

**Pictures are Worth a Thousand Words:
Graphical Information Disclosure and Investment Decision Making**

Abstract

Individual investors are investing sub-optimally and suffer from behavioral biases. They are not aware of the impact of the cost-return structure of mutual funds and their risk perception is wrong. In this paper we confirm that individuals suffer from behavioral biases and cognitive limitations when they only receive summarized textual information from the mutual fund Summary Sheet. Individuals invest sub-optimally as they incur many unnecessary fees as they use harmful heuristics. We show that this problem can be ameliorated substantially when individuals receive graphical illustrations in addition to the written text. Our respondents make less use of heuristics and unnecessary fees drop by 7 to 24 percent depending on the treatment information, while their risk perception improves as well. Our results suggest that the graphical illustrations which take into consideration individuals' cognitive limitations and behavioral biases help investors to better understand the textual information of the Summary Sheet and thereby improving their risk perception and investment choices.

Keywords: Information disclosure, heuristics and cognitive limitations, investment decision making, economics and psychology, cues.

JEL-codes: G11, M31, D12, D91

1 Introduction

It is well known that individual investors have problems making their own investment decisions. Investors suffer from search cost, fund marketing effort as a result they rely largely on irrelevant characteristics (see for example Elton et al. 2004 and Cronqvist, 2006). Individuals have problems understanding the impact of fees on future returns and chase past returns instead (DeBondt, 1993) or use other heuristics¹ in order to try to reduce the complexity of their investment decision. Investors also perceive the risks of funds incorrectly and therefore make investment decisions that do not reflect their risk preferences (Vlaev et al., 2009). In the US, the SEC acknowledged these problems and issued guidelines that made it possible for funds to disclose a Summary Sheet which contains more condensed information compared to the statutory prospectus.² This should reduce search cost and thereby help individuals to improve their investment decision. Beshears et al. (2011) shows that potential investors prefer the Summary Sheet (compared to the statutory prospective) and it helps them to reduce the time spent on making the investment decision. However, the summarized information and treatments for search cost and financial illiteracy of investors do not help investors to improve their asset allocation. Choi et al. (2010) therefore conclude that although better disclosure and financial education may be helpful, their effect on portfolio formation is likely being modest.

Recently, Bertrand and Morse (2011) show that providing information that takes into account the individual cognitive limitations has an effect on some individuals' decisions whether to take on a payday loan. It appears that getting consumers to think more broadly about the decision to take up a payday loan, results in a in a reduction in the amount of payday borrowing. Economic theories of advertising often emphasize the role of informational content. Many financial institutions also use advertising as a means to increase demand. For example, Bertrand et al. (2010) show, using a real life field experiment implemented by a consumer lender, that content has significant effect on demand of the loans that they were trying to sell. In the field of consumer goods marketing, Pieters and Wedel (2012) find that consumers already know with high degree of certainty whether something is an ad or editorial material after an exposure of less

¹ These are easily applied procedures, which are especially used when individuals perceive a task to be complex. Investment decisions are often perceived to be complex and therefore investors often use heuristics.

² The statutory prospectus is the sheet which contains all the information of the fund and which individuals can use before they make an investment. Usually the statutory prospectus is very long as it contains very detailed information and investors typically do not bother to read it carefully as they find it too complex.

than 100 milliseconds and also which product is being advertised. With regard to investment decisions it is not very likely that consumers are able to make an investment decision this quickly, but as in Bertrand and Morse (2011) pictures say more than text alone. How the reader perceives the picture, does influence how she continues with the textual part of the information. In this paper we provide empirical evidence that graphical information which takes into account the cognitive limitation of consumers helps consumers in making better (financial) decisions and more aware of the risks involved.

We design an experimental survey with three information treatments that take into account the individuals cognitive limitations in order to help participants to improve their asset allocation. The information treatments are in the form of graphical illustrations that should take into account individuals' limited understanding of funds riskiness and the impact of fees. Illustrations can (i) decrease the salience of past returns, (ii) help individuals to process risks more effectively (Stone et al., 1997) and (iii) make information easier to understand (Lipkus, 2007). If the graphical illustrations lead to a reduction in task complexity, it will motivate investors to use the provided information more extensively (Stigler, 1961; Nelson, 1970; 1974) and help them to reduce the use of alternative heuristics.

We use a similar experimental setting as in Choi et al. (2010). Participants were asked the invest \$10,000 in three different mutual S&P500 index funds that only differ by their fees. Therefore the optimal strategy for the investor is to minimize investment cost by allocating all the available wealth to the lowest cost fund. Because all the index funds have the same level of risk, it allows us also to examine whether respondents perceive the level of risk of the index fund correctly and whether they understand the similarity in riskiness of the funds. Inspired by the findings of Bertrand and Morse (2011) we incorporated three information treatments with graphical illustrations that help participants understand better the risks of the investment and, more importantly, results in better wealth allocation decisions.

All participants were shown summarized information about all funds. First, a Frequently Asked Question (FAQ) sheet was shown which contains information about an S&P 500 index fund. Second, a return summary table that provided the average *net* annual realized returns of the three

index fund since inception data. Finally, a Summary Sheet that contained information about fees and an explanation about the principal risks of each mutual fund, all drawn up in the same language, was shown. The participants that were confronted with this information consisted of our control group. Each treatment group was confronted with graphical illustrations as well, which were based on the characteristic of the fund and were explained in words as well. As such, it did not necessarily contain extra information, but only an additional visual representation of the textual information.

The first treatment provides participants with a graphical risk indicator illustration. It provides an indication of the risk of the mutual fund on a five point scale. Because the same indicator type is used for all mutual funds it allows for an easy comparison between the funds. It thereby helps participants to process potential risks more effectively and create a better understanding of the risks participants are about to take when investing. The second treatment provides participants with a graphical illustration that deals with expected returns of the investment opportunity *net* of fees. Again, the same type of illustration is used for all mutual funds in order to facilitate the comparison between funds. The reasoning behind this illustration is that it allows participants to easily compare the fees among mutual funds and helps them to identify the cheapest investment opportunity. In the third information treatment participants are confronted with both graphical illustrations at once. One could argue that by providing this much graphical information to participants it leads to some form of information overload. Our test show that this is indeed the case to a certain extent, but the differences relative to the control group are tiny and in all cases not statistically significant. We do not come up with these graphical illustrations ourselves. The illustrations that are used in this paper are taken from a Dutch equivalent of the Summary Sheet, the financial leaflet. The first illustration covers the net expected return of the investment opportunity, while the second illustration is an overall risk indicator.

Our empirical results are summarized as follows. Even when search cost and financial illiteracy are reduced, individuals keep using heuristics and make sub-optimal investment decisions. However, participants of the treatment groups improved their investment allocation substantially and do not use heuristics that often anymore. The average unnecessary portfolio fees of the treatment group participants are reduced by 7-24 percent, depending on the treatment used.

Moreover, participants that are shown the risk indicator illustration perceive the risk level of the fund better and at the same time are better aware of the similarity in riskiness of the funds. The latter is not the case for participants that were only shown the net expected return illustration. Our results suggest that the perceived information contained in graphical illustrations that take into consideration individuals' cognitive limitations and behavioral biases help investors to better understand the textual information of the Summary Sheet and thereby improves their risk perception and investment choices. This implies that policy makers have a choice to implement education policies to increase financial literacy or to augment investment communication with visual nudges.

The rest of this paper proceeds as follows. In Section 2 we discuss the background of the behavioral biases and the rationale of why graphical illustrations can help in addition to the Summary Sheet. In addition we discuss the hypothesis development. Section 3 outlines our empirical methodology, and the empirical findings are presented in Section 4. We conclude in Section 5.

2 Background literature and hypothesis development

2.1 Problems of the investment environment

Nowadays many pension plans are moving more towards defined contribution systems and this implies that more individuals are confronted with complex investment decisions they are not used to. The group of consumers who own mutual funds is growing and is currently above 50 percent in Europe and North-America (Investment Company Institute, 2005). The process of determining optimal portfolio weights is a complex task and therefore it is not surprising that many individuals own suboptimal investment portfolios (Lauricella, 2004). They are for example not aware of the impact of fees on net returns as expensive mutual funds still attract large money flows, while there is only scant evidence that these funds offset their higher fees by higher net returns (Gruber, 1996; Carhart, 1997). The magnitude and composition of mutual fund fees are important in the composition of future net returns on investments (see Elton et al., 2004) and therefore it is surprising that high fee index mutual funds still attract much money flows (Hortacsu and Syverson, 2004), although recently the much cheaper ETF have become much more popular.

Sirri and Tufano (1998) and Hortacsu and Syverson (2004) argue that individuals' sub-optimal investment behavior is sustained by two factors, namely mutual fund marketing and search cost. First, mutual fund marketing can help, especially high fee index funds, to attract more investors and consequently more money. Second, although funds disclose more information, the amount of investment options has also grown. This leads to higher search costs and thereby increasing perceived information overload which results in individuals having difficulty to understand all the information that is provided (Agnew and Szykman, 2005). Even without information overload individuals perceive the investment decision to be complex, which harms their motivation to use the provided information correctly (Iyengar and Lepper, 2000). This leads them to use heuristics instead. (Benartzi and Thaler, 1999; Foxall and Palister, 1998).

Heuristics reduce complex situations into a simpler judgmental operation, but often lead to systematic errors (Tversky and Kahneman, 1974). Often seen heuristics in the investment decision are the tendency to chase past returns and the tendency to diversify naively. The latter is sometimes referred to as diversification heuristic and it is the tendency of investors to divide their money across all the available funds in order to decrease the level of risk. However, it is naïve to do so when it does not help to decrease the overall risk level. The heuristics is also costly as individuals do not take their own preferences into account for the investment decision. For example, investors invest in safer options than their own preferences which results in lower pay-offs (Brennan and Torous, 1999) or conversely, they take risks which they do not want to take. Individuals can thus have a mismatch between the risks they initially want to take and the risks they actually take. Vlaev et al. (2009) have shown that individuals can have such a mismatch due to their limited understanding of the overall risk level of funds. This is not surprising as Statutory Prospectuses contains many pages explaining the risks of the funds while there is no clear indication of the overall risk. Different funds use different concepts for similar risks and give various explanations for similar risk factors. This makes it very complicated for investors to compare funds when reading the information in different Statutory Prospectuses.

Investors also have a limited understanding what influences future return. Investors believe that past returns are a good indication of future returns (DeBondt, 1993), which is irrational as it has

been shown to be inefficient (Gruber, 1996; Carhart, 1997; Zheng, 1999; Sapp and Tiwari, 2004) and past returns can be manipulated. Fund managers can promote their fund by using the time horizon in which their fund has performed best or hide real performance by going out of business or merge with other funds (Damato, 1997). Mutual fund advertisements even encourage the tendency to chase past returns by emphasizing fund's past performance (Johnson and Tellis, 2005) by making the historical return more salient (Jain and Wu 2000; Sapp and Tiwari, 2004; Cronqvist, 2006). As a consequence, many mutual (index) fund investors are influenced by past return performance (Coval and Shumway 2005; Johnson and Tellis 2005; Hendricks et al. 1993; Sirri and Tufano, 1998).

Choi et al. (2010) show that especially more financial knowledgeable investors chase past returns, but these investors will also make less use of other heuristics (Benartzi and Thaler, 1999; Foxall and Palister, 1998). Financial knowledge of theoretical concepts helps individuals to make better financial decisions as they use information in a better way (Lusardi, 2008). Good indicators of theoretical knowledge are (i) the level of education, (ii) the educational major and (iii) whether they can answer some financial literacy questions correctly (Lusardi, 2008). Experience, in addition to theoretical know-how also helps to increase knowledge of investing. Experience makes funds fees structure salient and thereby helps individuals to improve their asset allocation (Barber et al., 2005).

