

Thinking is silver, looking is gold

The influence of graphical
representation on the investment
decision

Aimée van de Ven

NETSPAR ACADEMIC SERIES

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Master thesis Finance

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1. Introduction

There is a growing body of research providing evidence that individual investors take sub-optimal investment decisions. Previous research found that there are two advocated remedies to minimize sub-optimal investments: improving financial literacy and improving information disclosure. This study focuses on the latter and empirically researches the improvement of the Key Investor Information Document.

To help investors and make financial products transparent, regulators have obligated, providers of financial goods to systematically provide investors with a prospectus before they decide to invest. This is however a long, often technical document which is not convenient for the average individual investor. Within the European Union, policymakers attempt to help investors by forcing providers to give a summary of the prospectus. This simplified prospectus called the 'Key Investor Information Document' (KIID hereafter) is meant to contain the most important information about the investment product at hand. The objectives of this KIID are to provide retail investors with: better disclosure, easier to understand information and to facilitate comparison of investment products (AFM, 2018).

Several studies (e.g. Beshears, Choi, Laibson & Madrian, 2011; Choi, Laibson & Madrian, 2010) found evidence that this KIID does not improve the investment decision to a great extent. This current study gives empirically based insight that the KIID in its current form is far from optimal. De Goeij, Hogendoorn and Van Campenhout (2014) provided evidence that adding graphical representation significantly de-bias the investment decision and results in cheaper investment decisions. They tested the addition of a single graphical representation of the net expected return and a representation of the risk. In this research I test several replacements of information on past performance, by a graphical representation of the net expected return with and without risk bounds. The net expected return graph without risk bounds is similar to the graph De Goeij et al. (2014) tested, only the design and textual information is different. Testing this enhances the empirical evidence that the addition of graphical representation improves the investment decision. Additionally, a graphical representation of the net expected return that also takes risk into account, is tested. This is done to see if this representation might be better equipped to improve the key disclosed information, leading to a more optimal investment decision and a better understanding of the risk.

Empirical results are gained via an experimental survey that focuses on the investment decision concerning index mutual funds. These test results give insights that by changing the disclosed information, the investment decision can greatly be improved. Replacing information on past performance by a graphical representation of the net expected return, reduces incurred unnecessary fees by at least 33 percent. This is undoubtedly a considerable improvement in the investment decision and needs to be taken into account by policymakers.

2. Literature review

This chapter describes main findings in past literature conducted on index mutual funds, the index mutual fund investment decision and how to improve this decision. In the first section of this chapter, the reason to conduct this research is discussed followed by background information on the specific financial product that this research focuses on: index mutual funds. In the rest of this paragraph, I will review past literature on improving the index mutual fund investment decision. Improving the decision can be done in two ways: increasing financial literacy of investors or improve the information disclosure of financial products. This research focuses on the latter which includes limiting the information quantity and increasing the information quality. The chapter will conclude with the main research question of this thesis.

2.1 Reason to conduct this research

Economist model economic agents (people) to behave in a rational way. However, research has shown that this is not the case, people do not comply with the classical economic theories of economic transactions (Kahneman, 2011). Kahneman (2011) shows that when making decisions individuals use simple heuristics and are subject to systematic behavioural biases (Kahneman, 2011).

Research provides abundance of evidence that investors do not always make rational decisions (e.g. Bailey & Kumar, 2011; Barber & Odean, 2000; Gruber, 1996; Zheng, 1999). The choice which investment opportunity to pursue, should depend on a fully rational evaluation of the trade-off between risk and return. Unfortunately, behavioural economics has demonstrated systematic decision-making biases in both lab and field data (Chen, Lakshminarayanan, & Santos, 2006). This irrational decision-making becomes especially clear when looking at index mutual funds. Several studies (Barber, Odean & Zheng, 2005; Elton, Gruber & Busse, 2004; Gruber, 1996) provided evidence that individual investors buy and hold significant positions in mutual funds with high fees. For years, it remains puzzling why index fund investors invest act so irrational when it comes to investing in expensive funds that do not outperform cheaper funds. This paper therefore focuses on the effect improved information disclosure can have on the, currently sub-optimal, investment decision concerning index mutual fund investing.

The investment decision in mutual funds is important due to the great extent to which these funds are used by individual investors. A mutual fund pools money from different investors to purchase securities on behalf of the participants. Index mutual fund investing is considered an ideal investment vehicle for regular investors who do not know much about investing (The Economic Times, 2018). The European mutual fund industry has over 10.4 trillion Euro under management (Thomson Reuters Lipper, 2018). The total net assets of mutual funds in the United States in 2017 amounted to approximately 18.75 trillion U.S. dollars divided over more than 9,000 mutual funds (Statista, 2018). In the same year, 44.5

percent of households in the United States owned mutual funds. These facts indicate that mutual funds play an important role in household finances.

2.2 Index mutual funds

The index mutual fund industry has two remarkable features, namely the large number of funds and the sizable dispersion in the fees funds charge investors, even within narrow asset classes. Funds tracking a given index offer virtually identical portfolio returns before fees but have significant dispersion in fees. This dispersion in fees between index mutual funds is no smaller than the dispersion in fees for actively managed funds (Hortacsu & Syverson, 2003).

The dispersion in fees cannot be explained by just portfolio financial performance difference alone (Hortacsu & Syverson, 2003). Non-portfolio services could also be an explanation for the dispersion in fees but Elton et al. (2004) find no evidence for this explanation. They regressed funds net inflows on proxies for non-portfolio services but there was no significant relationship. Choi et al. (2010) as well investigated the non-portfolio explanation but failed to find evidence for their hypothesis that non-portfolio services can account for the existence of high-fee index funds.

It is puzzling that the considerable amount of competition in the mutual fund industry has not yet reduced the dispersion in fees. Although the market for exchange-traded funds (ETF's), which overall have lower fees, is growing fast there are still investors incurring unnecessary high fees. These unnecessary fees show that investments are sub-optimal. There are different explanations in the literature but all come from the fact that not all investors in the market act rational. In the market for index funds, there are no arbitrage opportunities causing the law of one price only to hold if all investors are rational informed investors. The existence of high-fee funds and the above-average growth of these highest expense funds (Elton, Gruber, & Busse, 2004) that do not out-perform low-cost funds, gives evidence that not all investors in the index mutual fund market act rationally.

2.3 The investment decision making process

Existing research recognises the irrational behaviour of investors and has tried to find explanations. Choi et al. (2010) investigate the high-fee phenomenon and suggest that the mistake of not minimizing fees is mainly driven by financial illiteracy. Search cost matter according to Choi et al. but after eliminating these costs, fees are not minimized, therefore they conclude that financial illiteracy must be the cause. De Goeij, Van Campenhout & Hoogendoorn (2014) established evidence that better communication enhances the investment decision concerning mutual funds. Their work shows that incurred unnecessary fees drop when adding real-life graphical risk and returns representations to the disclosed information. Hence, better communication significantly de-bias individuals' investment decisions. These observations link to the existence of search costs, investors' information acquisition, and information processing techniques. Sirri and Tufano (1998) provide evidence that search costs are an important determinant of fund flows. The purchase decision of consumers is based on asymmetrical

past performance information. They chase the highest recent returns, invest disproportionately more in funds that performed very well in the prior period but do not flee from poor performers. Another finding by Sirri and Tufano (1998) is that the flows towards funds directly relate to the size of the fund's complex (which is a group of mutual funds managed by the same company) and the current media attention received by the fund, which both have an impact on search costs. They suggest that mechanisms or conditions that reduce search costs, like media attention, have a material impact on consumers' fund choices. In short, recent work suggests that search costs and financial literacy could explain the sub-optimal investment decision by investors.

Search costs and financial literacy are not the only factors that could lead to sub-optimal investment decisions. Research in decision-making literature found that when decisions become more complex, investors reduce the amount of effort devoted to the decision (Payne, Bettman & Johnson, 1988, 1996). By simplifying the choice environment, it is possible to reduce the feeling of information overload; which is strongly related to the concepts of search costs and financial knowledge. Information overload is a consequence of the already mentioned concepts of information acquisition and information processing techniques, from the work of De Goeij et al. (2014), and information processing capacity. Less information overload will likely lead to a more effective evaluation of choices and decisions that are more informed.

The phenomenon of information overload arises when information load keeps increasing and it will finally exceed the cognitive capacity of the decision maker. When this happens, the decision maker will decrease information processing instead of further increasing it (Hwang & Lin, 1999). Agnew and Szykman (2005) researched information overload for contribution plan participants. Their findings suggest that the financial background of participants strongly affect the success of certain plan features due to overload. Participants with low financial knowledge choose the default allocation of the assets more often than high-knowledge participants because of information overload.

According to Agnew and Szykman (2005) there are four factors that contribute to information overload concerning investments namely: (i) the presentation of information to investors, (ii) the number of investment options given, (iii) the similarity among those options and (iv) the financial knowledge of the investor. The research of Agnew and Szykman provides evidence that how individuals react to changes in the information overload (the number of options and how information is displayed) depends on their relative financial knowledge. High financial knowledge participants presented with a table format were significantly less overloaded than when presented with a booklet condition. The same holds for a fewer number of options to choose from, which also reduces overload for high financial knowledge participants (Agnew & Szykman, 2005). Both effects do not hold for low financial knowledge participants, they feel overwhelmed by the information and search for an 'easy way out', regardless of the number of choices and how the information is presented. In the analysis of the results, this should be taken into account by dividing the respondents into two groups, depending on whether their financial

knowledge is high or not.

2.4 Improving the decision

Evaluating the research on the index mutual fund decision, there are two ways to improve the decisions: increase financial literacy or improve disclosure (reduce search costs and information overload). There are two ways to improve the latter. On the one hand, reducing the amount of information and on the other hand improving the quality of what is included can lead to more optimal decision-making by reducing information overload and search costs.

There is some contradictory research on the effect of improving financial literacy. When improving financial literacy, the aim is to enhance investors' understanding and processing of financial information, to be able to make more optimal decisions (De Goeij, Van Campenhout, & Hoogendoorn, 2014). Garcia (2013) found that regardless of ones' financial education, individuals use biases rather than the presented information. Moreover, it fosters overconfidence, which would cancel out the positive effect of higher education. This could also explain why the decisions of financial literate investors remain sub-optimal. The mutual fund selection abilities of financial literate investors are not better, they do not fully account for fees and remain to chase past returns. (Choi, Laibson, & Madrian, 2010).

Both, De Goeij et al. (2014) and Choi et al. (2010) investigated the effect of improving the disclosed information and demonstrate that improved disclosure enhances the investment decision. I choose also to focus this research on optimizing the investment decision trough improving the information disclosure instead of improving financial literacy. This contains both removing unnecessary information and improving the quality of information that is included.

2.4.1 Improving the disclosed information quantity

Both in Europe and the United States several initiatives are developed which aim to increase investors' understanding of financial products by improving the disclosed information. In the United States, all investment companies are obligated to provide information on their investment product in the form of a funds' prospectus. The prospectus needs to comply with the rules of the U.S. Securities and Exchange Commission (SEC). It contains important information about its fees and expenses, investment objectives, investment strategies, risks, performance, pricing, and more (U.S. Securities and Exchange Commission, 2010). Some mutual funds also provide a summary prospectus, which the SEC allows since 2007, with the key information but they are not obligated to do so. Within the European Union, such a summary prospectus, called the 'Key Investor Information Document', is obligated for all Packaged Retail and Insurance Providers (PRIIPs). This two-page document on top of the prospectus gives a short overview of the fund information, is drawn with the same format, and contains the same kind of information across all providers that sell within the European Union. The purpose of the legislation is increasing transparency of investment products to protect investors (AFM, 2018).

