in the clients and employees sample. Six percent of all the target clients and 7% of all the target employees invested in the ZinSMI. Of all the ZinSMI buyers, 31% did it for the first time, whereas 27% of the employees subscribing to the ZinSMI bought first a structured product.

There is a difference regarding the invested amount, which can however be easily considered. In average, the bank’s employee invested in absolute terms 1.3 times more than the other clients. 11 We explain this difference by a wealth effect: A banker may be more wealthy than an average citizen. In our sample the wealth factor between employee and client is known. This factor allows to easily adjust the employees to the clients data.

Asking its own employees by a questionnaire however may not bring to light the clients’ behavior. In our sample the results gained in the questionnaire did not mirror the ZinSMI purchasing pattern of the clients. Whereas 12% of all the asked employees in the questionnaire announced to make an investment, in reality only 6% of all the target clients did it really. Even 86% of all the asked employees announcing to make an investment would have done this for the first time whereas in reality the market entry of all the target clients was 27%. Regarding the invested amount, the employees announced to make an investment whose size is only 0.77% of the size invested by the clients. The wealth together with the indicator effect may have been responsible for the difference.

Is behavioral finance a selling proposition?

Many studies quote gender differences in the (investment) behavior. Our first questioning also showed that traditional approaches lead to a strongly uneven behavior between men and women (see Table 2). To find out whether behavioral finance motivates women to invest in

11 Table 6 shows that in average, a client invested in absolute terms 1.3 times more than the questionnaire participants whereas a bank’s employee invested 1.7 times more than the questionnaire participants.
financial product we analyze gender-specifically the purchasing pattern of the ZinSMI and also the one announced in the questionnaire regarding SP1. Both products are based on a behavioral finance approach; the ZinSMI even stronger in the way how it is presented to the potential investors in the product description.

Gender differences in the investment behavior disappear with a behavioral finance approach of the product. No strong discrepancy between men and women showed up in the ZinSMI subscription. In fact, 56% of all the individuals which subscribed to the issue were women. We could also observe no significant difference in the investment amount between men and women. Similar results can be observed if only the employees subscribing to the ZinSMI are considered. These results concerning ZinSMI are in line with the ones from the questionnaire where 49% of all the announced investors are women and where no significant different investment amounts between men and women were announced. The structured product in the questionnaire, the SP1, is based on the investment motives and themes of behavioral finance and also considered behavioral finance insights in the way how the product is presented to the questionnaire participants. The latter however was even more strongly considered in the case of the real product. The similar results in both behavioral finance approaches is a strong evidence that the behavioral finance approach indeed motivates women to invest in financial products in contrast to the traditional approaches.

An often mentioned reason for gender differences in the literature are different preferences regarding risks between men and women (e.g., Powell and Ansic (1997)). Besides this, another mentioned reason is different self-confidence due to lack of clarity. As Lenny (1977) reports when a feedback is unclear, women seems to be less confident than men about their ability to make investments. Unlike men, women therefore only invest if they understand the product.

Our finding supports the view that women are not less risk seeking than men but that their self-confidence due to the lack of clarity plays an important role. It seems that our approach to describe the product clearly and understandable (see the behavioral finance product framing above) eliminated the uncertainty of women towards investments in a way that the gender differences disappeared.

Our finding however are at variance with results gained in experimental analysis. Powell and Ansic (1997) shows that irrespective of the framing females are less risk seeking than males. They gained this result from investigating different framings. A reason for the deviation from our result could be that they did not consider extremely enough differences in the framings. In other words, they did not find those framing which eliminates the differences as we have found it. Our finding supports therefore the view of Odean (1998).