2.2 Summarized information in the investment options

Summarizing disclosed information can help to decrease time and effort needed to make an investment decision and thereby motivate individuals to use the provided information more extensively (Stigler, 1961; Nelson, 1970; 1974). The SEC also noted this and argued that prospectuses are often too long. In addition the language of prospectuses is complex and very legally oriented. Moreover, the presentation format makes little use of graphic design techniques which would help to improve readability. As a result, two-third of the investors does not read the prospectus before investing in mutual fund (Investment Company Institute, 2005). The SEC issued new guidelines that make it possible for funds to disclose a shortened information sheet, in the hope that investors would be able to make conscious decisions in what funds to invest. This Summary Sheet contains key information about the fund such as the risk factors, the fees,

funds objectives and the past performance. Much information is left out which helps to reduce search cost and complexity. This can potentially help investors to evaluate choice alternatives more effectively, decrease the use of heuristics and possibly help to reduce problems of individuals' cognitive limitations.

However, Beshears et al. (2011) show that the Summary Sheet does not effectively change consumer behavior. Consumers do prefer the Summary Sheet in favor of the prospectus and as such it decreases the search costs, but the efficiency of the asset allocation does not improve. Choi et al. (2010) find also limited evidence which supports that treatments for search cost and financial literacy help investors to improve their asset allocation. There are several reasons why the summarized information does not help to improve investment decisions. First, the language of the Summary Sheet is not simplified, which does not help the readability (SEC, Investment Company Institute, 2005). Second, although the Summary Sheet decreases search cost it does not take into account investors' cognitive limitations. The Summary Sheet makes past returns actually salient and therefore more individuals use this information for their decision (Kozup et al., 2008 and Beshears et al., 2011). The existing research shows that Summary Sheet does not help investors enough in understanding the impact of fees and the perception of investment risk.

We argue that graphical illustrations can help to overcome the issues discussed above and help individuals to understand the information better. Well designed graphical illustrations take advantage of the visual perception to make critical information easy and accurate to evaluate (Lipkus, 2007; Pieters and Wedel, 2012). Illustrations can reduce the cognitive load that is needed and it can communicate (risk) information more effectively than numerical information (Stone et al., 1997). It can therefore reduce the perceived complexity of the portfolio allocation decision and alleviate the use of heuristics. Illustrations can also highlight important information as they attract attention and thereby reduce salience of other information, especially of the harmful and possible manipulated past returns (Hogart and Einhorn, 1992).

Including graphical illustrations in the Summary Sheet is not difficult to do, but the question is what type should be used. In this paper we remain agnostic about how many illustrations should be used and how they should look like. Therefore we borrow them from the Dutch Financial

Leaflet for complex financial products that is used in the Netherlands. The Financial Leaflet contains graphical illustrations that show the risk level of the investment on a 5 point scale a graph that depicts a time series graph of potential expected returns net of fees for certain cases. Moreover, the Financial Leaflet is set up using uniform language concepts for risk and return which are all set by the Dutch financial regulator (AFM). Overall the Dutch financial leaflet is an example of a Summary Sheet that acknowledges the cognitive limitations of individuals and tries to ‘nudge’ investors in making better investment decisions.

To test whether adding illustrations to the summary sheet do help investors making better decisions, we augment the experimental survey design of Choi et al. (2010) with graphical illustrations treatments for risk perception and fee structure and implement a uniform language across competing index mutual funds. Such a Summary Sheet facilitates the comparison of different competing mutual funds that offer similar products and would alleviate the complexity of the asset allocation decision.

2.3 Hypotheses development

In this section we formulate hypotheses that allow us to test whether graphical illustrations in a standardized Summary Sheet help to facilitate and improve individuals’ investment decision. As mentioned above, for investors it is especially difficult to make a correct risk assessment of financial products and to assess the impact of fees. Therefore we focus on graphical illustrations, taken from the Dutch Financial Leaflet, which can overcome these two problems.

Based on the written information in the Summary Sheet it is not easy to make a correct risk assessment. Therefore a standardized risk indicator, which indicates the overall risk, can be of great help. Such a risk indicator would help investors to make a quick, but accurate, risk assessment, thereby solving the language problem of the Summary Sheet and at the same time makes it easier to compare competing products. Overall this will help investors to make investment decisions that better represent their risk preference. The first hypothesis is formulated as follows:

Hypothesis 1a: *Individuals who are faced with a graphical risk indicator will have a perceived risk level that is closer to the accurate level³.*

We expect that the risk illustration will decrease the cognitive load that is needed to assess the accurate risk level, and as a result decrease complexity of the financial decision and information overload (Agnew and Szykman, 2005). The reduction in complexity and information overload will help individuals to understand the presented information quicker and better. It will improve the understanding of the impact of fees, while the reduction in complexity will also help to reduce the use of heuristics. As a result, investors that are confronted with the risk illustration are able to form investment portfolios with lower fees. The hypothesis is formulated as:

Hypothesis 1b: *Individuals who are faced with the graphical risk indicator illustration will more often choose to invest in funds with lower fees, thereby reducing portfolio fees.*

Another issue which can potentially be solved using graphical illustrations is the tendency of investors to chase past returns which has been documented in the literature. We propose to use a graphical illustration that presents the expected net return of the fund, thereby incorporating the fees structure. This will make the impact of fees easily to be understood and allows for a more straightforward comparison between funds. Note that if all Summary Sheets look alike it will motivate consumers to use them to compare competing investment choices. We expect that such an illustration is particularly helpful to the more financial knowledgeable investors as they especially are more likely to chase past returns. The hypothesis is formulated as:

Hypothesis 2a: *Individuals who are faced with a graphical net expected return illustration will more often choose to invest in funds with lower fees, thereby reducing portfolio fees.*

Ex ante, the impact of the net expected return illustration is not clear. It might help investors to reduce information overload and thereby improve the risk assessment when reading the written

³ The accurate level refers to the actual risk level of the fund which equals level 5 according to the financial leaflet and is similar across all funds used in this study. We refer to the research design below for further explanation. Less knowledgeable investors refers to individuals with less experience, less education and who are not following any Economic or Business major.

information. Higher returns can also be misperceived as less risky, thereby harming the risk perception (see Kozup et al., 2008).

We expect that the availability of information from the financial crisis makes respondents aware that higher returns often come at the cost of higher risk levels. Hence, they will increase their risk perception when they are not aware that differences in expected returns are only caused by fees⁴. Therefore we propose the following hypothesis:

Hypothesis 2b: *Individuals who are faced with a graphical expected return illustration will perceive the fund with higher expected return as more risky.*

When both the risk indicator and expected return illustrations are provided, it will help investors to understand that differences in the return illustration are due to fees and not due to differences in risk levels underlying the funds. The extra motivation from the reduction in cognitive load, due to the illustrations, will also help consumers to understand the risk indicator and thereby improve the risk perception. Therefore we propose the following hypothesis:

Hypothesis 3a: *Individuals who are faced with both graphical illustrations will have a perceived risk level that is closer to the accurate level compared to individuals who receive no illustration or only the return illustration.*

In addition, a Summary Sheet that contains both illustrations helps to decrease complexity and information overload even more. This will help individuals to understand the impact of fees even better, while it will also help to reduce the use of heuristics. Therefore the final hypothesis is formulated as follows:

Hypothesis 3b: *Individuals who are faced with both illustrations will invest more money in funds with lower fees, thereby reducing portfolio fees compared to every other setting.*

⁴ Especially because we use the return illustration from the Dutch Financial Leaflet which does not make the differences in fees itself salient. The illustration only shows the differences in net expected return, therefore investors might not believe that differences are solely caused by fees and might be due to other features such as differences in the level of risk.

A possible side effect of using illustrations in the Summary Sheet is that individuals can perceive the illustrations as extra information. This again can lead to information overload. However we argue that in this case, investors will definitely use the graphical information as it is the easiest to understand and it is most salient. We therefore argue that this side effect should be relatively small.

3 Research design and summary statistics

3.1 The experimental setting

Students at Tilburg University in the Netherlands, KULeuven in Belgium and the University of Johannesburg in South Africa were asked to participate in a digital Survey. The participants were asked to divide a total sum of \$10,000 between three S&P 500 Index Funds; the Invesco S&P 500 Index Fund, the Ishares S&P 500 Index Fund and the Vanguard S&P 500 Index Fund.⁵ Such funds are increasingly used by investors as they are highly diversified and relatively cheap. All funds track the S&P 500 index and are passively managed. The participants were presented with the Summary Sheet information of all funds at the same time. The interesting reader might argue that this is not realistic as it is not possible to compare the competing mutual fund investment opportunities all at once. We argue the opposite. Due to the standardized nature and language the Summary Sheet used (inspired by the Dutch Financial Leaflet), the language and presentation is so similar that investors do compare the properties of computing investment opportunities. They do so, because it was made easy for them to compare. The information that was presented to the participants was very close to the original existing Dutch Financial Leaflets of the mutual funds that are available to the public. The experimental setting also eliminates the influence of non-portfolio services. Most importantly, in order to align participants' motives with the experiment a lottery was held.⁶ Two winners were given the one-month net return of their \$10,000 investment allocation. The one month investment horizon is more tempting for participants, while it also increases the impact of the fees. Furthermore, the survey participants received feedback of the empirical findings once the data was analyzed.

⁵ We changed the name from Vanguard 500 Index Fund into Vanguard S&P 500 Index Fund to make it even more salient that funds are tracking the same index.

⁶ The financial means to promise *all* participants their one-month portfolio net returns were not available to us. We argue that our empirical results are therefore a 'lower bound' of the effects in a real life situation.

The only difference between the funds is the fees which are presented in Table 1. The table shows that Invesco is the most expensive fund, while Vanguard is the cheapest fund. Our setting also allows us to test whether individuals' risk perception is correct. As the funds track the same index, the overall risk of each fund is the same. According to the official Dutch Financial Leaflet the risk level for all funds is 5 on a 5-point scale.

[Insert Table 1 about here]

Respondents receive information from the Summary Sheet, a return sheet and a Frequently Asked Question (FAQ) sheet. As treatment, part of the respondents receives either one or two graphical illustrations in addition to the standardized text. As mentioned in the introduction, the illustrations are taken from the original Dutch Financial Leaflet. The risk illustration (see Figure 1) indicates the overall risk of the funds on a 5-point scale, whereas the return illustration shows the expected net return of the fund over time⁷. The return illustration (see Figure 2) does incorporate fees, but does not show the direct impact of fees.

[Insert Figures 1 and 2 about here]

The Summary Sheet is standardized to reduce the influence of possible noise factors. Differences in presentation are minimized as the information is given in a similar format and with a similar font⁸, while the sheet remains within the guidelines of SEC. Search cost are also minimized as the Summary Sheet includes a simplified fees sheet. Potential problems that might arise due to the lack of financial knowledge are also reduced by means of the FAQ sheet that explains the objectives of the funds. Respondents were also confronted with the average fund return since inception date in order to distinguish between individuals who optimally minimize fees and those who use harmful heuristics. We have set inception dates such that the amount of fees is positively related with the past average returns, which makes sense as fund managers also

⁷ The return illustration is not used for index funds in the Netherlands due to European regulation. Therefore we used the Dutch Financial Leaflet of complex financial products as an example how to construct the return illustration. Every fund is expected to have an annual gross return of 5 percent as set by the Financial Regulator. Every return illustration uses the 5 percent gross return while the cost of buying and selling and the fees holding the funds are incorporated.

⁸ This is actually in line with the requirements of the Dutch Financial leaflet. The three funds we selected have a Summary Sheet of comparable size and therefore less standardization was needed.

manipulate the presentation of average past returns (Damato, 1997). As a result, individuals who chase past returns are incurring unnecessary fees which harm future returns. Naively diversifying among the available fund does not help either as the funds have similar risks. It would only result in higher unnecessary fees of the total investment portfolio.