Beshears et al. (2011) investigated whether a simplified disclosure affects individuals' mutual fund choices. They define simplified as a summary of the important information from the prospectus (equal to the necessary elements in the summary prospectus allowed by the SEC). Beshears et al. (2011) find no evidence that a summary prospectus has an effect on the quality of portfolio choices. They did find an effect on the time spent and effort to arrive at the portfolio decision. A related study by Choi et al. (2010) finds that providing a summary prospectus on top of the prospectus improved the investment decision of respondents modestly but was still far from optimal, being all unnecessary fees avoided.

To increase the quality of portfolio choices, only improving disclosure policies by limiting the quantity of information provided will not provide the solution. Improving the quality of the disclosed information might be a better way to help investors to minimize fees and hence make better investment decisions.

2.4.2 Improving the quality of disclosed information

Simplifying the information used to make the complex investment decision can optimize the decision. Increasing the quality of information by improving the comprehensibility can effectively be done by displaying information in a graphical format (Schnotz, 2002; Sujan, Bettman & Sujan, 1986; Tegarden, 1999). Presenting information using appropriate graphical formats can greatly enhance data comprehension, which presumably helps reduce bias (Lurie & Mason, 2007; Wainer & Velleman, 2001).

Visualization tools are the step between converting data into insight (Green, 1998). These visualization tools include using colour, size, shape, texture, orientation, geometry and brightness to depict some dimensions. These tools encode the information in visual representations. When the decision maker sees the visuals, he decodes the aspects (Lurie & Mason, 2007).

Graphical representation has many advantages. It can provide insights into data that is not easily derived from tabulated information, like patterns that would otherwise go undetected (Lipkus, 2007; Smith, Best, Stubbs, Archibald & Roberson-Nay, 2002; Wainer & Velleman, 2001). Furthermore, visual representations can enlarge problem-solving capabilities by making it possible to process the information without overloading the decision maker (Tegarden, 1999; Payne, 1982). Sloman (1996) explains this via the use of the associative system (if the information engages the use of it). Meaning to the information then comes from processes like visual recognition. Thirdly, presenting information graphically can decrease processing time since it can summarize a great deal of data, as Youngworth (1998) said instead of the old saying: 'a picture is worth more than a thousand rows (of data)'. Providing extra insight, enlarging problem-solving capabilities and decreasing processing time are just three of the advantages of graphical representation.

Graphical representation also has the ability to increase the salience of important information (Jarvenpaa, 1990), for example in this research fund charges. These salience effects might facilitate

more accurate perceptions of the data and hence dampen the biases created by prior beliefs (Hogarth & Einhorn, 1992; Hutchinson, Alba & Eisenstein, 2010), for example created by the funds' complex or marketing efforts.

Providing insight, enlarging problem-solving capabilities, decreasing processing time and increasing salience of important information can all help to make the investment decision more optimally. There is one drawback: the graphical representation only improves decision-making if the visual encoding is accurate and efficient. Graphs can increase the use of biases (Hutchinson, Alba, & Eisenstein, 2010) when not properly designed. Graphical representations can focus attention on just a small set of alternatives and thereby encourage inaccurate comparisons (Lurie & Mason, 2007). Hence, graphical representation has many advantages but they only pay-off if the visual encoding is done in the right way.

2.4.3 Visualization of financial risk

Improving the quality of the information disclosed also concerns the information regarding the financial risk of the product. Rationally, the level of risk of an investment opportunity is taken into account in the investment decision-making. Risk is a combination of the probability of loss and the consequence of the loss (Lipkus, 2007). There appears to be a mismatch among consumers' understanding of risk, their attitudes toward risk, and their financial decisions (Vlaev & Chater, 2009). This is caused by the fact that people rely on a limited number of heuristic principles when evaluating risk and try to reduce the complex tasks of assessing probabilities and predicting values, to simpler judgmental operations (Kahneman & Tversky, 1979). To improve the information disclosure concerning risk, the improvement needs to stop investors' reliance on simple heuristics when evaluating risk.

The way financial risk is presented affects investors understanding and evaluation of the investment decisions. Slovic (1972) discovered that in decision-making under uncertainty, people use rules such as; minimizing possible below-target return or maximizing possible gain. Vlaev and Chater (2009) identified, related to retirement plans, what the best way is to communicate risk of financial products to consumers in order for them to make rational decisions. The most suitable risk information framing, according to their research, is to display risk as a variation between minimum and maximum values with an average in between. This is more concise, informative and clearer than other highly ranked contenders. For example, the percentage chance that you will get at least the amount of money back that you put in. In brief, to improve investors understanding and evaluation of risk, a graphical representation of the risk presented as a minimum and maximum value with the average in between, is suggested to be the optimal way of presenting risk.

2.5 Research question

European legislation has tried to help and protect investors by forcing providers of investment products to disclose adequate information on the investment product in the most appropriate way. This manifests

in the KIID that has to be disclosed by providers of PRIIPs. This European legislation is further elaborated in a standard template containing the exact rules for disclosure. The KIID consists of five parts: objectives and investment policy, risk and reward profile, charges of the fund, past performance and practical information. The risk is displayed using a seven-point risk-indicating bar and past performance is presented using a table and a histogram of the returns over the last ten years. It does not demand information on expected future returns (not graphical nor tabulated or in text) and no graphical representation of the charges and risk. Not including these pieces of information or not showing them in a simplified, standardized and easily accessible way, may lead to less optimal investment decisions (Hung, Heinberg & Yoong, 2010; Kozup & Hogarth, 2008). This leads to the following main question of this research:

‘Does replacing information on past performance in the KIID, by a graphical representation of the expected return with its uncertainty and fund fees, lead to a more optimal investment decision?’

To empirically answer this research question an experimental survey will be conducted. The empirical design is explained in the next chapter where the hypotheses are developed as well.

3. Experimental design

To examine the effect of graphical representation in the key investor information, on investment decisions by individual investors, an experimental survey is conducted. The experimental survey is designed to test which treatment leads to the most optimal asset allocation thus the best investment decision. The experiment is inspired by the survey design of De Goeij et al. (2014) and Choi et al. (2010). The survey participants have to invest a fictional amount of EUR 500 in up to three mutual MSCI Europe index funds. Different information treatments were used to test the effect of graphical representation. I develop hypotheses to test the effect of graphical representation primary on asset allocation and the unnecessary fees incurred but also on confidence, time spent and the risk perception.

3.1 Respondents collection

From the 17th to the 31st of May responses were collected via various channels. 436 subjects started the survey of whom 293 completed it. Respondents were incentivized by the fact that they could be randomly selected to earn the one-month return of their investment decision of allocating 500 Euro and two gift vouchers of 20 Euro. For every 100 participants that completed the survey, 25 winners receive the one-month return (with a maximum of 10 Euro per participant) of their chosen portfolio. The one-month return is calculated over the period from the 1st of June until the 29th of June. The return is equal to the index funds' realized net return, so the return that would have been earned if an investor in real-life would allocate the 500 Euro in the same way, for the period of one month. Charges are thus subtracted from the realized return. This variable reward-system is chosen because the impact of the investment decision on the return is very significant due to the short time period and the dispersion in fund charges. In contrast to a fixed return, respondents have impact on the expected reward through their asset allocation. Another advantage of using this incentive is that it is incentive-compatible. Using real funds and their real-life price in- or decrease to determine the reward, gives an objective measurement of the reward the participant should receive due to its own choice.

3.2 Fund information

Subjects could allocate the hypothetical amount of 500 Euro in up to three MSCI Europe index mutual funds. These funds are all passively managed funds, namely the iShares MSCI Europe UCITS ETF (dist), the Amundi Index MSCI Europe – IE and the Amundi Index MSCI Europe – AE. To prevent decisions to be influenced by advertising, fund complex or familiarity, the fund names are changed to respectively Fund A, B and C. Table 3.1 gives an overview of the funds and their characteristics.

[Insert Table 3.1 here]

I use index mutual funds because funds tracking a given index offer virtually identical portfolio returns before fees and have the same risk level. The important difference across the funds are the fees, which vary significantly between the funds. It should therefore be clear for the rational investor what would be the optimal investment strategy. The total fees over the one month investment period for an initial investment of 500 Euro are 0.15 Euro for the iShares fund, which is the cheapest fund, compared to 22.62 Euro for the Amundi-AE and 12.56 for the Amundi-IE fund. These differences are due to the ongoing- and entry charges. Since the funds track the same index and hence have identical risk levels it is optimal to choose a cost-minimizing strategy. The dispersion in fees makes it very clear that the rational investment strategy would be to allocate all assets in the cheapest iShares fund.

3.3 Control variables

To test the robustness of the findings, demographic and background variables are obtained using specific questions in the survey. A copy of the complete survey can be found in Appendix 1. In the beginning of the survey, subjects have to fill in their gender, age, employment status and current or otherwise highest achieved education level. These variables will be used as control variables to check the robustness of my findings hence to ensure that different compositions of the groups on respondent's characteristics do not influence the findings. Additional control variables are work experience, work experience in the financial sector, investment experience, risk aversion, cognitive skills and financial literacy since previous studies have linked these variables to the investment decision (Choi et al., 2010; De Goeij et al., 2014; Van Rooij et al., 2011).

Risk aversion is determined by two questions on risk taking behaviour, to make an estimation of the risk aversion level of the participant. The second question is dependent on the participant's answer to the first question in order to estimate the level more accurately. The questions ask whether or not they would accept a job offer that has a higher but uncertain payoff. The questions are derived from the research on preference parameters of Barsky et al. (1997) and are also used in the Health and Retirement Survey and the DNB Household Survey. The risk aversion level is measured on a 1-4 scale. 1 for respondents that accept the risky option twice (least risk averse), 2 for those who choose the riskiest option in the first question but not in the second question, 3 for respondents that choose the safe option in the first question and the risky option in the second question and 4 for those who chose the safe option twice (most risk averse).

Cognitive skills reflect the ability to absorb knowledge and process information. Low cognitive skills will enhance the chance that a subject experiences information overload when making the investment decision. I asked three questions to make an estimation of the cognitive skills of the respondent. The three questions are taken from the Cognitive Reflection Test (CRT) designed in the study 'Cognitive Reflection and decision making' by Frederick (2005). These questions test the respondents' ability to think further than the intuitive answer and ignoring the impulsive answer, which for all questions is

incorrect. The CRT makes it possible to separate respondents in cognitive groups with only three questions and its predictive validity equals other much more elaborated cognitive tests. Furthermore, other research suggests that cognitive skills may have an effect on financial decision-making through preferences such as risk aversion and the rate of time preference (Benjamin, Brown, & Shapiro, 2013). Despite how it will affect decision making it is clear that cognitive skills need to be taken into account when testing the robustness of the findings.

Related to cognitive skills is the level of financial literacy, which I measure by five questions on financial principles. The questions used are from the 'financial literacy, retirement planning and household wealth study' by Rooij et al. (2012). Respondents have to answer three questions on basic financial knowledge. These questions test their understanding of compound interest, the effect of inflation and their knowledge of the time value of money. Two more questions follow to test advanced financial knowledge. These questions test the participants' understanding of the effect of diversification on risk and the relationship between interest rates and bond prices.