Not only women but also men find favor with a behavioral finance approach of the product. The absolute amount of the ZinSMI subscriptions was also larger than the ones of other new issued products of the Cantonal Bank in the same year. More precisely, the bank issued 123 products in 2006. The type of products covered the whole range of structured products, i.e. products with capital protection, participation, barriers, linear payoffs for example. To compare the market entry for these products with that one of ZinSMI, we delete the four products which were designed for a single clients only, i.e. there was no public offering. All

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As it is yet market practice in Switzerland, the major banks use own names for the different products. In our case, we consider Soft-Runner, Protein, Bonus Protein, Casual, Proper, Index Tracker, Runner, Condinote Plus, Booster, Condinote and Soft-Casuals.
the products in this control grouped were issued using term sheets and a less technical product description in daily newspapers. But there was no explicit mailing to private clients and the efforts to design client-friendly material was far less than for ZinSMI. The market entry of this control group then reflect what one would expect: Compared to ZinSMI, market entry is reduced by a factor of 5 (THIS FIGURE IS PRELIMINARY).

4 Conclusion

In this paper we draw three major conclusions. First, the behavioral finance model and a transparent and non-technical product framing is effective. The latter has an impact on women and first time buyers of structured products. Women in particular welcome the behavioral finance approach to describe and communicate the structured products in a clearly and understandable way. In contrast to many studies quoting gender differences in the investment behavior, we observe a vanishing gender difference impact of behavioral finance in the questionnaire as well as in the field experience. Our findings supports the view that women are not less risk seeking than men, but that the lack of the product clarity impair their self-confidence towards investments.

Two further findings speaks for behavioral finance model. On the one side, we find that our participants in the questionnaire behave consistent within the behavioral finance model: They stated to buy those products which are consistent with their investment motives announced at an earlier stage. The analysis of the estimated parameters of those motives one the other side shows that the questionnaire participants do not behave as described in traditional expected utility theory.

Second, the prediction power of surveys is limited. Our analysis of the revealed and stated investment decisions of the bank’s employees shows that they do not what they announce in many respects. Among other things, stated values for the investment sizes are 1.7 times higher than observed ones. We believe that the employees have different indicators in mind by allocating the investment amount: Those in the questionnaire focus on their income situation, those subscribing to the issued product their wealth situation. With respect to market entry, we observed that stated market entry dominates revealed market entry of a similar product, both in its payoff, design and communication, which in turn again dominates market entry if structured products are designed using traditional more technical instruments such as term sheets and fact sheets.

Third, a field experience conducted with a small amount of the bank’s own employees reflects the investment decisions of the bank’s overall clients. Analyzing the data from the product launch we find that the bank’s employees under the subscriber behave similar to the much larger group of the remaining clients. There is a small difference in the invested amount which we explain with a wealth effect between bankers and non-bankers. This wealth effect can however be easily considered in the data. We therefore conclude that clients research can be done in a cheap and effective way by a small amount of the own employees. These employees have however to be involved in a field experience and not in a questionnaire.

We gain these conclusions with a questionnaire and a field experience approach considering two samples: the bank’s clients and employees one. More insights into the usefulness of behavioral finance to support the individuals’ investment decisions could be obtained by experimental economics as a further method. Such a completion is open for future research.
5 Appendix

Daniel Kahneman and Amos Tversky (1979) criticized the expected utility theory (also called von-Neumann Morgenstern utility) as not being able to describe how decisions are actually made. For that reason they developed an alternative descriptive model of decision making under risk, which they called prospect theory. We will show the main difference between these two theories and then present the formal model we used to estimate the participants answers in the questionnaire. Finally, we will give an example of a question we posed in the questionnaire.

Differences between prospect theory and expected utility theory

Unlike expected utility theory, prospect theory describes how individuals evaluate losses and gains. Prospect theory replaces the notion of “utility” which is assigned to net wealth in expected utility theory with “value” which is defined in terms of gains and losses. This is due to the fact that in assessing gambles, people look not at the levels of final wealth they can attain but at gains and losses relative to some reference point.