3.2 Summary statistics

Our main sample consists of 357 participants that were recruited by means of a digital survey in Tilburg, Leuven and Johannesburg, in addition to a hardcopy survey at Tilburg University campus. We exclude individuals who (i) spent less than 2 minutes on the investment decision (for digital surveys only) or (ii) are older than 30 year. The first restriction was implemented to eliminate participants that were (potentially) not motivated. The second restriction was implemented to have a sample that is homogeneous in nature with regard to the participants' full time working experience. In Section 5 below we discuss some robustness tests where we have alleviated these restrictions. The sample statistics of the main sample are provided in Table 2.

[Insert Table 2 about here]

The average age of the participants is just below 22 and 61 percent is male. The level of education is quite mixed, but most participants fail to understand the basic financial concepts.⁹ The level of financial literacy is above the average level of American citizen (Hancock, 2002), but below the financial literacy level of Harvard staff and students who participated in the surveys of Beshears et al. (2011) and Choi et al. (2010). The latter is not surprising as our sample participants are much younger on average and do not have a lot of working experience. We argue that our sample is very well suited to test our hypotheses because the financial knowledge level of the participants is in line with real life investors that have to make such investment decisions. Participants on average perceive themselves as knowledgeable, but inexperienced. The average time spent on the investment decision by participants of the control group is about 8 minutes. Note that the average time spent on the investment decision for the participants of the treatment groups is less than 8 minutes. This indicates that the investment decision takes less effort for the participants that have receive illustrations and is consistent with

⁹ The financial literacy questions can be found in the survey in the appendix.

participants reading the textual information with a certain risk-return perception in mind. Differences among treatment groups are small by construction.

4 Empirical results

4.1 The asset allocation

Table 3a shows the average portfolio fees for each treatment group and also the test results for differences among treatment groups. All respondents were given information beforehand about the type of investments they were about to make. This was done to reduce search costs and to make the participants as financial aware as possible. However, as can be seen in the top panel of the table, many respondents in the control groups fail to make an efficient investment despite the textual information that was presented to them. On average, the control group participants pay more than 203 dollars of unnecessary fees. Even a naïve diversification strategy by putting an equal amount of money in each fund, would have been less costly.¹⁰ Figure 3 presents the asset allocation per treatment group and shows that many participants in the control group chase past returns as 42% is allocated to Invesco, the fund with the highest historical performance, but also the most expensive fund. There is also a strong indication that many participants use a naïve diversification approach because the average portfolio weights for the Ishares fund are above 30% in the control group. This fund does not have the highest past return or the lowest fee structure and thus attracts money from naively diversifying investors. On average the lowest percentage of money is allocated to Vanguard, the lowest cost fund (27 percent).

[Insert Tables 3a and 3b and Figure 3 about here]

Table 3a also shows that for each treatment group the average portfolio fees are lower than in the control group. Moreover, the bottom panel of the table shows that for all treatment groups the average portfolio fees are significantly smaller compared to the control group. Table 3b presents the relative differences in terms of unnecessary portfolio fees¹¹ between treatment groups. Participants in the risk treatment group incurred on average 12.3% lower unnecessary portfolio fees compared to the control group. The risk indicator especially helps subjects to reduce the

¹⁰ This is in line with earlier findings of Choi et al. (2010) and Beshears et al. (2011).

¹¹ The unnecessary fees are calculated as the dollar value of fees above the lowest cost allocation.

amount of money allocated to Ishares, demonstrating that fewer participants are naively diversifying. In addition less money is allocated to Invesco and hence Vanguard attracts more funding. A similar pattern is observed when respondents receive the risk illustration in addition to the return illustration (7.2 percent drop in unnecessary fees, but not significant), again mainly due to less naively diversifying. These findings confirm Hypothesis 1b.

Participants in the return treatment group incurred on average 18.2% lower unnecessary portfolio fees. Especially fewer participants chase past returns, but also less investors seem to diversify naively. Hence also the return illustration helps participants to allocate more money to the lowest cost fund. There is a similar impact of the return illustration when it is given in addition to the risk illustration (drop of 13.5 percent of unnecessary fees, mainly due to fewer individuals chasing past return). In line with hypothesis 2a the return illustration helped the treatment group participants to make less use of heuristics and invest more in the lowest cost fund.

The largest reduction in fees is for the treatment group with both illustrations with a reduction in average fees of more than 24%. In line with hypothesis 3b both illustrations help the treatment group participants to make a more optimal investment decision. However the news is not all good as many participants still do not invest all their money in the cheapest fund and choose to diversify among the funds. Of all participants in the treatment group 75 percent invests in at least two funds, while 60 percent invested in all three funds. This result is consistent with the explanation that if the mutual fund suppliers are not very well known to the respondents, they take into account the risk that one might go bankrupt. In that case a diversifying strategy is not at all suboptimal.

4.2 Risk perception

Table 4 presents the differences in risk perception between treatment groups using different measures. Participants were asked to rate the riskiness of the individual funds on a 5 point scale where 5 is the highest level. The correct risk level of each fund is 5 as indicated on the original Dutch Financial Leaflet for each mutual fund. The table shows the average perceived risk level of each individual fund, the average perceived risk level of all the funds together and the standard deviation of the perceived risk level of the individual funds. A higher average perceived

risk level indicates that participants are able to assess the risk level better. A lower standard deviation indicates that participants are able to better comprehend that the funds have the same risk level.

[Insert Table 4 about here]

In the control group participants perceive funds with higher past returns as more risky, which indicates that participants relate higher past realized returns with a higher risk level. The average perceived risk levels of the funds are far away from the assumed correct level, while the standard deviation is quite high. This demonstrates that participants have problems understanding the correct risk level when they only were presented with textual information. The results for the expected return illustration treatment group are to some extent even worse on average. Participants in this treatment group are less aware of the similarity in riskiness as indicated by the larger standard deviation than for the control group, while the average perceived risk level is also further away from the correct level. On the other hand, similar as in the control group, the participants also perceive funds with higher past realized returns with a higher risk level, which is an indication that they are not so much aware that the differences in the expected return illustration are solely due to the differences in mutual fund fees. Overall, these results are in line with hypothesis 2b.

In line with hypothesis 1a, the table shows that participants of the risk illustration treatment group have an on average more accurate risk perception of the funds. Compared to the control group (and the return illustration treatment group for that matter) all measures of perceived risk levels increase, while the standard deviation decreases. The effect of the risk illustration becomes clearer when considering the findings of the treatment group where both illustrations were shown. On average, the participants in this treatment group have a better risk perception and are more aware that the risks of the mutual funds are similar. The previous section showed that including the return illustration reduces average portfolio fees, but in order to help participants

understanding the risks of the investment opportunity, the risk indicator illustration is necessary. Overall these findings are in line with hypothesis 3a.¹²

Now that the empirical results have confirmed all our hypotheses, we explore the explanations that drive our empirical findings in the following subsections.

4.3 Information overload

When individuals perceive the graphical illustrations as extra information it can possibly lead to a higher information overload. The findings presented in Table 5 show that participants that were confronted with either one or two illustrations indeed experienced some information overload. However, the differences relative to the control group were very small and in all cases not statistically significant. The table shows that perceived information overload is especially harmful for participants in the control group. Although there are participants who perceive the graphical illustrations as extra information, overall there is no problem of information overload as the amount of information overload is not significantly different among treatment groups.

[Insert Table 5 about here]

4.4 Perceived importance of funds characteristics

In addition to an investment decision problem similar to Choi et al. (2010) and Behears et al. (2011) we asked participants to rate the importance of nine different factors that could influence their investment decision. Participants were asked to answer the questions on a 5-point likert scale, where 1 corresponds to “not important at all” and 5 corresponds to “very important”. Table 6 reports the average rating of each factor’s importance across for each treatment group while the ordinal ranking in parentheses. The table shows that possible noise factors as brand recognition, past experience with fund companies, customer service and quality of the prospectus¹³ are rated unimportant and therefore do not need further emphasis. Participants in the control group actually rate fund fees as the most important factor, while as a group they incurred the highest

¹² A more careful examination showed that more experienced and higher literate participants benefited more from the risk illustration. This is counterintuitive as we expected that especially lower knowledgeable individuals would benefit from the risk illustration more.

¹³ These are rated relatively important in the control setting, which was also reported in Choi et al. (2010) and in Beshears et al. (2010)

average portfolio fees. The latter was mainly caused by participants who chased past returns, which also makes sense as Table 6 shows that past performance was the second most important factor. Moreover, on average the desire to diversify is the fourth most important factor for the control group which is consistent with the explanation that many participants choose for a naïve diversifying strategy.

[Insert Table 6 about here]

In Section 4.1 we showed that participants in the risk treatment group choose on average not to follow the naïve diversification strategy and the results in column 3 of Table 6 supports this finding. The average score of the desire to diversify is lower in the return treatment group and especially in the treatment group where both illustrations were shown to the participants. The impact of the risk indicator on perceived importance of past performance is quite small. Again this indicates that risk indicator illustration especially helps to reduce the use of diversification heuristics. However, respondents do not find the risk indicator that important. Its ordinal ranking is 4 in the risk treatment group while it obtains a fifth place in the both illustrations treatment group.

In the two treatment groups where the return illustration is shown, it is perceived as the most important characteristic for the investment decision. We argue that this is the case the illustration helps to distinguish the differences (in fees) of the funds. The illustration helps to reduce the average portfolio fees mainly because fewer participants chase past returns. This is confirmed as the importance of the past return factor decreases once the return illustration is shown. The fact that the fund fees factor is on average less important than in the control group is an indication that participants are not really aware of the fact that the return illustration actually highlights the impact of fees. For participants in the both illustrations treatment group the importance of past performance and desire to diversify is lower than in the control group. This shows that participants use the information that is included in both illustrations extensively and it helps them to reduce the use of heuristics.

Table 7 shows the multiple regression results of the individual factor importance ratings on their incurred total portfolio fees. The results show that participants who perceive the heuristics of

tracking past performance and diversification desire as more important incur higher portfolio fees. In contrast, the importance of fees factor actually decreases portfolio fees.

[Insert Tables 7 and 8 about here]

We are also able to investigate why participants have a different risk perception than indicated by the risk indicator illustration. In total, 85% of the participants perceived the mutual funds to be less risky than the risk indicator showed. Of all the participants that deviated from the risk indicator level, Table 8 shows that 26% did not understand the label. In addition, 27% of them acknowledged the fact that the index mutual funds are much diversified across many assets.

4.5 The relationship between portfolio fees and participant characteristics

In this section we investigate the relation between participant characteristics and their portfolio fees. Table 9a shows OLS estimates of multivariate regressions of portfolio fees on participant characteristics. Model 1 controls for the treatment effects, investment experience, level of education, gender and education major.¹⁴ Ceteris paribus, the graphical illustrations reduce unnecessary portfolios fees 13-25 percent, which is very similar to the findings presented in Table 3b above. The empirical results also show that more knowledgeable participants have on average lower portfolio fees. This is true for participants with a higher educational degree and for finance major students. Male participants also incur lower portfolio fees.

[Insert Table 9a about here]

Model 2 includes perceived information overload and perceived importance of both past performances of the funds and the desire to diversify as additional control variables. We argued before that information overload can potentially influence the investment decision and therefore we asked two questions regarding the perceived information overload. Furthermore did we see that perceived importance of certain factors matter and therefore we include the perceived importance of past returns factor and desire to diversify factor as well. These factors matter as

¹⁴ We do not control for financial literacy as it is correlated with education and experience and because the impact of financial literacy on portfolio fees is very small. When we do control for financial literacy it does not lead to different coefficient of the impact of illustrations.

both an increase in perceived importance of both issues and a higher perceived information overload *ceteris paribus* increase portfolio fees.¹⁵ Moreover, the estimates of the treatment effect dummies are very similar to Model 1.