After every financial literacy question, the respondent has to give an indication of, in percentage, how confident he is that the question was answered correctly. To determine the score for every question this confidence percentage is taken into account. The scores of all questions are summed to come to the respondents' level of financial literacy.

3.4 Asset allocation

After the questions on risk aversion, cognitive skills and financial literacy, questions are asked about the work and investment experience of the respondent. Next, the participant is provided with general background information on investment funds. This information contains three frequently asked questions on funds. The information is provided to avoid problems with respondents that have very limited financial knowledge. The FAQ are (i) What is an investment fund? (ii) What is an index fund? (iii) What is the MSCI Europe Index? After the FAQ the main task, rules and reward of allocating the 500 EUR is explained.

In the next part, participants have to allocate the 500 EUR in up to three MSCI Europe index mutual funds that are presented to them. The information provided on each fund depends on the treatment group. There is one control group and three treatment groups to which the survey software randomly allocates respondents. Each group contains roughly 25 percent of the total sample. All groups are presented with a summarized version of the objectives and investment strategy, the risk and reward profile and the tabulated charges of the three funds. A copy of the survey with the exact information provided can be found in Appendix 1. These are all required elements of the regulative key investor's information.

The additional information depends on the group the participant is allocated to, an overview of the additional information per group is provided in Figure 3.1.

[Insert Figure 3.1 here]

The control group is presented with the information of the KIID, conform the current regulations. Which means that in addition to the information mentioned before, respondents are also presented with a histogram and tabulated representation of the past returns. The treatment groups are not presented with past returns to limit the information quantity. Past returns are not relevant for the investment decision and only increase the chance that the respondent experiences information overload. Instead the respondents in the first treatment group are presented with a graphical representation of the net expected return as displayed in Figure 3.1 in the upper right part of the table. This graph shows the growth of the expected return of the fund after subtracting all costs charged by the fund. Based on the 20-year average return of the MSCI Europe Index, the expected return is calculated and shown for a period of 24 months. A grey area visually shows the initial investment amount of 500 Euro. This graph is similar to the graph used by De Goeij et al. (2014).

The second and third treatment group is presented, instead of the past return, with the net expected return including an upper and lower risk indicating bound of respectively one and two standard deviations for treatment 2 and 3 respectively (graphs can be found in the lower part of Figure 3.1). The upper and lower risk indicating bounds are displayed with a dotted line on both sides of the net expected return, based on the research of Vlaev and Chater (2009). The standard deviation is calculated using the 20 year past returns of the MSCI Europe Index. The graphs are accommodated with an explanation that the upper and lower bounds represent potential optimistic and pessimistic views that might occur and that 68 (or in case of two standard deviations 95) percent of the expected returns lie within the bounds. This graph also shows the initial investment amount with a grey area.

Independent of the information treatment the respondent is restricted to allocate exactly 500 Euro and is not allowed to go short. After the investment-decision, respondents are asked to indicate the risk level of each fund. Questions about the process of the investment decision they just made follow. I ask questions concerning: (i) if there was sufficient information to make a good estimation of the risk level of funds, (ii) if they felt that the decision took a lot of time, (iii) their level of confidence about the decision and (iv) if they were able to compare the funds properly with the information provided. Additionally, respondents have to rank what were important factors for them in making the decision.

At the end of the survey, additional questions are asked to examine whether respondents understand the graphical representation of the net expected return with risk indicating bounds. Respondents are shown the one standard deviation graph from two different funds. What should be clear to respondents when looking at the graph is that they show the expected return based on the average historical data and that this expected return will not be certain in the future. When comparing the one standard deviation graphs

for two funds, it should be clear that both funds have the same level of risk since the upper and lower bounds were drawn at the same distance from the solid line. Thirdly, it should be clear that in this case the fund with the highest starting point of the solid line is the cheapest fund. To test if this is clear to respondents, a 5-point Likert scale is used indicating the degree of clarity.

For the last question, the one and two standard deviation net expected return graphs are shown with explanation. Participants have to answer which graph they find most informing, the one standard deviation graph, the two standard deviation graph or no difference.

3.5 Hypothesis development

To test the main research question whether graphical representations improve the investment decision, I developed hypotheses that will be tested with the analysis of the data in Chapter 4.

The literature suggests that improving the quality of the provided information leads to a more optimal investment decision. I used three information manipulations to see if they improved the information quality and hence the investment decision. To test this, I formulate the following hypothesis:

Hypothesis 1: *Investors presented with a graphical representation of the net expected return (treatment group 1, 2 and 3) will incur less unnecessary fees than investors presented with representation of past returns (control group).*

The way of presenting financial risk affects investors understanding and evaluation of the investment decisions. If investors would understand that the risk is similar for index funds that track the same index, I expect that investors will incur less unnecessary fees. I try to increase this understanding by presenting the risk graphically, with an upper and lower risk bound around the expected return. To test if the graphical representation of the risk helps participants to better assess the risk level and hence enhances the investment decision the following hypotheses are developed:

Hypothesis 2.1: *Investors presented with a graphical representation of the net expected return with risk indicators (treatment group 2 and 3) will incur less unnecessary fees, then investors only presented with the risk-indicating bar (treatment group 1 and control group).*

Hypothesis 2.2: *Investors presented with a graphical representation of the net expected return with risk indicators (treatment group 2 and 3) will assess the risk level of the funds better than investors who are presented with only the risk-indicating bar (treatment group 1 and control group).*

When improving the quality of information concerning risk I would expect that investors increasingly feel like they were presented with sufficient information to assess the risk level. Since if this is not the case it might be that respondents do not understand the information or that the different representation of the information does not improve the quality of the disclosed information on risk.

Hypothesis 2.3: *Investors presented with a graphical representation of the net expected return with risk indicators (treatment group 2 and 3) will to a higher degree, be of the opinion that they were presented with sufficient information to make a good estimation of the level of risk than investors who were not presented with risk indicators (treatment group 1 and control group).*

When the information respondents receive is of higher quality and thus easier to compare and process, I would expect the time needed to make the investment decision to decrease. Related to this is that I expect that: respondents only presented with past returns and no visualization of net expected return and charges (control group) will feel like the investment decision took a lot of time compared to other information treatment.

Hypothesis 3.1: *Investors presented with graphical representation of the net expected return or the net expected return with risk indicators (treatment group 1, 2, and 3) spent less time making the investment decision compared to the control group.*

Hypothesis 3.2: *Investors presented with tabulated information on past returns (control group) will to a higher degree, be of the opinion that the investment decision took a lot of time compared to investors presented with graphical representation of the net expected return or the net expected return with risk indicators (treatment group 1, 2 and 3).*

If investors are able to better assess the expected return, the charges and the risk level they might be more confident about the investment decision they made. Confidence will help to prevent investor's from taking the 'easy way out' and choosing the default option.

Hypothesis 4: *Investors presented with graphical representation of the net expected return or the net expected return with risk indicators (treatment group 1, 2 and 3) are more confident that they made the right investment decisions than investors presented with a tabulated representation of past returns (control group).*

4. Empirical findings

This chapter presents the empirical findings of this research, focusing on the optimal investment decision. In addition, analyses on the risk perception and the understanding of the graphs are reported. Firstly, I will discuss the characteristics of the sample to get a feeling of the data. Secondly, I report the results of the analyses executed to test the hypotheses that were developed in paragraph 3.5 Thirdly, I try to give more insight in what drove the investment decision and what information respondents prefer to be presented with.

4.1 Characteristics of the respondents

The survey was distributed via various channels. Via the University Blackboard-page, first year business economics and business administration students were asked to fill in the survey. Via email, master students in Finance, Economics and Strategic Management were approached to fill in the survey and I asked my own network via Facebook, LinkedIn, email and WhatsApp. This led to 436 respondents starting the survey of whom 293 respondents completed the survey. For the analyses, I use only the responses of participants that completely filled in the survey.

[Insert Table 4.1 here]

Sample summary statistics are reported in Table 4.1. I split the sample into two groups, the first one being students and the second being employed respondent or entrepreneurs (after this called the non-student group). There are no unemployed respondents in the sample. I split the sample because I expect different results for the two groups since I expect them to have different characteristics like investment- and work experience, education level and experience in the financial sector. The student sample is considerably larger than the non-student sample and contains 221 participants. The non-student sample has 72 respondents. The average student respondent is 21 years old, non-students are on average 35.6 years of age. Of the total sample, 67 percent is male, among students this is slightly higher with 70 percent.

The education level is composed differently among student than among non-students. There might have been some misunderstanding with the education-question since participants had to fill in their current or otherwise highest achieved education level. Many students misread this question and gave their highest completed education level (for first year students this being secondary education) instead of their current University bachelor studies. In later analyses, I correct for this by changing the education level for all participants that responded to the survey via Blackboard, since they must be University bachelor students to be able to receive the Blackboard announcement.

The student sample mainly contains University bachelor and master students (91 percent of the sample) and in addition a small percentage of University of applied sciences students. 60 percent of the non-student sample has a University master degree. Nevertheless, the sample is more evenly spread across former intermediate vocational education (mbo)-, University of applied sciences- and University students.

The level of risk aversion is higher for non-students than for students in every treatment group. In the loss frame, as the risk aversion questions partly are, older adults are more risk averse since they are considerably less likely to gamble (Albert & Duffy, 2013). This is a logical explanation for the higher level of risk aversion among non-students.

Students outperform non-students in cognitive skills questions: on these questions, students perform better in every group. The higher education level among the student sample could explain this. In line with this, the level of financial literacy is also higher among the student sample. The student sample mainly contains first year students that very recently had a financial course and master Finance and Economics students, which I would naturally expect to have a very high level of financial literacy.

The experience in investing is surprisingly higher for student than for non-students. This might be caused by a different interpretation of the question by both groups. The question was ‘I have experience with investing in financial products like stocks, bonds and investment funds’ which had to be answered on a five point scale from ‘completely disagree’ to ‘completely agree’. The question might have been interpreted as knowledge on investing instead of investing themselves. Perhaps it would have been clearer if I had directly asked if they had invested themselves. Nevertheless, it could actually be the case that on average the student-group has more experience in investing.

Non-students have considerably more years of work experience. 75 percent of the non-student sample has more than 1 year of work experience where only 46 percent on the student sample has more than 1 year of work experience. The share of non-students that has experience in the financial sector is also much higher with 36 percent versus 12 percent of the student sample.

The total time recorded for the whole survey on average was 3574 seconds, almost 1 hour. There are a lot of outliers in this recording, driving up this number. These are probably caused by respondents that did not finish the survey directly but left it open while doing other things. Nevertheless, the amount of time spent by students is almost one third lower than for non-students. Why this difference is this big is unclear. I can only speculate about the reasons, for example the fact that the survey is in English and the non-student sample might have had more trouble understanding. Another explanation could be that non-students simply take the time to read all the information more carefully than students do.

4.2 Differences in optimal investment

After discussing the characteristic of respondents, I will proceed this research with analysing the data. Table 4.2 gives per group, an overview of the average absolute incurred fees (split in entry charges and ongoing charges), the unnecessary fees, the share of respondents that minimized fees and the share that diversified. This gives a rough indication of the degree of ‘optimal investment’ per group. The total portfolio fees are the entry charges over the 500 Euro invested plus the ongoing charges. The ongoing charges are calculated by multiplying the assets on the end of the first month with the ongoing charges of the fund invested in. Unnecessary fees are calculated per respondent by deducting the minimum fees, if all assets would be allocated in the fund with the lowest fees (fund A), from the portfolio fees that are incurred by the respondent with his asset allocation. The fees incurred by the treatment groups are strikingly lower than the control group. Yet they remain far from optimal since the minimum fees are only 0.15 Euro. Figure 4.1 visualizes the incurred unnecessary fees per group to underline the differences per group.