Prospect theory says that decision makers evaluate gains differently than losses. They tend to be risk averse concerning gains. They value a gain that is certain more than a gain that is less than certain, even when the expected value of each is the same. The value function for gains is therefore concave. On the other side, decision makers tend to be risk seeking concerning losses. They will clutch at straws to avoid a certain loss, even if it means taking even greater risks. Consequently, the value function for losses is convex.

Prospect theory however also says that losses hurt more than gains are pleasurable. This insight is called loss aversion. The latter implies that the value function is steeper for losses than that for gains.

The different value function for losses and gains have an important implication: it is essential how a problem is framed. If the reference point is defined such that an outcome is viewed as a gain, the resulting value function will be different than if the reference point is defined such that an outcome is viewed as a loss.

Prospect theory also differs from expected utility theory in the way it handles the probabilities. Classical utility theory assumes that decision makers value a 50 percent chance of winning as exactly that: a 50 percent chance of winning. In contrast, prospect theory assumes that people make decisions on the basis of subjective assessments of probabilities which may be quite different from the objective or true probabilities. Therefore, prospect theory treats preferences as a function of “decision weights” and it assumes that these weights do not always correspond to probabilities. Specifically, prospect theory postulates that decision weights tend to overweight small probabilities and underweight moderate and high probabilities. The attractiveness of both insurance and gambling can be explained by the overweighting of low probabilities.

Formal model
To estimate the questionnaire’s answers, we use the following formal model. We treat gains and losses separately and we have a two-outcome gamble. The latter is in line with the fact that we considered in the questionnaire only gambles with a few number of outcomes.

If the two monetary outcomes \(x_1\) and \(x_2\), which occur with probabilities \(p_1\) and \(p_2\), are both positive, the preference value of the gamble \(V^+(x,p)\) is

\[
V^+(x_1,x_2,p_1,p_2)=g(p_2)u(x_2)+(1-g(p_2))u(x_1) \quad (1)
\]

with \(u\) the utility function and \(g\) the probability weighting function. The function \(g\) is increasing with \(g(0)=0\) and \(g(1)=1\).

If the outcomes are negative a corresponding function \(V^-\) is defined. The preference for the gamble \(V\) where both positive and negative outcomes are possible, is the sum of \(V^+\) and \(V^-\).

We fix the following utility function \(u\) and probability weighting function \(g\) to evaluate our questionnaire.

\[
u(x) = \begin{cases} 
  x^\alpha, & \text{for } x \geq 0 \\
  -\beta(-x)\gamma, & \text{else}
\end{cases}, \quad g(p) = e^{-\gamma (\ln(p))^\beta} \quad (2)
\]

The function \(u\) is proposed by Kahneman and Tversky (1979). The function \(g\) deviates from the original Kahneman and Tversky proposal. This deviation is due to Prelec (1998). The parameters \(\alpha\), \(\beta\) and \(\gamma\) represent risk aversion, loss aversion and gambling behavior, respectively. The probability weighting function \(g\) overweights small probabilities and underweights moderate and high probabilities.

**Example of a question in the questionnaire**

We finally give an example of a question in the questionnaire. The question mentioned below was used to calibrate the three parameters for the individuals.

*Please assume that you have the choice to invest CHF 10'000 for one year either into an investment fund or a fixed deposit account. The investment fund charges no issue or other costs.*

**Question**

An investment fund provides a 50\% chance on a 10\% return, i.e. to earn CHF 1000, and a 50\% chance on a 0\% return, i.e. to earn CHF 0.

Compare the investment fund with the fixed deposit account. Is there an interest rate level for the fixed deposit account such that you prefer the investment in the fixed deposit account to a fund investment? Please make a single selection:

- I prefer the fixed deposit account if interest rates exceed 1\%.
- I prefer the fixed deposit account if interest rates exceed 2.5\%.
- I prefer the fixed deposit account if interest rates exceed 3.8\%.
- I prefer the fixed deposit account if interest rates exceed 5\%.
- I always prefer the investment fund than any of the above four proposed fixed deposit accounts.
6 References