In Model 3 we investigate whether participants with a higher self-assessed level of experience are benefitting more from illustrations. We have constructed three dummy variables: low experience level, medium experience level and high experience level¹⁶. High knowledgeable investors benefit more from the graphical illustrations. On top of the effect of the illustrations they reduce fees even more with 57- 85 dollars. In addition, the coefficients of the male and finance major dummies remain highly significant. Model 4 is the most extensive model and includes all control variables. Overall the estimates are in line with the other models. We conclude that the impact of the illustrations on the incurred portfolio fees is strong and robust. Moreover we conclude that more knowledgeable participants incur lower fees when presented with illustrations than less knowledgeable participants, which is counterintuitive.

To conclude this subsection, Table 9b presents the relative differences in portfolio fees between treatment groups. The table confirms that the treatment group with both illustrations incurs the lowest portfolio fees.

[Insert Table 9b about here]

4.6 Risk perception and subject characteristics

In this section we investigate the relation between participant characteristics and their risk perception. In Table 10a the estimation results of multivariate regressions with a measure of risk perception as the dependent variable are shown. We only examine the impact of the illustrations on the average risk perception and the standard deviation because the results for the individual funds risk perception are very similar. We control for possible differences in risk aversion (taken

¹⁵ High information overload is significant when the factor importance of past performance and desire to diversify are not in the regression, because these factors are connected. It is quite surprising that medium overload has a bigger effect on unnecessary fees, while it will later also be shown to impact the risk perception more. Therefore do we here, but also later in table 8a not use the linear term information overload, but rather use a medium and high information overload dummy.

¹⁶ This effect seems to hold only for high experience individuals and therefore do we divide individuals into a low, medium and high experience group and do we use medium and high experience dummies, instead of the linear term experience.

from Barsky et al. 1997) because more risk averse individuals are more likely to have a higher risk perception. We also include the level of education, gender and education major¹⁷.

[Insert Tables 10a, 10b and 10c about here]

Model 1 in Table 10a shows that for participants that were faced with the risk indicator illustration the average risk perception is about 7% higher than in the control group. For participants that were faced with both illustrations the average risk perception is about 6% higher. Because the correct risk level is 5, this indicates that participants assess risk better when faced with the risk indicator illustration and it shows again that the graphical information helps. The impact of the return illustration on the average risk perception is negative, but not significant.

In Model 2 the impact of the illustrations on the standard deviation of the perceived fund risk level is investigated. As before, the lower the standard deviation, the better participants perceive the funds to be of similar risk level. The highest level of education and the both illustrations dummy estimates are both negative and the only significant variables, therefore indicating that higher educated participants are better aware of the similarity in riskiness. Model 3 includes perceived information overload as controls and its estimates shows that participants with more information overload are less aware of the similarity in riskiness. To conclude, Model 4 includes education and treatment group interaction effects. The estimates confirm that better educated and higher knowledgeable participants are benefiting more from receiving both illustrations, while they also benefit when receiving the return illustration. Because the return treatment dummy is significantly positive, it implies that the harmful effect of the return illustration is alleviated by better education.

Table 10b tests the differences in average risk perception between treatment groups. The table shows that participants substantially improve their average risk perception when they are confronted with a risk illustration in addition to the return illustration. On the other hand, adding the return illustration to a Summary Sheet that already contains the risk illustration does not

¹⁷ In non-reported results we also included experience as a control. The effect was tiny, so we excluded it from the main analysis.

influence the risk perception significantly. This shows again that the risk illustration can help subjects to form a more accurate risk perception, while it also minimizes the harmful effect of the return illustration.

The tests results presented in Table 10c use the same control variables as in Model 3 of Table 10a. The findings show that risk illustration do help to reduce the standard deviation of individual risk perception across treatment groups. It confirms our findings that both illustrations should be added to the Summary Sheet.

4.7 Confidence and knowledge

Choi et al. (2010) show that participants with higher portfolio fees were less confident about their investment decision and about their own knowledge. They also showed that participants that did not understand what type of assets are presents in a money market fund, formed portfolios with higher fees. In the previous subsections we already showed that the self-assessed level of experience was related the size of the portfolio fees. Table 11 shows our findings when investigating the impact of financial literacy, self-assessed knowledge and confidence on portfolio fees. The second column in the table shows the distribution of participants' responses to different questions while the third column shows the average amount of fees paid by each answer category.

[Insert Table 11 about here]

There is a negative relationship between portfolio fees and investor confidence. The more likely the participant was to change her mind when a professional investment advisor was consulted, the higher the portfolio fees. The more confident the participant was about her own decision, the lower the portfolio fees. The same holds for the questions with regard to self-assessed knowledge and investor skill. The more confident the participant is about her own answer, the lower the portfolio fees. Overall these findings are in line with our expectations.

4.8 Robustness

We test the robustness of our results by examining the influence of the imposed restrictions to our sample; (i) individuals above 30, (ii) who spent less than 2 minutes and (iii) non-Tilburg University students were excluded and therefore we test whether these restrictions influences our main results. The age restriction does not really influence our results. Older respondents seem to be influenced a bit more by the illustrations which is in line with earlier findings as older individuals are often better educated and more experienced.

[Insert Table 12 about here]

When the time interval becomes less restrictive, the strength of the influence of the risk indicator decreases. When there is no time restriction at all, also the influence of the return illustration decreases. Participants who spent less than 1 minute on the investment decision part of the survey are not able to use the information consciously. Therefore it is not surprising that the effect of the illustrations decreases. When time becomes more restrictive than the impact of the illustrations on both the risk measures and portfolio fees increases. Overall, taking into account any other reasonable time restriction than in our main sample only supports our empirical findings.

[Insert Table 13 about here]

Including the small group of students from Belgium and South-Africa does not affect our main findings.¹⁸ When taking into account only Tilburg University students the results are similar to our main findings as well. Only the impact of both illustrations on the standard deviation decreases, which might be due to the reduction in sample size.

[Insert Table 14 about here]

¹⁸ The only difference is the risk indicator that does not significantly decrease portfolio fees anymore.

In order to further examine the impact of the risk illustration we elected 16 individuals that were confronted with a risk indicator illustration with incorrect information.¹⁹ Table 14 shows the average portfolio fees for the different risk treatment groups and also the test results for differences among these treatment groups. When faced with an incorrect risk indicator, the participants behave similar as documented above. Respondents understand the similarity in risk between mutual funds better, while the average portfolio fees are also reduced. This again shows the positive side effect of the risk indicator. It helps investors to focus on the importance of mutual fund fees. As the risk indicator shows a lower risk level, individuals also reduce their perceived risk level of the funds. This shows that the *perceived* information of the risk indicator is more important for the participants than the information in the main text. Again this is evidence of the important influence of graphical information. Our findings are consistent with the mechanism that consumers form a strong prior based on the graphical illustration and then interpret the information of the summary sheet that is presented.

[Insert Table 15 about here]

4.9 Discussion

Our empirical results were obtained by means of a survey and one might argue whether the participants were as motivated for the survey as in real life. As mentioned above, we have implemented restrictions on the participants answer to be included in the main sample. In addition we have aligned the incentives of the participants and the survey questions by offering potential payments that were related to the investment decision. Moreover, the robustness tests are in line with the main findings. Finally, when analyzing the control group participants' answers, we observe similar behavioral patterns as in Choi et al. (2010) and Beshears et al. (2011). Therefore we are confident that our sample of respondents is as representative as in the aforementioned studies.

In our experimental setting we use index mutual funds with similar gross returns and risk levels. This setup is ideal to investigate the impact of adding graphical illustrations to the summary sheet. However we acknowledge that this setting might be too simplistic for real life

¹⁹ These individuals received a risk indicator presenting a risk level of 2 for all the funds, instead of risk level 5.

applications. As a result it is very interesting to repeat this analysis in a more realistic setting. However, previous research has shown that investors rely more on heuristics when confronted with more difficult tasks. We therefore argue that investors might actually benefit more from graphical information when confronted with more realistic and therefore more difficult tasks. If this is indeed true, our findings might prove to be only a lower bound of real life effects.

5 Concluding remarks

Even though regulation has caused increased information disclosure by those that offer the investment products, in many cases consumers are not able to process this additional information in the correct way. We show that using simple graphical illustrations that visualize the information of the Summary Sheet helps investors to make better portfolio allocation decisions. Instead of using heuristics, respondents invest less in the most expensive fund and more in the cheapest fund and make better risk assessments.

Many studies have acknowledged the fact that natural policy responses to suboptimal choices are to improve disclosure and financial education. The latter, while it has the largest potential, may not be able to reach the most at-risk groups and is too expensive to be realized. This paper however shows that visualizing information helps a lot. Information disclosure that uses known cognitive biases or limitations that are related to individual portfolio allocation decisions help to reduce use of harmful heuristics and reduce unnecessary fees up to 24 percent in our simple setting. Although the illustrations that were used in the information treatments help, they are not able to completely eliminate financial illiteracy of the participants. As usual with

Our results show that both risk and net return illustrations should be added to the Summary Sheet to help potential investors making better decisions. This paper is just a first step, as it is not clear from our findings whether the illustrations that were used in this paper are the best fit for all potential investors. We intend to address this question in future research. Nevertheless, the most important question is policy related. Should financial regulators enforce same-language summary sheets with the addition of graphical illustrations, or should the investor herself decide to spend time conducting her due diligence?

References

Agnew, J. and L.R. Szykman (2005), "Asset Allocation and Information Overload: The Influence of Information Display, Asset Choice, and Investor Experience", *Journal of Behavioral Finance* 6, 57-70.

Barber, B.M., T. Odean and L. Zheng (2005), "Out of Sight, Out of Mind: The Effects of Expenses on Mutual Fund Flows", *Journal of Business* 78, 2095-2119.

Barsky, R.B., F.T. Juster, M.S. Kimball and M.D. Shapiro (1997)," Preference parameters and behavioral heterogeneity: an experimental approach in the health and retirement study", *The Quarterly Journal of Economics* 112, 537-579

Benartzi, S. and R. H. Thaler (1999), "Risk Aversion or Myopia? Choices in Repeated Gambles and Retirement Investments", *Management Science* 45, 364-381.

Benartzi, S. and R. Thaler (2001), "Naive Diversification Strategies in Retirement Saving Plans", *American Economic Review* 91, 79-98.

Bertrand, M., D. Karlan, S. Mullainathan, E. Shafir and J. Zinman (2010), What's Advertising Content Worth? Evidence from a Consumer Credit Marketing Field Experiment, *Quarterly Journal of Economics* 125, 263-305.

Bertrand, M. and A. Morse (2011), "Information Disclosure, Cognitive Biases and Payday Borrowing" *The Journal of Finance* 66, 1865-1893.

Beshears, J, J.J. Choi, D. Laibson and B.C. Madrian (2011), "How Does Simplified Disclosure Affect Individuals' Mutual Fund Choices?" 75-96, in D. A. Wise (Eds.), *Explorations in the Economics of Aging*, NBER, University of Chicago Press.

Brennan, M. J. and W.N. Torous (1999), "Individual decision-making and investors welfare" *Economic Notes* 28, 119-143.

Carhart, M. (1997), “On Persistence in Mutual Fund Performance”, *The Journal of Finance* 52, 57-82.

Choi, J.J., D. Laibson and B. Madrian (2010), “Why Does the Law of One Price Fail? An Experiment on Index Mutual Funds”, *Review of Financial Studies* 23, 1405-1432.