The column ‘minimized fees’ of Table 4.2 gives the percentage of respondents within the group that has not incurred any unnecessary fees, hence allocated all assets in fund A. This percentage is for all treatment groups at least 5 percent higher than the control group but does not exceed 32 percent. Hence, less than one third of the participants in every group chose the optimal investment strategy.

The last column represents the percentage of respondents that allocated assets across all three funds. 59 percent of the respondents in the control group naively diversified the 500 Euro. For the treatment groups this varies between 45 and 36 percent. This is still a high share of respondents when considering that diversification has no benefit, since the investment decision only concerns index mutual funds that track the same index.

[Insert Table 4.2 here]

Allocating all assets to fund A is the optimal investment strategy as discussed in 3.2 since fund A has the lowest fees and all funds track the same index. I calculated the percentage of the total investment that is allocated to fund A for the control group and the treatment groups as shown in the upper panel of Table 4.3. The control group allocated the lowest percentage to fund A and hence has on average the most sub-optimal asset allocation. In the control group, only 43.3 percent of the available funds were invested in the optimal fund. This percentage is significantly different from the treatment groups, which vary between 59.9 and 63 percent, providing evidence that the treatments lead to better, more optimal investments. The lower panel of Table 4.3 reports the unnecessary fees incurred per group. The control group incurred 33.1 percent more unnecessary fees than treatment group 1. For treatment group 2 and

3 the difference is even bigger with 38.1 and 38.5 percent respectively. However, to be able to confirm hypothesis 1, the results needs to be examined further to check if they hold after testing for robustness.

Among the treatment groups there are no significant differences in the unnecessary fees incurred, so I cannot conclude that one of the treatments outperforms the others. Hypothesis 2.1, that treatment group 2 and 3 would outperform treatment group 1 can therefore not be confirmed.

[Insert Table 4.3 here]

4.3 Control variables

In the first analysis of the data, there is a significant effect of the information treatments on the unnecessary fees indicating that the information treatments substantially improve the investment decision. Further analyses are conducted below to investigate if these results hold after testing for robustness.

To be able to check for robustness of the findings I use participants' characteristics as control variables. These characteristics include the demographic characteristic age and gender, employment status, the level of education, investment experience, work experience and experience in the financial sector. In addition, the respondents' level of risk aversion, level of cognitive skills and level of financial literacy will serve as control variables as well.

Investment experience and work experience in the financial sector are two variables I would expect to have a positive influence on the degree to which the respondent understood the optimal investment strategy and hence the amount of unnecessary fees he incurred.

[Insert Table 4.4 here]

Investment experience is used as a control variable and seems to have an impact on the degree to which the investment decision was optimal. The upper panel of Table 4.4 reports for all levels of respondents' own perception of their investment experience: the average incurred fees, what percentage of this subgroup minimized fees and what percentage naively diversified. Respondents that view themselves as more experienced in investing, make a more optimal investment decision, as I would expect. The unnecessary fees incurred drop with every higher level of investment experience. When comparing the highest and lowest group, the highest group incurred 49 percent less unnecessary fees and the difference is significant at a 1 percent level. Furthermore, the percentage that minimized fees increases from 18

percent, for the respondents with no experience, to 47 percent for the highest experienced ones. In line with this, is that the percentage of respondents that naively diversified drops from 50 percent for the lowest level of investment experience, to only 18 percent for the highest level. This all indicates that investment experience most likely has a substantial influence on the investment decision and should definitely be taken into account when analysing the effect of information treatments.

Respondents had to indicate, in case they had working experience, if they had work experience in the financial sector, which is also used as a control variable. 84 percent of all respondents did not have experience in the financial sector. I would expect respondents who have this experience in the financial sector to outperform in the asset allocation decision. Looking at the data, as is displayed in the second panel of Table 4.4 this is not the case. In fact, respondents with experience in the financial sector perform worse in avoiding unnecessary fees in absolute terms. The group with experience did have a slightly higher percentage of respondents that minimized fees and lower percentage that diversified but this difference is very small. Overall for this sample, respondents with work experience in the financial sector do not outperform respondents without this experience.

When looking at employment status I used a dummy that takes the value of 1 for non-students and the value of 0 for students. The distribution between students and non-students can be found in Table 4.1. Students incurred slightly more unnecessary fees than employed respondents and respondents that are entrepreneurs, but this difference is not statistically significant. Nevertheless, I use employment status as a control variable since I cannot conclude with certainty that there is no effect.

The same as for employment status holds for work experience. The work experience variable has the value of 1 for no work experience, 2 for less than one year of experience, 3 for more than one but less than five years and 4 for more than five years of working experience (for distribution figures I refer to Table 4.1). I compared the unnecessary fees incurred by the group with no work experience and the group with more than five years of experience. Respondents with no work experience slightly outperform the more experienced group but again this difference is not significant.

The education level is also taken into account when testing for robustness. The dispersion is reported in Table 4.1. 70 percent of all participants are or were university students without correcting for bachelor students that incorrectly filled in the question. When correcting even more than 84 percent is or was a university student. None of the respondents has no or only primary education and only 13 percent only has secondary education. It is therefore not relevant to compare the lowest and highest group for a significant difference.

Another control variable is risk aversion, which was measured with two questions in order to allocate all respondents to one of four risk aversion levels. An overview of the risk aversion levels is provided in the third panel of Table 4.4. The unnecessary fees incurred increase moving from least risk averse to

most risk averse, this difference is significant at a 5 percent level. Since all three funds are equally risky, I did not expect to see a difference in unnecessary fees.

Cognitive skills are taken into account when testing if the results are robust since the intelligence level could affect the investment decision. To measure the respondents' cognitive skills, the survey contained three questions from the Cognitive Reflection Test (CRT) by Frederick (2005). Around 56 percent of all participants answered all three questions correctly as is reported in the fourth panel of Table 4.4. Concerning unnecessary fees, there is no significant difference between the highest and lowest level of cognitive skills.

The last control variable is financial literacy, which is, as we previously say according to the literature, very much related to the degree in which the investment decision is optimal. This however does not show in the data, the lowest level of financial literacy does not have the highest unnecessary fees and the highest level does not have the lowest unnecessary fees. It is puzzling to me why this is the case, but perhaps it is due to relatively small sub-samples in the lower categories, in combination with an on average relatively high financial literacy level of the whole sample (56 percent of all participants answered at least 4 out of 5 questions correctly).

When referred to control variables further on in this paper, unless stated differently, all of the above mentioned variables will be taken into account.

4.4 Multivariate regression results

In this paragraph, I present regression results where unnecessary fees is the dependent variable. As explanatory variables, I use dummies for the different information treatments and I control for the respondents' characteristics as described in paragraph 4.3. Next, I regress unnecessary fees using the important aspects in the decision making process, the experience-statements, decision time and respondents understanding of the treatment graphs as independent variables.

4.4.1 Testing for robustness

The findings presented in Table 4.3 indicate that the information treatment significantly enhances the investment decision by at least 33 percent. To confirm that this result is not caused by other factors than the information treatment I test for robustness. Participants' characteristics as explained in paragraph 4.3 are used as control variables.

When regressing unnecessary fees on the treatment dummies and control variables the coefficients on the treatment dummies remain significant at the 1 percent level. The OLS coefficient for the treatment dummies are -2.91, -3.28 and -3.43 for treatment group 1, 2 and 3 respectively (reported in Table 4.7 model 1) which is a percentage increase of 31, 35 and 37 percent. This indicates that the unnecessary fees drop by this amount compared to the control group. Hypothesis 1 can therefore be confirmed with

a 1 percent significance level. The only other significant variable is the control variable investment experience, which also has a negative effect on unnecessary fees with a 5 percent significance level. Hence, respondents with more investment experience make on average a more optimal investment decision.

In short, the information treatments significantly improve the investment decision. Even after testing for robustness by controlling for various characteristics of the respondents by means of control variables, the findings remain valid. This implicates that the current disclosed key information is far from optimal.

4.4.2 Experiences of the investment decision

Besides improving the investment decision, the treatments might influence respondent experience during the decision process. To test if the treatments have an effect on this experience, additional questions were asked after the investment decision on what participants experienced during the investment decision. They had to indicate on a five point Likert scale whether they agreed with different statements. The statements concerned: sufficient information on risk levels, confidence about the decision, if the decision took a lot of time and the comparability of the funds. The exact wording of the statements can be read in the copy of the survey in Appendix 1. The time it took respondents to make the investment decision was also recorded. The results of the statements and the decision time are reported in Table 4.5. Using a t-test, I tested if the control group differed from the treatment groups for both the statements and the decision time. The decision time did not significantly differ between the control group and the treatment groups, hence it cannot be concluded that hypothesis 3.3, stating that the treatment groups would need less time for the investment decision, is true.

Confidence about the investment decision, the feeling that the decision took a lot of time and the extent to which they were able to compare the funds, did also not substantially differ between the control group and the treatment groups. Only for treatment group 1, the opinion about ‘being provided with sufficient information to make a good estimation of the level of risk’ significantly differed from the control group at the 5 percent significance level. Respondents that were presented with the net expected return graph agreed more with the statement that they were provided with sufficient information than respondents presented with past returns. This cannot be concluded for treatment group 2 and 3 and hence hypothesis 2.3 cannot be confirmed. An explanation for this could be that respondents had trouble understanding the meaning of the risk bounds. This could lead to information overload, causing the feeling of being provided with sufficient information to decrease.

[Insert Table 4.5 here]

In the next sub-paragraphs, the experience-statements will be used in regression analyses to test if they affect unnecessary fees and if they affect the deviation from the accurate risk level.

4.4.3 Understanding of the net expected return with risk bounds

Other variables that will be used in the analyses are three variables that indicate if respondents understood the graphs of treatment 2 and 3. This is measured using three questions that all participants had to answer on a five-point Likert scale from 'extremely clear' to 'extremely unclear'. Higher numbers correspond in this case to the graph being clearer on the asked aspect. Before and during the questions all participants were confronted with the net expected return graphs with 68- and 95 percent bounds as shown in Figure 3.1. Participants were asked if the following was clear: (i) that the graphs show the expected return and this return is uncertain (ii) that the funds have the same level of risk since the spread of the risk bounds of both funds is the same and (iii) that fund 1 is cheaper than fund 2 since the solid line starts at a higher level. The exact wording of the questions can be found in Appendix 1. On average as can be found in Table 4.6, the control group understood the graphs slightly less than the other groups, which is probably caused by the fact that they see these graphs for the first time. The other treatment groups saw the graphs or at least part of the graphs already during the investment decision. Table 4.6 also reports the standard errors which are not higher than 0.14 for any aspect in any group, indicating that a relatively large part of the answers are around the reported average.