Coval, J. D. and T. Shumway (2005), “Do Behavioral Biases Affect Prices?”, *The Journal of Finance* 60, 1–34.

Cronqvist, Henrik, (2006). “Advertising and Portfolio Choice.” Working Paper Ohio State University.

Damato, K. (1997), “Mutual Funds Quarterly Review: Ghosts of Dead Funds May Haunt Results”, Wall Street Journal, April 4.

De Bondt, W. (1993), “Betting on Trends: Intuitive Forecasts of Financial Risk and Return”, *International Journal of Forecasting*, 9, 355–371.

Elton, E., M.J. Gruber and Jeffrey Busse (2004), “Are Investors Rational: Choices among Index Funds”, *The Journal of Finance* 59, 261-288.

Foxall, G. R. and J.G. Pallister (1998), “Measuring purchase decision involvement for financial services: comparison of the Zaichkowsky and Mittal scales”, *International Journal of Bank Marketing* 16, 180–194.

Gruber, M. J. (1996), “Another Puzzle: The Growth in Actively Managed Mutual Funds”, *The Journal of Finance* 51, 783-810.

Hendricks, D., J. Patel and R. Zeckhauser (1993), “Hot Hands in Mutual Funds: Short-Run Persistence in Relative Performance”, *The Journal of Finance* 48, 93-130.

Hogarth, R.M. and H.J. Einhorn (1992), “Order Effects in Belief Updating: The Belief Adjustment Model”, *Cognitive Psychology* 24, 1-55.

Hortaçsu, A. and C. Syverson (2004), “Product Differentiation, Search Costs, and Competition in the Mutual Fund Industry: A Case Study of S&P 500 Index Funds”, *The Quarterly Journal of Economics* 119, 403-456.

Investment Company Institute, (2006), “Understanding Investor Preferences for Mutual Fund Information”, Washington, D.C.: Investment Company Institute.

Iyengar, S., and M. Lepper (2000), “When Choice is Demotivating: Can One Desire Too Much of a Good Thing?”, *Journal of Personality and Social Psychology* 76, 995-1006.

Jain, P.C. and J.S. Wu, (2000), “Truth in Mutual Fund Advertising: Evidence on Future Performance and Fund Flows”, *The Journal of Finance* 55, 937-958.

John Hancock Financial Services (2002), “Insight into Participant Investment Knowledge and Behavior: Eighth Defined Contribution Plan Survey”, Boston, MA: John Hancock Financial Services.

Johnson, J. and G.J. Tellis (2005), “Blowing Bubbles: Heuristics and Biases in the Run-Up of Stock Prices”, *Journal of the Academy of Marketing Science* 33, 486–503.

Kozup, J., E. Howlett and M. Pagano (2008), “The Effects of Summary Information on Consumer Perceptions of Mutual Fund Characteristics”, *Journal of Consumer Affairs* 42, 37-59.

Lauricella, T. (2004), “Money Trouble: A Lesson for Social Security: Many Mismanage Their 401(k)s; Workers Often Make Bad Picks in Saving for Retirement”, *Wall Street Journal*, December 1, A1.

Lipkus I.M. (2007), “Numeric, verbal, and visual formats of conveying health risks: suggested best practices and future recommendations”, *Medical Decision Making* 27, 696–713.

Lusardi, A. (2008), “Financial Literacy: An Essential Tool for Informed Consumer Choice?” Joint Center for Housing Studies, Harvard University.

Nelson, P. (1970), “Information and Consumer Behavior”, *Journal of Political Economy* 78, 311-329.

Nelson, P. (1974), “Advertising as Information”, *Journal of Political Economy* 83, 729-754.

Pieters, R., and M. Wedel (2012), “Ad gist: Ad communication in a single eye fixation” *Marketing Science*, 31, 59-73.

Sapp, T. and A. Tiwari, (2004), “Does Stock Return Momentum Explain the ‘Smart Money’ Effect?”, *The Journal of Finance* 59, 2605-2622.

Sirri, E.R., and P. Tufano (1998), “Costly Search and Mutual Fund Flows”, *The Journal of Finance* 53, 1589-1622.

Stigler, G. (1961), “The Economics of Information”, *Journal of Political Economy* 69, 213-255.

Stone, E.R., J. F. Yates and A.M. Parker (1997), ”Effects of Numerical and Graphical Displays on Professed Risk-taking Behaviour”, *Journal of Experimental Psychology: Applied* 3, 243–256.

Tversky, A. and D. Kahneman (1974), “Judgment under Uncertainty: Heuristics and Biases”, *Science* 185, 1124–1131.

Vlaev I., Chater N and N. Stewart (2009), “Dimensionality of Risk Perception: Factors Affecting Consumer Understanding and Evaluation of Financial Risk”, *Journal of Behavioral Finance* 10,158-181.

Zheng, L, (1999) “Is Money Smart? A Study of Mutual Fund Investors’ Fund Selection Ability”, *The Journal of Finance* 54, 901-933.

Appendix: Tables

Table 1: Characteristics of Index Funds used in Experiment

The table shows the information of the index funds which we use in the survey. The information is taken from the up-to-date prospectuses available at the starting time of the survey. In order to have a fair comparison we also included a small fee for buying Vanguard, because their prospectus mentioned that there could be an extra fee involved for the agency that sells the funds. The approximate fee on a \$10,000 investment is taking all the fees into account for the investment horizon of one month. Yearly expense is the percentage of the investment which has to be paid every year for holding the fund (besides loads). Front-end load is the amount of fees which have to be paid for buying the fund, while back-end load is the amount of fees which have to be paid when you sell the fund. The inception dates are taken such that the Return since inception is positively correlated to the amount of fees you have to pay.

Mutual Fund	Inception Date	(Annual) Return since Inception date	(Annual) Expense	Front-end load	Back-end load	Approximate fee on a \$10K investment
Invesco S&P 500 index Fund	2003/1/1	7.47%	0.60%	5.50%	0%	554.73
iShares S&P 500 index Fund	2004/1/1	5.43%	0.09%	3%	2%	495.51
Vanguard 500 Index Fund	2005/1/1	2.35%	0.17%+20	1.25%	1.25%	251.97

Table 2: Subject characteristics

The table shows the characteristics of the subjects in each experimental condition. The left column shows the average of all the participants in that treatment group, while the right column excludes participants from the hardcopy version in order to see the amount of time spent per information condition. Every individual receives the Summary Sheet, a return sheet and a FAQ sheet which is referred to as the written information. Individuals in the control group only receive this written information, while the risk treatment group receives the risk illustration, the return treatment group receives the return illustration, while the both illustration group receives both illustrations in addition to the written information. Risk aversion is measured on a 1-4 scale, where one indicates risk neutral and 4 indicates most risk averse (taken from Barsky et al., 1997). Time spent is the amount of seconds which participants spent on average reading the provided information and making the investment decision (recorded by the software). It is not the time spent in the whole survey but only the part of the survey that matters for the investment decision.

	Control group		Risk Treatment		Return Treatment		Both illustrations	
	Whole Sample	Digital Sample	Whole Sample	Digital Sample	Whole Sample	Digital Sample	Whole Sample	Digital Sample
Average age	22	21.8	22	21.9	22.2	21.8	21.8	21.5
Percent male	62%	64%	58%	55%	63	64	62	62
Highest education								
Finished High school	25%	29%	22%	26%	31%	36%	28%	33%
First year of college	12%	14%	17%	13%	11%	12%	14%	14%
Second year of college	17%	13%	19%	19%	17%	12%	14%	11%
College degree	27%	27%	23%	20%	21%	18%	27%	25%
Graduate degree	19%	17%	19%	22%	20%	21%	17%	17%
Educational Major								
Finance	15%	14%	19%	19%	10%	12%	14%	14%
Econometrics	6%	6%	4%	3%	7%	6%	5%	4%
Economics	21%	22%	25%	26%	27%	30%	26%	27%
Business Studies	26%	24%	26%	23%	23%	23%	28%	30%
Other	32%	34%	27%	29%	32%	29%	26%	26%
Beta question correct	47%	48%	49%	52%	38%	42%	43%	43%
Diversification correct	80%	78%	88%	88%	79%	85%	81%	81%
Knows what a money market fund holds								
	11%	10%	9%	10%	14%	15%	11%	12%
Average risk rating (1 to 5; higher = riskier)								
A stock	3.2	3.2	3.3	3.2	3.2	3.1	3.3	3.2
An equity mutual fund	3.7	3.8	3.5	3.7	3.7	3.8	3.9	3.9
Risk Aversion	2.5	2.4	2.4	2.4	2.6	2.6	2.3	2.4
Time spent (seconds)	–	481	–	397	–	304	–	194
Sample size	100	86	81	69	81	66	95	81

Table 3a: Average portfolio fees paid across treatment groups

The top panel of the table presents average portfolio fees paid by per information condition. The bottom panel of the table reports two-sided p-values of t-tests for the equality of means in fees, allowing for each group to have a different variance. The null hypothesis is listed in the second column, and the subsequent column reports the p-value for this test. The first column indicates which illustration effect is tested. For example, the third column containing "Control=Return treatment", which tests whether the return illustration influence the amount of portfolio fees incurred, compared to individuals who only receive written information. Bold numbers indicate significance at the 5% level.

Average Portfolio Fees		
	Control Group	\$455
	Risk Treatment Group	\$430
	Returns Treatment Group	\$418
	Both Illustrations Group	\$406
<i>Two-sided p-values from t-tests of equality of means (unequal variances)</i>		
Effect of Risk Illustrations	Control Group = Risk Treatment	0.03
	Return Treatment = Both Illustrations	0.36
Effect of Return Illustrations	Control group = Return Treatment	<0.01
	Risk Treatment = Both Illustrations	0.06
Both Illustrations	Control Group = Both Illustrations	<0.01
Risk vs. Return Illustrations	Risk Treatment = Return Treatment	0.36

Table 3b: Relative differences in unnecessary fees paid across treatment groups

The table reports in the first column the unnecessary fee of the different information conditions. The total fee of investing all the available money in the lowest cost fund (Vanguard) is subtracted. The second, third and fourth column shows the relative differences among information conditions. The information conditions indicated on top of the table serves every time as the base level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Unnecessary Fees	Control Group	Risk Treatment	Return Treatment	Both Illustrations
Control Group	\$203	-	-	-	-
Risk Treatment	\$178	-12.3%**	-	-	-
Return Treatment	\$166	-18.2%***	-6.7%	-	-
Both Illustrations	\$154	-24.1%***	-13.5%*	-7.2%	-

Table 4: Perceived riskiness across treatment groups

The top panel of the table presents the average perceived risk level of the individual funds, the average risk perception and the average standard deviation among information conditions. Risk is indicated on a 1-5 point scale. The average risk perception is the average of the three individual funds, while the standard deviation is calculated across the three individual funds risk perception. The bottom panel of the table reports two-sided p-values of t-tests for the equality of means, allowing for each group to have a different variance. The first column reports which illustration impact is being tested and the null hypothesis is listed in the second column. Bold numbers indicate significance at the 5% level.

		Perceived Risk Invesco	Perceived Risk Ishares	Perceived Risk Vanguard	Average Risk Perception	Standard Deviation
	Control group	3.51	3.33	2.86	3.23	0.77
	Risk treatment group	3.74	3.54	3.06	3.45	0.68
	Returns treatment group	3.20	3.22	3.00	3.14	0.84
	Both illustrations group	3.41	3.46	3.36	3.41	0.67
<i>Two-sided p-values from t-tests of equality of means (unequal variances)</i>						
Effect of Risk Illustrations	Control group = Risk treatment	0.09	0.06	0.16	0.02	0.16
	Return treatment = Both Illustrations	0.13	0.02	0.02	<0.01	0.02
Effect of Return Illustration	Control group = Return treatment	0.03	0.27	0.34	0.19	0.28
	Risk treatment = Both illustrations	0.02	0.49	0.06	0.72	0.88
Overall Effect	Control group = Both illustrations	0.45	0.22	<0.01	0.02	0.12
Risk vs. Return Illustration	Risk Treatment = Return Treatment	<0.01	<0.01	0.72	<0.01	0.02

Table 5: Information overload across treatment groups

This table examines differences in information overload among information conditions. Two questions are asked; “The investment task took me a lot of time “ and “It was difficult to comprehend all of the information available to me”. Individuals could answer this question on a scale from 1 to 5 whether they agree or not. 1 is “I strongly disagree”, while 5 is “I strongly agree”. The higher the rating indicates more information overload. In the table we took the average rating and compared in section below we again test with a t-test the equality of the means among information conditions, allowing for each group to have a different variance.

		Average Perceived Information Overload
	Control Group	3.03
	Risk Treatment Group	3.14
	Returns Treatment Group	3.16
	Both Illustrations Group	3.13
<hr/>		
Two-sided p-values from t-tests of equality of means (unequal variances)		
Effect of Risk Illustrations	Control Group = Risk Treatment	0.34
	Return Treatment = Both Illustrations	0.78
Effect of Return Illustrations	Control group = Return Treatment	0.25
	Risk Treatment = Both Illustrations	0.93
Overall Effect	Control = Treatment + risk	0.33
Risk vs. Expected Return	Control + risk = Treatment	0.87

Table 6: Importance of various factors in the investment decision of participants

Each cell reports the perceived average importance the factor had on respondents' investment decision, as elicited in the survey. There were five possible responses, from "not important at all" to "very important". The integers are assigned such that higher numbers correspond to greater importance. Each factor's ordinal rank is in parentheses, with lower integers corresponding to greater ordinal importance.

	Control Group		Risk Treatment		Return Treatment		Both Illustrations	
Quality of prospectus	3.42	(3)	2.95	(5)	3.10	(5)	3.05	(6)
Brand recognition	2.60	(6)	2.25	(8)	2.20	(8)	2.07	(9)
Past experience with fund companies	2.62	(5)	2.47	(6)	2.43	(7)	2.21	(7)
Fund fees, expenses and loads	3.70	(1)	3.73	(2)	3.59	(2)	3.38	(3)
Past performance	3.63	(2)	3.75	(1)	3.54	(3)	3.44	(2)
Customer service of fund	2.51	(7)	2.42	(7)	2.47	(6)	2.17	(8)
Desire to diversify across funds	3.36	(4)	3.30	(3)	3.38	(4)	3.13	(4)
The risk indicator	-	-	3.21	(4)	-	-	3.24	(5)
The expected return analysis	-	-	-	-	4.06	(1)	3.98	(1)
Sample Size	100		81		81		100	

Table 7: Effect of Factor Importance Ranking in Portfolio Fees

The table shows the slope coefficients from a multivariate regression of participants' portfolio fees on their ratings of each factor's importance in shaping their investment decision. The explanatory variables are coded as integers from 1 to 5, where 1 corresponds to the response "not at all important" and 5 to the response "very important". Model 2 also includes the information condition. In both models we do not include importance of the illustrations because not all subjects received these illustrations. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Model 1	Model 2
Constant	-347.71 (21.23)	389.13 (22.77)
Risk Treatment	-	-24.47** (11.35)
Return Treatment	-	-34.63*** (11.28)
Both illustrations	-	-47.11*** (10.92)
Quality of prospectus	7.13* (4.17)	6.07 (4.12)
Brand recognition	3.00 (4.4)	0.76 (4.33)
Past experience with fund companies	-1.9 (4.04)	-1.67 (3.94)
Fund fees, expenses and loads	-10.02** (4.14)	-12.04*** (4.08)
Past performance	22.37*** (3.88)	22.63*** (3.81)
Customer service of fund	-8.43* (4.58)	-8.48* (4.49)
Desire to diversify across funds	9.61*** (3.5)	9.27*** (3.42)
R-square	0.1731	0.2183
Adjusted R-square	0.1565	0.1957
Sample size	357	357

Table 8: Why individuals deviate from the risk indicator

Participants were asked why their perceived risk level of the fund was different than indicated by the illustration. This question was only asked when their answer to the previous question was not in line with the risk level indicator. This question was only asked in the digital version of the survey.

Percentage that deviates at least ones	85%
<i>Why do people deviate?</i>	
Didn't understand the risk indicator	26%
Fund is diversified over many stocks, and hence safer	27%
Summary info gave me a other conclusion	14%
Didn't trust the risk indicator	9%
Didn't see this amount of the risk indicator	6%
Other	18%

Table 9a: Demographic Correlates of Portfolio Fees

This table report regression results where the dependent variable is portfolio fees. Risk treatment, Return Treatment and Both Illustrations are dummies that indicate that the subject was part of that particular treatment group. Male is a dummy from the male gender. Importance of past performance and importance of diversification are both factors which individuals could rate how important both were in shaping their investment decision. For the diversification importance we used dummies to measure the effect of each level of importance. We also control for subjects education major and as most individuals are following an economic major we take this as base level. We divide individuals into three groups according to their perceived information overload and we use dummies for Medium and High info overload in Model 2 and 4. In Model 3 and 4 we use interaction terms between high experience and the illustrations. We group individuals into 3 groups, according to their self-assessed investment experience Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Model 1	Model 2	Model 3	Model 4
Constant	501.68 (16.04)	361.01 (23.25)	484.45 (14.87)	353.79 (22.07)
Risk Treatment	-26.00** (11.92)	-29.13*** (10.94)	-13.33 (12.71)	-22.87* (11.79)
Return Treatment	-40.57*** (11.82)	-40.26*** (10.88)	-26.82** (12.76)	-32.27*** (11.84)
Both illustrations	-50.8*** (11.3)	-48.55*** (10.47)	-38.79*** (12.5)	-42.36*** (11.64)
Experience	-6.2 (4.36)	-4.64 (4.08)	- -	- -
Highest level of education	-5.38* (3.2)	-2.42 (2.96)	-5.7* (3.19)	-2.77 (2.98)
Male	-17.98** (9.16)	-13.45 (8.51)	-18.03** (9.03)	-14.5 (8.46)
Finance Major	-39.16** (15.3)	-22.76 (14.41)	-35.7** (15.57)	-22.91 (14.71)
Medium info overload	-	32.83*** (12.52)	-	33.25*** (12.62)
High info overload	-	10.35 (15.18)	-	13 (15.18)
Importance past performance	-	17.23*** (3.48)	-	16.56*** (3.51)
Importance diversification - Level 2	-	40.02*** (15.99)	-	38.67** (16.1)
Importance diversification - Level 3	-	52.42*** (13.72)	-	49.92*** (13.86)
Importance diversification - Level 4	-	49.61*** (12.69)	-	48.37*** (12.76)
Importance diversification - Level 5	-	28.64** (15.05)	-	28.33* (15.15)

(Table continues on next page)

Table 9a (continued): Demographic Correlates of Portfolio Fees

	Model 1	Model 2	Model 3	Model 4
Medium experience	–	–	–14.92 (12.22)	–11.25 (11.35)
High experience	–	–	28.77 (19.66)	15.83 (18.41)
High experience × risk treatment	–	–	–78.95** (37.17)	–32.06 (34.79)
High experience × return treatment	–	–	–84.87** (35.48)	–49.97 (32.94)
High experience × both illustrations	–	–	–57.79** (28.5)	–29.66 (26.61)
Controlled for education majors	Yes	Yes	Yes	Yes
R-square	0.1314	0.2935	0.1528	0.2986
Adjusted R-square	0.1037	0.2559	0.1156	0.2524
Observations	357	357	357	357

Table 9b: Influence of illustrations on fees paid across treatment groups

This table uses the same control variables as the first Model in table 7a, but it uses every time a different information condition as base level.; the first column takes the Control Group as base level, while the second column takes the Risk Treatment as the base level. In this way we can compare the effect of information conditions on portfolio fees. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Portfolio Fees	Control Group	Risk Treatment	Return Treatment
Risk Treatment	–26.00** (11.92)	–	–
Return Treatment	–40.57*** (11.82)	–14.57 (12.47)	–
Both Illustrations	–50.8*** (11.3)	–24.8** (12.02)	–10.23 (11.95)

Table 10a: Participant characteristics and risk perception

The table report regression results where the dependent variable is a measure of risk perception. Risk treatment, Return Treatment and Both Treatments are dummies that indicate that the subject was part of that particular treatment group. Risk aversion is taken from Barsky et al. (1997) and the higher the level, the more risk averse individuals are. Male is a dummy for being male. We also control for subjects education major and as most individuals are following an economic major we take this as base level. Individuals are assigned into three groups according to their perceived information overload and we use dummies for Medium and High info overload. Model 3 and 4 include these information overload dummies. Model 4 includes also interaction terms between level of education and the illustrations. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Average risk perception	Standard deviation	Standard deviation	Standard deviation
Model	1	2	3	4
Constant	2.72 (0.18)	0.94 (0.14)	0.79 (0.16)	0.57 (0.18)
Risk Treatment	0.23*** (0.08)	-0.09 (0.07)	-0.10 (0.07)	0.12 (0.15)
Return Treatment	-0.09 (0.08)	0.05 (0.07)	0.04 (0.07)	0.27* (0.15)
Both Illustrations	0.2** (0.08)	-0.12* (0.06)	-0.13** (0.06)	0.19 (0.14)
Risk aversion	0.08** (0.03)	0.00 (0.03)	0.00 (0.03)	0.00 (0.03)
Highest level of education	0.03 (0.02)	-0.08*** (0.02)	-0.07*** (0.02)	0.00 (0.05)
Male	0.08 (0.06)	0.00 (0.05)	0.01 (0.05)	0.00 (0.05)
Medium information overload	-	-	0.15** (0.07)	0.17** (0.07)
High information overload	-	-	0.16* (0.09)	0.18** (0.09)
Education × risk treatment	-	-	-	-0.07 (0.05)
Education × return treatment	-	-	-	-0.08* (0.04)
Education × both illustrations	-	-	-	-0.11** (0.04)
Controlled for education majors	Yes	Yes	Yes	Yes
R-square	0.0926	0.1412	0.1521	0.169
Adj. R-square	0.061	0.1113	0.1174	0.1273
number of observations	357	357	357	357

Table 10b: Influence of illustrations on average risk perception across treatment groups

This table uses the same control variables as in Model 1 in Table 10a, but it uses every time a different treatment group as base level. The first column takes the Control Group as base level, while the second column takes the Risk Treatment as base level. In this way information conditions can be compared with each other. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Portfolio Fees	Control Group	Risk Treatment	Return Treatment
Risk Treatment	0.23*** (0.08)	–	–
Return Treatment	–0.09 (0.08)	–0.32*** (0.09)	–
Both Illustrations	0.20** (0.08)	–0.04 (0.09)	0.29*** (0.09)

Table 10c: Influence of illustrations on the standard deviation of individual risk perception across treatment groups

This table uses the same control variables as in Model 3 in Table 10a, but it uses every time different treatment group as base level. The first column takes the Control Group as base level, while the second column takes the Risk Treatment as base level. In this way information conditions can be compared with each other. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

Portfolio Fees	Control Group	Risk Treatment	Return Treatment
Risk Treatment	–0.10 (0.07)	–	–
Return Treatment	0.04 (0.07)	0.14** (0.07)	–
Both Illustrations	–0.13** (0.06)	–0.03 (0.07)	–0.17** (0.07)

Table 11: Portfolio fees and the influence of investors' confidence and knowledge

This table reports the frequency of responses to four survey questions and the average (weighted by dollar allocation) portfolio fees when individuals give a certain answer.