[Insert Table 4.6 here]

4.4.4 Regression model experience statements, time spent and understanding of graph

To test if the experience statements, the time spent and the understanding of the treatment graphs have an effect on the unnecessary fees incurred, a regression analysis is done. Table 4.7 reports the regression results of regressing unnecessary fees as the dependent variable, on dummy variables for the three information treatments. Model two gives the regression results with the experience statements taken into account. It shows that the level of confidence about the decision has a significant effect on unnecessary fees. This effect seems logical. If the respondent fully understands the investment decision and hence invest more optimal he will be more confident about the decision he made. Furthermore, if the respondent to a higher extent felt that 'he was able to compare the funds', he incurred more unnecessary fees, which is not logical but this result is not significant. The coefficients for the statements 'sufficient information on risk level' and 'took a lot of time' do have the logical direction but are also not significant.

Model three takes, besides the dummy variables and the experience statements, time spent into account. The variable time spent is the time a respondent took to make the investment decision. The amount of

time a respondent took to make the decision, does not have a significant effect on the unnecessary fees the respondent incurred. I also tested the total time needed to complete the whole survey but the effect remains not significant.

The fourth model includes the respondent's understanding of the net expected return graph with risk indicating bounds. It contains the three variables that measure understanding of: the net expected return and uncertainty of this return, equal risk and charges. Interaction terms are used to control for the possible effect that seeing the graph for the second time has. Interaction dummies are used for treatment group 2 and 3 as they have already seen the graph during the investment decision, where the graphs are completely new for the control group and the risk bounds are new to treatment group 1.

I would expect that if all elements of the graphs were clear to participants, they would make a better investment decision. The regression results suggest that this is not completely the case. Participants to which it was more clear that 'the graphs show the expected return and this return is uncertain' incur on average more fees, which is significant at the 10 percent level. Why this is the case is puzzling to me and the only relatively logical explanation would be that participants did not notice immediately that the Likert scale was reversed compared to previous questions in this survey.

The other elements: that the funds have the same level of risk since the spread of the risk bounds of both funds is the same and that fund 1 is cheaper than fund 2 since the solid line starts at a higher level, do have the logical effect. If these elements are clearer to the participant, he invests more optimal. However, only the understanding of equal risk is significant at the 10 percent level.

[Insert Table 4.7 here]

4.4.5 Important aspects in the decision making process

After regressing the experience statements, decision time and understanding of the treatment graphs, I try to gain further insight in what drove respondents in the asset allocation decision.

After the investment decision and the risk perception questions, respondents had to indicate the importance of certain aspects in the decision making process, with the purpose of gaining insight in what were determining factors in the process. These factors were: (i) the ongoing charges and the entry- and exit charges of the fund, (ii) past performance, (iii) use of derivatives, (iv) desire to diversify the money across different funds, (v) the risk level indicator and (vi) for the treatment groups the figure of net expected return and net expected return with upper and lower bounds. Participants could rank the importance on a 5-point Likert scale, with 1 being 'not important at all' and 5 being 'very important'. Table 4.8 displays the average ranking of the factors per group with the ordinal ranking in parenthesis.

On average in all treatment groups, respondents ranked the figure of the net expected return (with or without bounds) as the most important element. The average importance of the net expected return figure is considerably higher than that of other factors. This provides evidence that respondents find it important to get a visual display of the net expected return. The results from Table 4.3 and 4.7 that groups provided with the figure of the net expected return make better investment decisions, is in line with this finding.

In the control group, the highest ranked aspect is the charges of the fund. For all groups, the charges of the fund is on average ranked near to 4 out of 5, which is near to 'important'. This could indicate that respondents understand that the charges are important for their investment decision. The use of derivatives and the risk level indicator have the lowest ordinal ranking. That the risk level has a low ordinal ranking is remarkable and could indicate that subjects are not concerned about the risk level or perhaps understand that the risk level is the same for all funds and therefore is not considered to be important.

The treatment groups were not provided with information on past returns of the funds. It is therefore noticeable that this indicator has the second or third highest ordinal ranking for all groups. Certainly when considering that the historic returns are not comparable since the periods are different and very short term.

[Insert Table 4.8 here]

I checked if what respondents rank as important aspects in the decision, has an influence on the unnecessary fees incurred. I would logically expect participants that rank charges as more important to make a more optimal investment decision and participants that rank 'desire to diversity' and past performance as more important to perform poorer on the asset allocation decision. Table 4.9 reports the regression results of regressing unnecessary fees as the dependent variable on dummy variables for the three treatment groups and variables for the importance of the various aspects. All treatment variables remain significant, indicating that the information treatments still have an impact when the important aspects are taken into account.

Charges have a significant effect on unnecessary fees, as expected. The OLS estimate is negative for charges indicating that respondents ranking charges as more important understand the optimal strategy better and hence allocate more assets to the cheapest fund. The significance of this effect decreases when all control variables from paragraph 4.3 are taken into account but remains significant at the 10 percent level. The desire to diversify has the opposite, positive effect on unnecessary fees. When this is ranked as more important, the respondent incurred more unnecessary fees, probably because he spread

his assets over the three funds and incurred the charges of fund B and C. This effect is significant at a 1 percent level even when control variables are taken into account.

On the contrary, the past performance aspect does not have a significant effect on the unnecessary fees. This is somewhat surprising to me since chasing past returns would lead to more unnecessary fees for investing in fund C. The aspect ‘use of derivatives’ on the other hand has a significant effect at the 1 percent level, which I cannot logically explain.

To summarise, if respondents find charges important they, on average, incur less unnecessary fees whereas regarding diversification and derivatives as an important aspect the unnecessary fees incurred on average rise.

[Insert Table 4.9 here]

There is one aspect of importance not discussed yet, which is the net expected return graph (with and without risk bounds). Only the treatment groups could rank the importance of this aspect, without risk bounds for treatment group 1 and with risk bounds for treatment group 2 and 3. In regression model 3 from Table 4.9 I include the ‘net expected return graph’ aspect by means of interaction terms for the importance of the net expected return graph (with and without risk bounds) and the applicable treatment group. This result in the finding that the importance of the net expected return graph reduces incurred unnecessary fees but for group 1 this effect is not significant. However, it is statistically significant at the 10 percent level for treatment group 2 and at the 5 percent level for treatment group 3. This means that: respondents that rank the importance of the net expected return graph higher make a better investment decision but this result is not significant for all treatment groups.

4.4.6 The effect of the treatments for different sub-samples

To test whether there is any difference between students and non-students I performed an additional regression analysis. Only the coefficient for the dummy of treatment group 2, which is -4.12, is significant at the 5 percent level. Students in group 3 perform especially well since they incur 2.96 euro less fees than their fellow working respondents. Though this difference is economically relevant, it is not statistically significant.

Furthermore, I tested if there is a difference between respondents with high and low levels of financial literacy. I regard respondent as having a high level of financial literacy when they scored at least 4.5 out of 5 on the financial literacy questions. About one-third of all respondents in my sample has a high level of financial literacy. The treatment groups outperformed the control group for all levels of financial literacy, which indicates that the information treatments work for both high and low financial

literate respondents. In all groups, respondents with a high level of financial literacy outperformed less financial literate respondents.

The difference between the high and low groups within the groups is overall slightly lower for the treatment groups than for the control group. For treatment group 1 and 2 the difference in incurred unnecessary fees for high and low financial literate respondents within the group, is considerably lower than for the control group. The difference within the control group is 2.03 between the high and low respondent where it is only 1.18 and 0.22 for treatment group 1 and 2 respectively. In treatment group 3 the difference is striking, high financial literate participants in this group outperform the others by 4.42 euro on average.

Additionally, the difference, when only looking at low financial literate respondents, between the unnecessary fees incurred by the treatment groups and the control group, is even bigger than when only looking at respondents with a high level of financial literacy. This is not in line with the findings of Agnew and Szykman (2005) who state that low financial knowledge participants regardless of how the information is presented feel overwhelmed and look for an ‘easy way out’ which suggests that different information treatments will not help. However, all differences are not significant which makes it impossible to conclude with certainty that this is an inconsistency with past research.

4.5 Risk perception

Undoubtedly, the degree to which the investment decision is optimal is important but there is a second aspect that is of importance, namely participants understanding of risk. Although the risk level in the survey for this research was equal across all funds to which participants could allocate their assets, this is not always the case. Therefore, it is important that investors have a good understanding of the risk that accompanies the investment product.

The information participants received to make an investment decision contained a risk indicating bar, indicating the risk level of the individual fund as shown in the complete survey in Appendix 1. All treatment groups received this information. Additionally, respondents in treatment group 2 and 3 were confronted with the 68 and 95 percent expected return graph respectively, which included risk-indicating bounds (overview of graphs can be found in 3.1). The risk level is equal for all funds and is 5 out of 7 on the risk scale that is conform European legislation. Directly after the investment decision, participants had to indicate the risk level of each fund. The average of this perceived risk level per fund and treatment group is reported in the upper panel of Table 4.10. The standard deviation, of the indicated individual fund risk level, is calculated for each participant, to evaluate if participants understood that the risk levels for all funds were equal. The last column of the upper panel of Table 4.10 represents the percentage of the group that correctly perceived the risk level and thus understood that all funds have a risk level of 5. The control group has the highest correctly perceived risk level where treatment group 1 has the lowest, but these differences are not significant.

There are also no significant differences between the groups for the perceived risk level. The control group does have a lower standard deviation than treatment group 1 and 2 (confirmed with a 10 percent level of significance). This indicates that they have a slightly better understanding of the risk being equal for all funds than treatment group 1 and 2. This finding contradicts with hypothesis 2.2 that treatment group 2 and 3 would be able to better assess the risk level of the funds.

The lower panel of Table 4.10 gives the average deviation from the real risk level per fund and for all funds together, split per group. The average deviation for fund A for treatment group 2 and 3 is considerably higher than for treatment group 1 and the control group. In addition, the average deviation over all funds is also higher for treatment group 2 and 3. Analysing these differences points out that these differences are not significant hence, I cannot conclude that treatment group 2 and 3 really have a poorer perception of the risk compared to treatment group 1 and the control group.

[Insert Table 4.10 here]

To further test if the different information treatments influence the perceived level of risk and make the perception more accurate, I use a regression analysis with the total average deviation from the risk levels as dependent variable. Table 4.11 reports the regression results for different regression models, all including the control variables from paragraph 4.3. The coefficients for the treatment dummies are not significant in all models, indicating that the different information treatment do not affect the perceived risk level of the funds. Hence it cannot be concluded that respondents in treatment group 2 and 3, who were presented with the net expected return with risk bounds, assess the risk level of the funds better than respondents in the control group and treatment group 1. Hypothesis 2.2 can therefore not be confirmed.

[Insert Table 4.11 here]

4.6 The preferred net expected return graph

The regression results show that the information treatments enhance the investment decision. The addition of risk-indicating bounds to the net expected return improves the investment decision even further than the net expected return without risk bounds but this difference is not significant. Also, the risk bounds do not seem to improve the extent to which participants assess the accurate risk level. Nevertheless, respondents value the net expected return graph and find it important as became clear

from the important aspects questions. Therefore, it is meaningful to know what graph respondents find most useful.

After the questions about the understanding of the net expected return graph, I asked respondents what graph is preferred. I asked: “The difference in the graphs is the spread of the lower and upper bound. These graphs should explain clearly the fact that investing in the stock market is risky and that there is a possibility that you will end up with more or less money than you expected. In your opinion, which graph makes this more clear?” to which respondent could answer: the 68% graph, the 95% graph, no difference in graphs or no opinion. The results of this question are reported in Table 4.12.

[Insert Table 4.12 here]

The higher number of respondents without an opinion in the control group might be caused by the fact that the control group was not confronted with these graphs before this part of the survey. The treatment groups already saw this graph or part of this graph (without the risk bounds) in the information provided for the investment decision.

The net expected return graph, with 95% of the expected returns falling between the upper and lower bound is among all groups overwhelmingly perceived as clearer than the 68% percent graph. 64 percent of the participants choose the two standard deviation graph while only 6 percent choose the one standard deviation graph. The information treatments with the 68% and 95% graphs do not outperform each other in unnecessary fees incurred. Therefore, when regulators want to improve the investment decision by means of improved information disclose using the net expected return graph, they should adopt the 95% graph.

5. Conclusion

Index mutual funds play an important role for many individual investors, but it appears that the index mutual fund decision is often sub-optimal. Regulators have tried to help investors by forcing providers of investment products to disclose adequate information on the investment product in the most appropriate and standardized way. Despite the help of regulators, index mutual fund investments stay sub-optimal.

Previous research found that there are two advocated remedies to minimize sub-optimal investments: improving financial literacy and improving information disclosure. This study focused on the latter and was designed to find an answer to the following research question:

'Does replacing information on past performance in the KIID, by a graphical representation of the expected return with its uncertainty and fund fees, lead to a more optimal investment decision?'

To empirically find an answer to this question, a survey was designed that was completed by 293 respondents. Using this data, analyses were undertaken to test the different information treatments that were embedded in the survey design. The results of these analyses reveal that the addition of graphical representation to the disclosed key information leads to more optimal investment decisions.

Respondents that were presented with a graphical representation of the net expected return (with and without risk bounds) outperform the respondents who were presented with information on past performance. They incurred between 33.1 and 38.5 percent less unnecessary fees. Undoubtedly this is a very considerable difference, providing evidence that the treatments lead to better, more optimal investments. Even after testing for robustness by controlling for various characteristics of the respondents by means of control variables, the findings remain valid. This implicates that the current disclosed key information is far from optimal.

That the treatment groups outperform the control group is clear, but there is also a difference between the information treatments tested. The first treatment group was presented with the net expected return graph. The second group was presented with the net expected return graph, with upper and lower risk-indicating bounds of one standard deviation. The third group was presented with the net expected return graph, with upper and lower risk-indicating bounds of two standard deviations. Although the treatment groups that were presented with the net expected return graph with risk-indicating bounds incurred on average 7.7 percent lower unnecessary fees than the treatment group without risk bounds, this result is not statistically significant.

Besides the effect of the treatments on unnecessary fees incurred, I also tested if the treatments had an effect on the extent to which respondents assessed the accurate risk level. Overall, respondents had a good estimation of the risk level of the funds. On average 72 percent of the respondents correctly perceived the risk level of all three funds. When regressing the average deviation from the correct risk

level on the treatment groups and the control variables, the OLS coefficients for the treatment dummies were not significant. Therefore, it cannot be confirmed that respondents presented with the net expected return with risk bounds on top of a risk-indicating bar, assess the risk level better than respondents who were only presented with a risk-indicating bar.

In line with the perceived risk level, is the extent to which respondents felt that they were presented with sufficient information to make a good estimation of the level of risk of the three index funds. Only the treatment group that was presented with the net expected return without the risk bounds, agreed significantly more with the statement of being provided with sufficient information than the control group. An explanation for this needs further research.

Concerning other experience statements of the respondents, the treatments did not have a significant effect. Respondents in the treatment groups did not significantly agree more or less with the statements that: “the investment decision took a lot of time”, “I’m confident that I made the right investment decision” and “I was able to compare the three funds properly based on the information provided.” Also the time spent to allocate the assets did not significantly differ between the groups. As a result, the main gain of the information treatments is in the more optimal investment and not the respondents’ improved experience of the investment decision. Yet, respondents do value the information treatment, as becomes clear when evaluating the answers to the important aspects questions. Important aspects give insight in what drives the investment decision of respondents. The highest ranked aspect for the treatment group was the net expected return graph (with and without risk bounds). This indicates that respondents consider the net expected return graph to be important in their investment decision.

Besides the net expected return graph (for the treatment group), respondents found charges to be an important aspect. Respondents that rank charges as a more important factor make a better asset allocation decision. The same holds for the aspect: ‘the desire to diversify’ but here the effect is negative. This can be explained by the fact that respondents that value diversification, do not understand the investment decision and incur fees from not allocating all assets in the cheapest fund.

The following conclusion can be drawn from the present study: graphical representation, in the form of a net expected return graph which visualizes the expected return and the influence of charges, reduces the unnecessary fees incurred with the index mutual fund investment decision by more than 33 percent. The addition of risk-indicating bounds as designed in this study, does not significantly improve the investment decision or refines respondents’ understanding of the risk level. Additional studies need to be carried out to further investigate the understanding of risk.

Taken together, the empirical findings in this study help to improve the Key Investor Information Document on investment products. The results support strong recommendations to add a graphical representation of the net expected return as a replacement for past returns to the disclosed key information, to improve the investment decision of index mutual fund investors.

6. Recommendations

The empirical findings of this research point out that there is room for improvement in the KIID to enhance the investment decision of individual investors. It becomes clear that replacing information on past performance by a net expected return graph improves the decision substantially. The research focuses on index mutual funds since they are commodity-like and it is absolutely clear what is the optimal investment strategy. However, the research can be taken much broader than just index mutual funds. There is no reason to assume that if the changed information disclosure works for index mutual funds, it will not work for other investment products. Therefore, I recommend European policymakers to re-evaluate the disclosed information in the KIID for all investment products. European regulation 583/2010, which states what information needs to be disclosed and the standard template that contains the exact rules for disclosure, then need to be revised.

All information treatments improved the investment decision but the two treatments with risk bounds improved the decision even further. This difference is however not significant and the bounds did not improve the correct assessment of the risk. However, respondents value the graphs and among all participants the 95% graph (with risk bounds of two standard deviations from the expected return, as shown in the lower right corner of Table 3.1) was preferred. They found it, for the 95% graph, overwhelmingly more clear that investing in the stock market is risky and that there is a possibility that you will end up with more or less money than you expected. When adding the graphical representation to the KIID I advise to make use of the 95% graph.

There however are, as to every research, some limitations to this study. The findings of this research are based on a survey with 293 respondents. The bigger part of the sample was students. This holds that the sample is not fully representative for the average population that invests or will in the future. Hence it decreases the extent to which the results of this research are generalizable. Nevertheless, the sample is representative for a big part of consumers that invests for the first time. These are the consumers I expect to gain their information on investment products from the KIID instead of the prospectus or direct contact with the funds (which is more often the case with more experienced or professional investors). Hence, the results are still important but need to be further tested among investors.

There is a second limitation which concerns the degree of information overload. As discussed there are four causes of information overload: (i) the presentation of information to investors, (ii) the number of investment options given, (iii) the similarity among those options and (iv) the financial knowledge of the investor. The investment information in the survey was summarized to contain only the key information of every item in the KIID. This might have reduced information overload compared to the real life situation where investors see the whole KIID. Also, the number of investment options, which is only 3 in this study, might influence the degree of information overload. In addition, the high level of financial literacy could influence the average information overload among respondents. In case there

is a higher degree of information overload, in the real investment decision process, investors will reduce the effort they make and are more likely to choose the default option. In that case the effect of the improved information disclosure may not have had the same magnitude.

Although the investment decision on average becomes much more optimal from the graphical representation there remains a substantial group that, despite the improved information disclosure, does not understand the investment decision and fails to minimize unnecessary fees. Still less than one third of all participants in the treatment groups managed to minimize all fees. There is still much to gain in further research to improve the decision even more. Nonetheless, the addition of graphical representation is a great step towards more optimal investments and will help many investors to make a better investment decision.

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Tables and figures

Table 3.1
Characteristics of the used MSCI Europe index mutual funds

	Index fund A	Index fund B	Index fund C
Name	iShares	AMUNDI - AE	AMUNDI - IE
ISIN-code	IE00B1YZSC51	LU0389811885	LU0389811539
Inception date	06-07-2007	29-6-2016*	29-6-2016*
Entry charge	0%	4.5%	2.5%
Exit charge	0%	0%	0%
Ongoing charges	0.35%	0.3%	0.15%
Risk level	5	5	5
Front load on 500 Euro investment	0	22.5	12.5
Ongoing expenses	0.15	0.12	0.06
Total fees after 1 month	0.15	22.62	12.56