	Proportion	Average portfolio fees
<i>How likely is it that you would change your decision if you consulted a professional investment advisor</i>		
1. Very likely	20.7%	\$432.34
2. Relatively likely	45.4%	\$435.50
3. Somewhat likely	24.9%	\$431.59
4. Less than likely	5.3%	\$385.38
5. Not at all likely	3.6%	\$348.88
<i>How confident are you that the decision you made is the right one for you?</i>		
1. Not at all confident	8.4%	\$416.04
2. Less than confident	22.1%	\$432.56
3. Somewhat confident	44.8%	\$431.57
4. Relatively confident	21.8%	\$429.22
5. Very confident	2.8%	\$362.82
<i>How knowledgeable do you consider yourself to be as an investor</i>		
1. Not at all knowledgeable	13.4%	\$439.37
2. Less than knowledgeable	28.9%	\$437.01
3. Somewhat knowledgeable	38.7%	\$432.92
4. Relatively knowledgeable	17.9%	\$405.63
5. Very knowledgeable	1.1%	\$251.97
<i>Which of the following types of investments are found in a money market fund?</i>		
Correct answer (short- term U.S. government bond)	11%	\$399.92
Incorrect answer (corporate bonds, stocks, none of above)	89%	\$431.60

Table 12: Age Robustness

The tables presents our main results when we control for similar variables as in Model 1 of Table 7a and Models 1 and 3 from Table 8a, but now using other age restrictions. The First column shows the main results with the restrictions used in the paper. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Main Sample	All Ages	Excluding >24 years
<i>Panel A: Portfolio Fees</i>			
Risk Illustration	-26.00** (11.92)	-30.68** (11.96)	-21.9* (12.22)
Return Illustration	-40.57*** (11.82)	-51.5*** (11.43)	-32.62*** (12.43)
Both Illustrations	-50.8*** (11.3)	-51.5*** (11.43)	-43.65*** (11.5)
<i>Panel B: Average Risk Perception</i>			
Risk Illustration	0.22*** (0.08)	0.23*** (0.08)	0.23*** (0.09)
Return Illustration	-0.09 (0.08)	-0.08 (0.08)	-0.11 (0.09)
Both Illustrations	0.20** (0.08)	0.22*** (0.08)	0.15* (0.08)
<i>Panel B: Standard Deviation</i>			
Risk Illustration	-0.10 (0.07)	-0.11 (0.06)	-0.07 (0.07)
Return Illustration	0.04 (0.07)	0.06 (0.06)	0.08 (0.07)
Both Illustrations	-0.13** (0.06)	-0.13** (0.06)	-0.09 (0.07)
Sample Size	357	379	314

Table 13: Robustness of the time restriction

Using different time restrictions to test the influence on our main results. The First column shows the result of our own restriction, namely excluding individuals who spent less than 2 minutes in reading the Summary Sheet and making the asset allocation. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Main Sample	No restriction	1 min.	1.5 min.	2.5 min.	3 min.	4 min.	< 2 min > 15 min	< 2 min > 10 min
<i>Panel A: Portfolio Fees</i>									
Risk - Illustration	-26.00** (11.92)	-3.50 (9.72)	-7.57 (10.13)	-15.51 (10.81)	-30.9** (13.6)	-32.66** (14.73)	-31.92** (14.81)	-23.35* (12.55)	-25.54* (13.84)
Return Illustration	-40.57*** (11.82)	-13.27 (9.68)	-17.69* (10.13)	-24.3** (10.84)	-51.84*** (13.19)	-51.41*** (14.26)	-53.03*** (14.37)	-37.82*** (12.44)	-39.8*** (13.79)
Both Illustrations	-50.80*** (11.3)	-25.05*** (9.6)	-29.22*** (10.01)	-36.12*** (10.6)	-61.5*** (12.85)	-56.77*** (14.42)	-77.59*** (23.43)	-48.29*** (11.99)	-50.03*** (13.32)
<i>Panel B: Average Risk Perception</i>									
Risk - Illustration	0.22*** (0.08)	0.10 (0.07)	0.12* (0.07)	0.17** (0.07)	0.21** (0.09)	0.21** (0.1)	0.22** (0.1)	0.26*** (0.09)	0.25** (0.1)
Return Illustration	-0.09 (0.08)	-0.17*** (0.07)	-0.15** (0.07)	-0.13* (0.08)	-0.07 (0.09)	-0.07 (0.1)	-0.07 (0.1)	-0.06 (0.09)	-0.08 (0.1)
Both Illustrations	0.2** (0.08)	0.12* (0.07)	0.14** (0.07)	0.17** (0.07)	0.23** (0.09)	0.25** (0.1)	0.47*** (0.16)	0.24*** (0.09)	0.23** (0.1)
<i>Panel C: Standard Deviation</i>									
Risk - Illustration	-0.10 (0.07)	-0.08 (0.05)	-0.08 (0.05)	-0.08 (0.06)	-0.14* (0.07)	-0.16** (0.08)	-0.16* (0.08)	-0.12* (0.07)	-0.09 (0.08)
Return Illustration	0.04 (0.07)	0.04 (0.05)	0.05 (0.06)	0.06 (0.06)	-0.03 (0.07)	-0.04 (0.08)	-0.05 (0.08)	0.03 (0.07)	0.05 (0.08)
Both Illustrations	-0.13** (0.06)	-0.12** (0.05)	-0.12** (0.06)	-0.12** (0.06)	-0.16** (0.07)	-0.15** (0.08)	-0.18 (0.13)	-0.14*** (0.07)	-0.11 (0.08)
Risk - Illustration	-0.10 (0.06)	-0.08 (0.05)	-0.08 (0.06)	-0.08 (0.06)	-0.14* (0.07)	-0.16** (0.08)	-0.16* (0.13)	-0.12* (0.07)	-0.09 (0.08)
Sample Size	357	394	389	378	306	275	216	338	312

Table 14: Robustness of Nationality of respondents

Column 1 presents the main sample results, so including students from Tilburg University. The second column reports results when only using Dutch students, while the third column also includes students from Universities in Belgium and South-Africa.. Standard errors are within parenthesis, while *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level respectively.

	Main Sample	Only Dutch	Ned, Bel and SA
<i>Panel A: Portfolio Fees</i>			
Risk Illustration	-26.00** (11.92)	-13.87 (14.5)	-18.13* (10.8)
Return Illustration	-40.57*** (11.82)	-41.87*** (13.8)	-31.66*** (10.76)
Both Illustrations	-50.8*** (11.3)	-53.7*** (13.07)	-43.65*** (10.54)
<i>Panel B: Average Risk Perception</i>			
Risk Illustration	0.23*** (0.08)	0.26*** (0.1)	0.24*** (0.08)
Return Illustration	-0.09 (0.08)	-0.04 (0.09)	-0.06 (0.08)
Both Illustrations	0.20** (0.08)	0.24*** (0.09)	0.22*** (0.07)
<i>Panel B: Standard Deviation</i>			
Risk Illustration	-0.10 (0.07)	-0.04 (0.08)	-0.11 (0.06)
Return Illustration	0.04 (0.07)	0.05 (0.07)	0.05 (0.06)
Both Illustrations	-0.13** (0.06)	-0.10 (0.07)	-0.15** (0.06)
Sample Size	357	261	412

Table 15: Robustness of incorrect risk indicator

This table examines the impact of giving an incorrect risk indicator (risk level 2 instead of risk level 5). We have divided the group into 3 groups. One group who does not receive a risk indicator (control group), one group which receives the incorrect risk indicator (low risk treatment group) and the group who receives the correct risk indicator (High risk treatment group). The top panel of the table presents average fees and risk perception measures, while the below part examines differences between groups. The bottom panel of the table reports two-sided p-values of t-tests for the equality of means, allowing for each group to have a different variance. Bold numbers indicate significance at the 5% level.

	Portfolio Fees	Average Risk Perception	Standard Deviation
No Risk Treatment	438.51	3.14	0.80
Low Risk Treatment	427.80	2.88	0.60
High Risk Treatment	417.29	3.44	0.67
<i>Two-sided p-values from t-tests of equality of means (unequal variances)</i>			
Control = Low risk treatment group	0.60	0.11	0.09
Control = High risk treatment group	0.02	<0.01	0.01
Low risk treatment group = high risk treatment group	0.63	<0.01	0.58

Figure 1: The risk indicator illustration

The risk indicator that is used as the information treatment provides the level of risk of the investment in the mutual fund on a five point scale. The left part of the figure is the risk indicator with (the highest) level 5 (very high risk), while the right part of the figure is the risk indicator with level 2 (little risk).



Figure 2: The expected return net of fees illustration

The figures was accompanied with a text explaining the content of the graph. The text explained that the picture indicates the expected value of the fund for different time horizons (in months) incorporating expected returns minus the cost of investing and holding the fund. The maximum possible investment amount of \$10,000 is used to create the picture and the gray background indicates this initial investment amount.

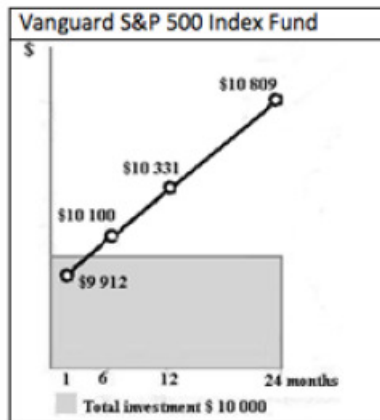
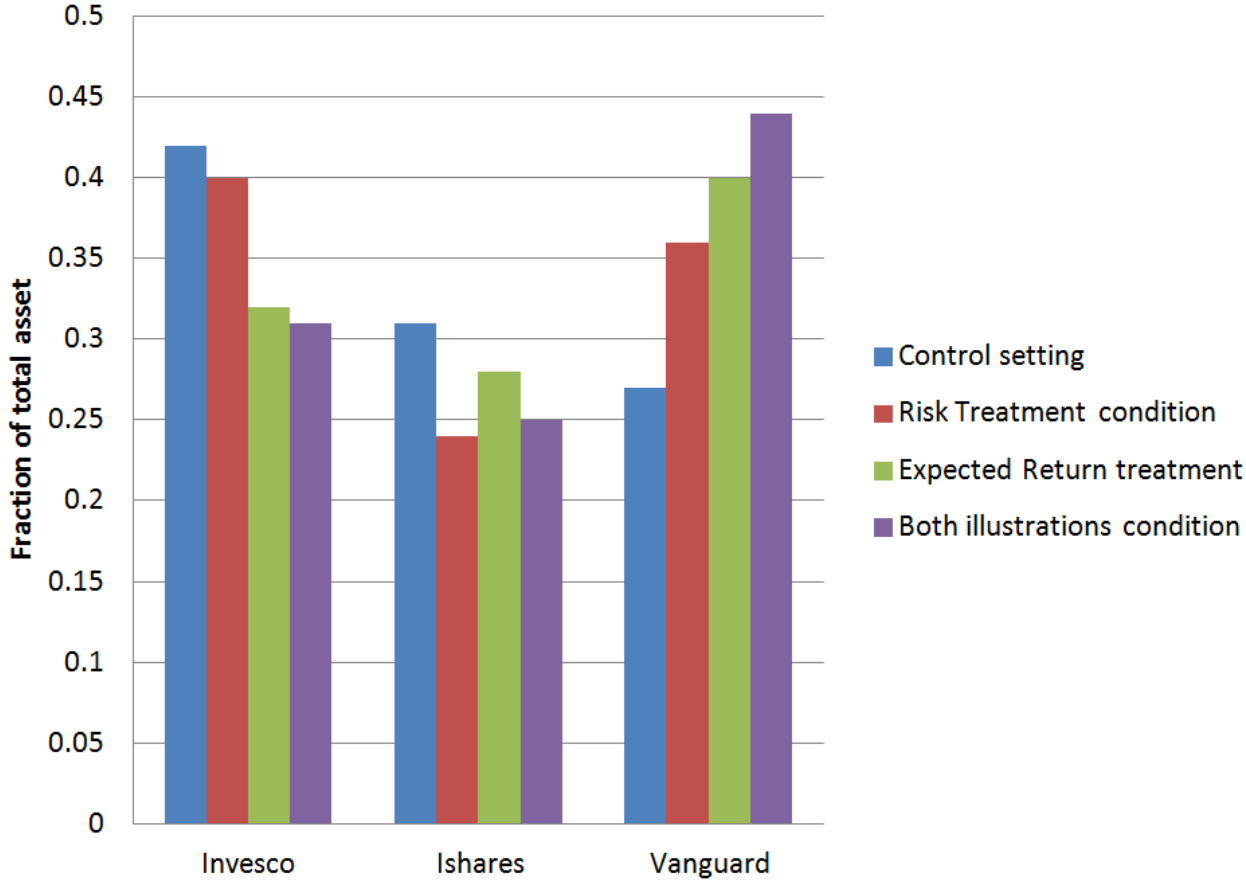


Figure 3: Average fund allocation distribution per information condition



Appendix: The hardcopy version of the survey

Welcome!