*Sub-fund of fund that is established 25-10-2008

Figure 3.1
Information provision per group

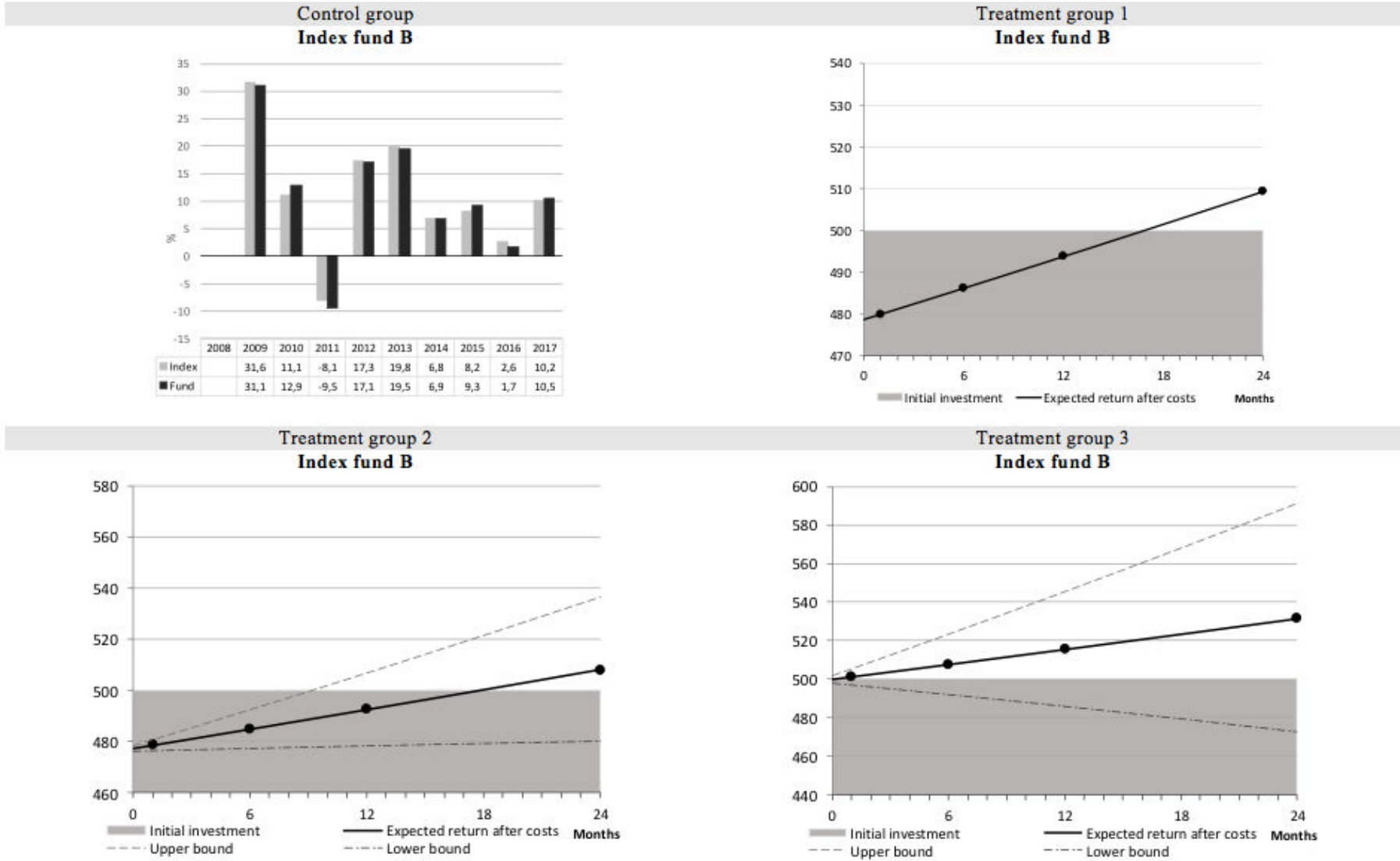


Table 4.1
Summary sample characteristics

	Control group			Treatment group 1			Treatment group 2			Treatment group 3			Total		
	Student	Not student	All	Student	Not student	All	Student	Not student	All	Student	Not student	All	Student	Not student	All
Average age	20.8	34.0	24.5	20.8	35.8	24.6	21.1	35.0	23.1	21.1	37.1	25.9	21.0	35.6	24.6
Percent male	72%	52%	67%	66%	71%	67%	76%	55%	73%	65%	57%	62%	70%	58%	67%
Current or highest education															
No education	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Primary education	0%	0%	0%	2%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Secondary education	24%	0%	17%	12%	0%	9%	27%	0%	23%	13%	0%	9%	19%	0%	15%
Mbo (=intermediate vocational education)	0%	10%	3%	0%	6%	1%	0%	9%	1%	2%	4%	3%	0%	7%	2%
Bachelor/Master HBO (university of applied sciences)	7%	24%	12%	6%	24%	10%	10%	36%	14%	6%	35%	14%	7%	29%	13%
Bachelor University	44%	0%	32%	64%	12%	51%	43%	0%	36%	59%	4%	43%	52%	4%	40%
Master University	24%	67%	36%	16%	59%	27%	21%	55%	26%	20%	43%	31%	20%	60%	30%
Working status															
Student	100%	0%	72%	100%	0%	75%	100%	0%	85%	100%	0%	70%	100%	0%	75%
Unemployed	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Employed	0%	95%	27%	0%	82%	30%	0%	100%	27%	0%	78%	26%	0%	88%	22%
An entrepreneur	0%	5%	1%	0%	18%	1%	0%	0%	1%	0%	22%	1%	0%	13%	3%
Risk aversion level 1-4	2.69	2.95	2.76	2.48	2.94	2.60	2.41	3.18	2.53	2.46	2.91	2.60	2.51	2.97	2.62
Cognitive level 0-3	2.20	1.90	2.12	2.46	2.00	2.34	2.29	2.09	2.26	2.26	2.26	2.26	2.30	2.07	2.24
Financial literacy level 0-5	4.11	3.46	3.93	4.12	3.83	4.05	3.97	3.27	3.87	3.98	3.42	3.81	4.04	3.51	3.91
Experience with investing	43%	33%	40%	38%	24%	34%	29%	27%	28%	33%	39%	35%	35%	32%	34%
Years of work experience															
None	26%	10%	21%	44%	0%	33%	25%	0%	22%	35%	4%	26%	32%	4%	25%
Less than 1	20%	29%	23%	22%	35%	25%	24%	0%	20%	19%	13%	17%	21%	21%	21%
Between 1 and 5	46%	33%	43%	28%	29%	28%	43%	45%	43%	43%	35%	40%	40%	35%	39%
More than 5	7%	29%	13%	6%	35%	13%	8%	55%	15%	4%	48%	17%	6%	40%	15%
Experience in financial sector	15%	38%	21%	6%	18%	12%	13%	73%	12%	13%	30%	18%	12%	36%	16%
Time spent (seconds)	1452	6396	2836	2526	2797	2595	4123	2416	3870	1498	12747	4858	2468	6967	3574
Sample size (N)	54	21	75	50	17	67	63	11	74	54	23	77	221	72	293

Figure 4.1

The unnecessary fees incurred per group

The bars represent the average incurred unnecessary fees per group in Euro. The error bars present the 95% confidence interval.

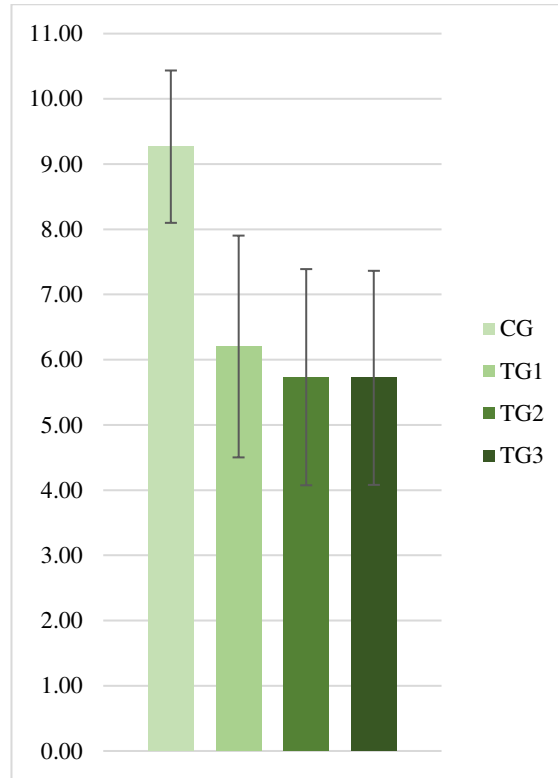


Table 4.2

Overview of incurred fees per group and the degree of optimal investing

The total portfolio fees are the entry charges over the 500 Euro invested plus the ongoing charges. The ongoing charges are calculated by multiplying the assets on the end of the first month with the ongoing charges of the fund invested in. Unnecessary fees are calculated per respondent by deducting the minimum fees if all assets would be allocated in the fund with the lowest fees (fund A), from the portfolio fees that are incurred by the respondent with his asset allocation. Minimized fees gives the percentage of respondents within the group that allocated all assets in fund A. Naively diversified represents the percentage of respondents that allocated assets across all three funds.

Group	Entry charges	Ongoing charges	Total portfolio fees	Unnecessary fees	Minimized fees	Naively diversified
CG	9.30	0.11	9.41	9.27	17%	59%
TG1	6.23	0.12	6.35	6.20	22%	45%
TG2	5.76	0.12	5.88	5.73	27%	36%
TG3	5.75	0.12	5.87	5.72	32%	38%

Table 4.3**Relative difference in percentage invested in fund A and unnecessary fees between treatments**

The upper panel of this table shows the percentage of assets invested in the optimal fund, being fund A, and the relative differences per group. In the lower panel, the unnecessary fees that participants incurred by allocating assets to fund B and C instead of investing all assets in fund A are displayed with the differences between the treatments. The control group is compared with the three treatment groups to test for differences in the dependent variable. In addition, I compared the treatments with each other. To test for the difference, a t-test for equality of means is used allowing for unequal variances. The significance level is indicated with asterisks.

Group	% invested in fund A	Group			
		CG	TG1	TG2	TG3
CG	43.3%	-	-	-	-
TG1	59.9%	38.5%*** (16.7)	-	-	-
TG2	63.0%	45.6%*** (19.7)	5% (3.1)	-	-
TG3	62.1%	43.5%*** (18.8)	3.6% (2.1)	-1.5% (-0.9)	-

Group	Unnecessary fees	Group			
		CG	TG1	TG2	TG3
CG	9.27	-	-	-	-
TG1	6.20	-33.1%*** (-3.06)	-	-	-
TG2	5.73	-38.1%*** (-3.53)	-7.6% (-0.47)	-	-
TG3	5.72	-38.5%*** (-3.54)	-7.8% (-0.48)	-0.2% (-0.01)	-

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Table 4.4**Overview of control variables**

For unnecessary fees I checked for significant differences in unnecessary fees between the two outer answer groups ('strongly disagree' and strongly agree').

Investment experience	Proportion of respondents	Unnecessary fees	Minimized fees	Naively diversified	N
Strongly disagree	34%	7.82	18%	50%	101
Disagree	25%	7.07	22%	54%	72
Neutral	12%	5.89	32%	47%	34
Agree	24%	5.90	29%	32%	69
Strongly agree	6%	4.02***	47%	18%	17

Work experience in financial sector	Proportion of respondents	Unnecessary fees	Minimized fees	Naively diversified	N
Yes	16%	7.31	23%	45%	47
No	84%	6.63	25%	44%	246

Risk aversion level	Proportion of respondents	Unnecessary fees	Minimized fees	Naively diversified	N
Level 1 - least risk averse	11%	5.57	42%	32%	31
Level 2	37%	6.57	22%	44%	108
Level 3	32%	6.21	27%	46%	95
Level 4 - most risk averse	20%	8.52**	17%	47%	59

Cognitive skills level	Proportion of respondents	Unnecessary fees	Minimized fees	Naively diversified	N
0	9%	8.15	16%	56%	25
1	15%	6.66	27%	45%	44
2	20%	6.06	27%	42%	59
3	56%	6.79	25%	43%	165

Financial literacy	Proportion of respondents	Unnecessary fees	Minimized fees	Naively diversified	N
0-0.99	2%	5.89	33%	67%	6
1-1.99	4%	8.14	15%	46%	13
2-2.99	11%	6.50	27%	27%	33
3-3.99	27%	7.56	17%	54%	78
4-5	56%	6.32	29%	42%	163

Table 4.5**Experience-statements and timing of the investment decision**

This table reports the average recorded time respondents used for the investment decision per group. The following columns refer to the statements asked after the investment decision on how the participant experienced the decision process and the provided information. The exact wording of the statements can be found in Appendix 1. To test to what extent a respondent agreed with the statements, I used a five point Likert scale with 1 being 'totally disagree' and 5 being 'totally agree'. To test for significant difference between the control group and the treatment group I used a mean comparison t-test, allowing each treatment group to have a different variance. The significance level is indicated with asterisks.

Group	Decision time	Sufficient info	Confidence	Took lot of time	Able to compare funds	N
CG	226.6	3.09	3.03	2.99	3.11	75
TG1	186.5	3.40**	2.90	2.99	3.24	67
TG2	211.3	3.24	2.97	2.93	3.27	74
TG3	225.0	3.12	2.91	3.01	3.05	77

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Table 4.6**Understanding of the net expected return graph with risk bounds**

The variables are averages of the particular group and are measured using a five point Likert scale from 'extremely clear' to 'extremely unclear. Higher numbers correspond to the graph being clearer on the asked aspect. The standard errors are in parenthesis.