Thank you for participating in this survey, which provides you with the possibility of earning up to US\$100 (around 70 euro). This survey will be used to investor's decision making and important to note is that you don't have to be experienced with investing.

The survey will take you around 10 minutes to complete and it consists of 3 main parts

Part 1: Some introduction questions

Part 2: The investment decision, you are asked to invest US\$ 10 000 in up to 3 funds. You have to make this investment decision based on the information that is provided

Part 3: Some debriefing questions and personal characteristics are asked

Note: Results will be kept anonymous

Before starting the survey we will give you some basic information by giving a Question/ Answer sheet

What is a mutual fund?

It is a fund which invests money on your behalf. Your return will be the return of the mutual fund minus the fees which the fund charges for its services.

What is an S&P 500 Index Fund?

It is a mutual fund that tries to make its pre-fee investment return approximate the S&P 500 Index's investment return. In part 2 you have to make an investment decision between three different S&P 500 Index funds.

What is the S&P 500 Index

The index measures the total stock market value of the 500 largest U.S. companies, and the returns is the percent change of the total value of the 500 companies.

Part 1: Introduction questions

Q 1.1 How knowledgeable do you consider yourself to be as an investor?

- Very knowledgeable Relatively Knowledgeable Somewhat knowledgeable Less than knowledgeable Not at all knowledgeable

Q 1.2 I am experienced with investing in financial instruments in for example stocks and bonds.

- Strongly Disagree Disagree Neither Agree or Disagree Agree Strongly Agree

Q 1.3 How risky would you rate the following investments? (Note there is no wrong or right!)

	Very little risk	Little risk	Medium risk	High risk	Very high risk	Don't know
Equity Mutual Fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stock	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q1.4 How many years of working experience do you have? Include full- or part-time experience, internship, co-op, summer jobs etc.?

If you have experience, than you can continue to question 1.4A and 1.4B below , otherwise you can skip them, and go to the next part.

- None
 Less than 2 years
 Two to less than 4 years
 Four to less than 6 years
 Six years or more

Q1.4A Have you worked full-time?

- No
 Yes

Q1.4B Was a part of this working experience in the financial industry?

- No
 Yes

Part 2: The investment decision: Sheet A to D are added for this part

- You will have to invest a (fictive) amount of US \$10 000 in up to 3 different mutual funds.
- The investment horizon is one month, from May 15th till June 14th 2012
- **You can use all information from sheet A to D, which comes from the different fund's prospectuses and is checked by financial authorities**
- A lottery will be held to pick 2 participant who will receive the net return of their personal investment (with a max. of 100 dollar for each participant)
 - o **Net return= return on the investment during one month – cost of the investment**

Rules:

- You can freely divide the \$10 000 between the funds
- Investing in only one fund is allowed, it is your own choice
- Negative investment amounts are not allowed
- All the money has to be spend; the sum of the investments needs to be US 10 000

Q2.1 So how would you divide the \$10,000 among the three funds?

Mutual Fund	Your allocation in dollars
Invesco S&P 500 Index Fund	
Ishares S&P 500 Index Fund	
Vanguard S&P 500 Index Fund	

Total must be 10 000

Q.2.2 How risky would you rate the different investment options

	Very little risk	Little risk	Medium risk	High risk	Very high risk
Invesco S&P 500 Index Fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ishares S&P 500 Index Fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vanguard S&P 500 Index Fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q.2.3 How risky do you rate the total investment which you just made?

- Very little risk
 Little risk
 Medium risk
 High risk
 Very high risk

Q.2.4 I had enough information to form an opinion about the risk

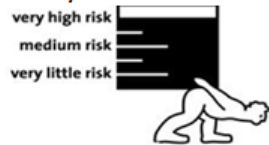
- Strongly Disagree
 Disagree
 Neither Disagree nor Agree
 Agree
 Strongly Agree

Q.2.5 Earlier you were asked to allocate \$10 000 among three different mutual funds.

How important were the following factors in shaping your final investment decision.

	Not important at all	Only slightly important	Somewhat important	Quite important	Very important
Quality of prospectus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brand recognition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Past experience with fund companies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fund fees, expenses and loads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Past performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer service of fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desire to diversify across funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The expected return analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The risk indicator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q.2.6 Were you already familiar with the risk indicator (example below)?

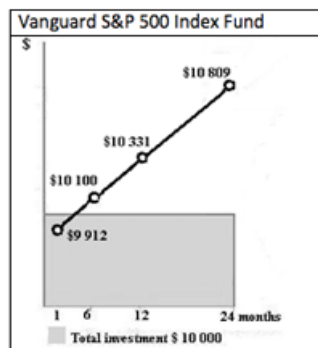


- No
 Yes
 Don't know

Q.2.7 The meaning of the risk indicator (example above), was clear to me

- Strongly Disagree
 Disagree
 Neither Agree nor Disagree
 Agree
 Strongly Agree

Q.2.8 The meaning of the expected return analysis (example below) was clear to me



- Strongly Disagree
 Disagree
 Neither Agree nor Disagree
 Agree
 Strongly Agree

Part 4: Personal characteristics

Q4.1 Age _____

Q 4.2 Gender

- Male Female

Q 4.3 Ethnicity

- White Middle-Eastern
 African descent Other _____
 Hispanic Private
 Asian

Q4.4 Country of birth

- The Netherlands China
 Belgium Turkey
 South-Africa Other _____
 United States

Q 4.5 What is your highest level of education (finished)?

- High school Third year of college (earned a bachelor degree)
 First year of college College graduate (earned a master degree)
 Second year of college

Q 4.6 What is your study/ major? (choose one which is closest to your study/ major)

- Finance Business studies
 Econometrics Science/ engineering
 Financial planner Other
 Economics

LAST question:

Like mentioned a lottery will be hold among the participants to give away the return on your investment. For that we need your email address. Note that we don't use this for advertising purposes and together with the results it will be held confidentially. Thank you for your cooperation, and if you have filled in your email address we will contact you if you have won a price.

Email address _____

Sheet A: Summary information:

Option 1: Invesco S&P 500 Index Fund

Expenses, fees and charges:

Sales charge (paid directly from your starting investment)	5,50%
Redemption fee (paid from your investment if you sell)	0%
Annual fees (paid every year)	0,60%

Principal Risks:

Equity Risk: The risk because the Fund invests in stocks. Stocks can fluctuate in response to firm specific, market, economic and political conditions

Index risk: The Fund operates as a passively managed index fund. Funds ability to correlate it's performance with the index can be affected by timing, cash flows and the valuation of the fund and index.

Management risk. The investment techniques and risk analysis used by the Fund's portfolio manager may not produce the desired result.

Option 2: Ishares S&P 500 Index Fund

Expenses, fees and charges:

Sales charge (paid directly from your starting investment)	3,00%
Redemption fee (paid from your investment if you sell)	2,00%
Annual fees (paid every year)	0,09%

Principal risks:

Asset Class Risk: Securities in the underlying index or in the Fund's portfolio may underperform in comparison to the general security market.

Market Risk: The Fund could lose money over short periods due to market movements or over longer periods due to market downturns.

Passive Investment Risk: The Fund isn't actively managed and doesn't take defensive positions under any market conditions.

Tracking error risk: The performance of the Fund may diverge from that of the underlying index.

Option 3: Vanguard S&P 500 Index fund

Expenses, fees and charges:

Sales charge (paid directly from your starting investment)	1,25%
Redemption fee (paid from your investment if you sell)	1,25%
Annual fees (paid every year)	0,17%+\$20*

*The \$20 is a fixed amount which is yearly deducted from the investment.

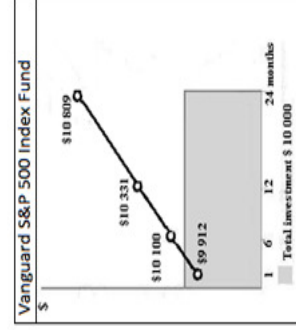
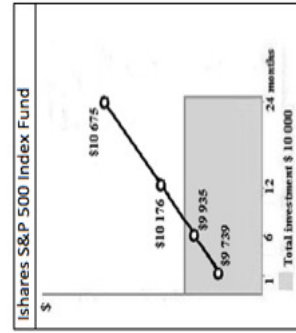
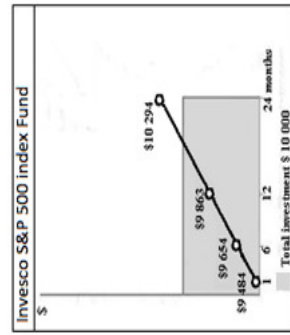
Principal risks:

Stock market risk: Risk that overall stock prices will decline. Stock markets tend to move in cycles, with cycles of rising or falling prices. Furthermore can the index become focused in a particular sector, and as the Fund tracks the index, this can result in underperformance compared to the overall stock market.

Investment style risk: The risk that large-capitalization stocks don't trail the overall stock market. Large cap stocks tend to go through cycles of doing better or worse than the stock market in general.

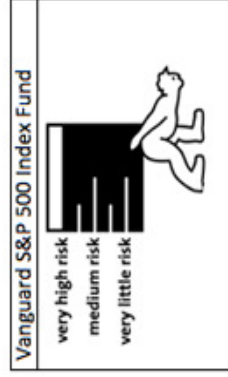
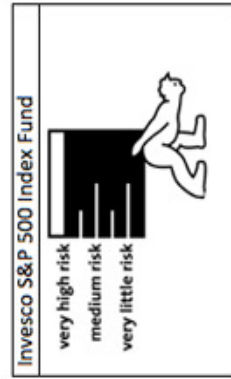
Sheet B: Expected return analysis

- The pictures below indicate the expected value of the different funds among different time horizons (in months), incorporating expected returns minus the cost of investing and holding the specific fund
- The maximum possible investment amount is used, and the grey background indicates this initial investment amount.



Sheet C: Risk level indicator

The 5-point indicator shows the overall risk for each fund. This is checked by financial authorities



Sheet D: Returns summary

The average annual returns since the start of each fund (so since inception), holding fees are already subtracted

Mutual Fund	Average annual return * (since inception date)	Inception date
Invesco S&P 500 Index Fund	7,47%	1-1-2003
Ishares S&P 500 Index Fund	5,43%	1-1-2004
Vanguard S&P 500 Index Fund	2,35%	1-1-2005

*Yearly returns are calculated from inception date till 31-12-2011

Past performance is no guarantee for future results