Group	Net expected return	Understand equal risk	Understand charges	Average understanding	N
CG	3.89 (0.14)	3.61 (0.13)	3.81 (0.14)	3.77	75
TG1	4.00 (0.11)	3.75 (0.14)	4.06 (0.13)	3.94	67
TG2	4.00 (0.12)	3.54 (0.14)	3.97 (0.14)	3.84	74
TG3	3.90 (0.13)	3.66 (0.12)	4.00 (0.13)	3.85	77
Total	3.95	3.64	3.96	3.85	293

Table 4.7**Regression models on unnecessary fees**

This table reports the regression results with unnecessary fees incurred as the dependent variable. Treatment group 1, 2 and 3 are dummies indicating that a respondent was presented with a particular information treatment. The experience statements are measured on a five-point scale where 5 represents 'completely agree'. The time spent variable is the time needed to make the investment decision. If respondents understood the net expected return graph is measured in three variables net expected return, equal risk and charges. These variables are measured on a five-point scale, where 5 again represents 'completely agree'. In all models, I control for the control variables discussed in paragraph 4.3. In model 4 interaction terms are added to the model for treatment group 2 and 3 with all of the 'understanding' variables. Standard errors are in parentheses and asterisks indicate the level of significance.

	Unnecessary fees (1)	Unnecessary fees (2)	Unnecessary fees (3)	Unnecessary fees (4)
Treatment group 1	-2.91*** (0.85)	-3.21*** -0.84	-3.28*** (0.85)	-2.84*** (0.85)
Treatment group 2	-3.28*** (0.83)	-3.61*** (0.82)	-3.63*** (0.82)	-3.35 (3.31)
Treatment group 3	-3.43*** (0.82)	-3.58*** (0.81)	-3.57*** (0.81)	-1.33 (3.17)
Sufficient information on risk level		-0.05 (0.39)	-0.02 (0.39)	
Took a lot of time		0.09 (0.32)	0.13 (0.33)	
Confident about the decision		-1.3*** (0.36)	-1.24*** (0.37)	
Able to compare funds		0.63 (0.40)	0.59 (0.40)	
Time spend on investment			0.00 (0.00)	
Understanding net expected return				0.83* (0.47)
Understanding equal risk				-0.79* (0.46)
Understanding charges				-0.37 (0.42)
Constant	9.36*** (2.97)	11.95*** (3.55)	11.97*** (3.55)	10.68*** (3.49)
Control variables	Yes	Yes	Yes	Yes
Interaction terms with dummies	-	-	-	Yes
N	293	293	293	293
R-squared	0.143	0.183	0.186	0.179
Adjusted R-square	0.104	0.133	0.133	0.112

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Table 4.8**Importance of various aspects in respondents' investment decision**

This table reports the average perceived importance of aspects in making the investment decision process. Respondents could rank all aspects on a five-point scale from 'not important at all' to 'very important'. High figures indicate higher perceived importance. The ordinal ranking per group is in parenthesis, where lower figures correspond to greater ordinal importance.

	Control group	Treatment group 1	Treatment group 2	Treatment group 3
Charges of the fund	3.76 (1)	3.79 (2)	3.70 (4)	3.77 (2)
Past performance	3.75 (2)	3.78 (3)	3.77 (2)	3.53 (3)
Use of derivatives	3.00 (5)	3.09 (6)	3.04 (6)	3.03 (6)
Desire to diversify	3.73 (3)	3.67 (4)	3.73 (3)	3.49 (4)
Risk level indicator	3.41 (4)	3.64 (5)	3.57 (5)	3.43 (5)
Figure of net expected return		4.12 (1)		
Figure of net expected return with upper and lower bounds			4.08 (1)	4.01 (1)
Sample N	75	67	74	77

Table 4.9**Regression unnecessary fees on importance factors**

This table reports regressions results where the dependent variable is unnecessary fees. Treatment group 1, 2 and 3 are dummies indicating that a respondent was presented with a particular information treatment. The other variables are aspects of importance in the investment decision, which respondents could rank on a five-point scale from one being 'not important at all' to five being 'very important'. In the last column, I control for gender, age, employment, education, risk aversion level, level of cognitive skills, financial literacy, investment experience, work experience and work experience in the financial sector as mentioned in paragraph 4.3. Standard errors are in parentheses and asterisks indicate the level of significance.

	Unnecessary fees (1)	Unnecessary fees (2)	Unnecessary fees (3)
Treatment group 1		-3.07*** (0.74)	-2.95*** (0.74)
Treatment group 2		-3.67*** (0.72)	-3.38*** (0.73)
Treatment group 3		-3.07*** (0.71)	-2.96*** (0.72)
Charges	-0.88*** 0.32	-0.91*** (0.31)	-0.59* (0.33)
Diversify	1.89*** (0.25)	1.85*** (0.24)	1.87*** (0.24)
Risk level	0.24 (0.26)	0.33 (0.25)	0.27 (0.25)
Past performance	0.28 (0.31)	0.23 (0.30)	0.17 (0.31)
Derivatives	0.66** 0.32	0.71** (0.31)	0.91*** (0.32)
Constant	-0.79 (2.07)	1.63 (2.03)	1.55 (3.33)
Control variables	No	No	Yes
N	293	293	293
R-squared	0.251	0.327	0.363
Adjusted R-square	0.238	0.308	0.321

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Table 4.10**Overview of perceived risk and deviation for the actual risk level per group**

The upper panel shows the individual fund risk level for the control group and the treatment groups, the average risk level per treatment group and the standard deviation. The standard deviation indicates the dispersion between the three individual risk levels that the participants indicated. The lower panel gives the average deviation for the real risk level of 5 for the individual funds as well as the total deviation. To test for significant difference between the control group and the treatment group, a mean comparison t-test is used allowing each treatment group to have a different variance. The significance level is indicated with asterisks.

Group	Average risk level fund A	Average risk level fund B	Average risk level fund C	Average risk level all funds	Standard deviation	Correctly perceived risk level
CG	4.73	4.73	4.81	4.76	0.20	74.7%
TG1	4.76	4.67	4.85	4.76	0.39 *	68.7%
TG2	4.59	4.76	4.82	4.73	0.36 *	70.3%
TR3	4.56	4.77	4.73	4.68	0.32	74.0%

Group	Average deviation fund A	Average deviation fund B	Average deviation fund C	Average deviation all funds
CG	0.27	0.27	0.19	0.24
TG1	0.24	0.33	0.15	0.24
TG2	0.41	0.24	0.18	0.27
TR3	0.44	0.23	0.27	0.32

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Table 4.11**Regression on total average deviation for the risk level**

This table reports regression results with the total average deviation from the risk level as dependent variable. The total average deviation is calculated by averaging the deviations per fund. Sufficient information on risk level, took a lot of time, confident about the decision and able to compare funds are measured on a 5 point Likert scale where 5 indicates 'completely agree'. Understanding net expect return, understanding equal risk and understanding charges are questions that measure the understanding of the net expected return graph with risk bounds and are also measured with a five-point Likert scale where 5 indicates 'Totally agree'. All models include control variables as reported in paragraph 4.3. Standard errors are in parentheses and asterisks indicate the level of significance.

	Average deviation	Average deviation	Average deviation
	(1)	(2)	(3)
Treatment group 1	0.07 (0.11)	0.09 (0.11)	0.09 (0.11)
Treatment group 2	0.10 (0.11)	0.10 (0.10)	0.11 (0.11)
Treatment group 3	0.09 (0.11)	0.10 (0.10)	0.08 (0.10)
Sufficient information on risk level			-0.07 (0.05)
Took a lot of time			0.10** (0.04)
Confident about the decision			-0.05 (0.05)
Able to compare funds			-0.03 (0.05)
Understanding net expected return		-0.05 (0.04)	
Understanding equal risk		-0.02 (0.04)	
Understanding charges		-0.12*** (0.04)	
Constant	0.59** (0.34)	1.47*** (0.40)	1.05** (0.46)
Control variables	Yes	Yes	Yes
N	293	-	293
R-squared	0.106	0.176	0.160
Adjusted R-square	0.065	0.128	0.108

*** Significant at the 1% level, ** significant at the 5% level, * significant at the 10% level

Table 4.12**Preferred net expected return graph with risk bounds**

The table shows the percentage of respondents that choose which graph they found clearer. 'Graph 68%' represents the net expected return graph with risk bounds that are calculated with 1 standard deviation from the expected return, so that 68% of the expected returns fall between the upper and lower bound. 'Graph 95%' represents the expected return graph with 2 standard deviation bounds.

Group	Graph 68%	Graph 95%	No difference	No opinion	N
CG	5%	60%	12%	23%	75
TG1	9%	64%	9%	18%	67
TG2	7%	68%	8%	18%	74
TG3	5%	65%	12%	18%	77
Total	6%	64%	10%	19%	293

Appendix

Appendix 1: Copy of the survey

Dear participant,

Thank you for participating in this survey. The results of this survey will be used to investigate the effect of the graphical presentation of financial information on investment decisions of private investors.

Making investment decisions partly depends on your financial literacy (financial knowledge), risk aversion and cognitive skills. Therefore, this survey also contains questions about these aspects.

The survey consists of the following parts:

- Part 1: Demographic questions
- Part 2: Risk aversion questions
- Part 3: Cognitive skills questions
- Part 4: Financial literacy questions
- Part 5: The investment decision
- Part 6: Concluding questions

Please take your time to answer the questions and be honest. The results will be treated anonymously. The survey will take 10 to 15 minutes.

By participating in this survey you have the chance to earn up to €20. More information on your reward is presented in the introduction of Part 5.

Thank you for your cooperation,
Aimée van de Ven

What led you to this survey?

- Blackboard announcement
- Link on Facebook
- Link on LinkedIn
- Via Email
- A WhatsApp-request
- Other _____

Part 1: Demographic questions

In this part you will be asked some questions personal information. This gives us more insight into the composition of the participants of this survey.

What is your gender?

- Male
- Female

What is your age in years? _____

I am:

- A student
- Unemployed
- Employed
- An entrepreneur

What is your current or otherwise highest achieved education level?

- No education
- Primary education
- Secondary education
- MBO (=intermediate vocational education)
- Bachelor/Master HBO (=university of applied sciences)
- Bachelor University
- Master University

What is/was your study program? _____

Part 2: Risk aversion questions

There will be two questions that help us make an estimate of your risk aversion level.

The risk aversion level reflects the degree of how much an individual dislikes risk.

Question 1 Suppose that you are the sole income provider for your family. You have a good job which enables you to always provide sufficient income for your family.

Now you are offered a new equivalent job. However, there is a **50% chance** that the salary of the new job:

- is **double** your current income.
- or**
- decreases your current income with **one-third**.

Would you accept the job?

- Yes
- No
- I don't know
- I don't want to answer

→ Next question only if risk aversion Q1 was answered with yes

Question 2 Suppose that you are the sole income provider for your family. You have a good job which enables you to always provide sufficient income for your family.

Now you are offered a new equivalent job. However, there is a **50% chance** that the salary of the new job:

- is **double** your current income.
- or**
- is **half** your current income.

Would you accept the job?

- Yes
- No
- I don't know
- I don't want to answer

→ **Next question only if risk aversion Q1 was answered with no or I don't know**

Question 2 Suppose that you are the sole income provider for your family. You have a good job which enables you to always provide sufficient income for your family.

Now you are offered a new equivalent job. However, there is a **50% chance** that the salary of the new job:

- is **double** your current income.
- or**
- decreases your current income with **one-fifth**.

Would you accept the job?

- Yes
- No
- I don't know
- I don't want to answer

Part 3: Cognitive skills questions

There will be three questions that help us make an estimate of your cognitive skills.

Cognitive skills reflect the abilities to absorb knowledge and process information.

Question 1

A book and a pen together cost €1.10. The book costs € 1.00 more than the pen. What is the price of the pen in cents? _____

Question 2

A portion of a lake is covered with a bunch of water lilies. The water lilies double in size every day, and it takes 48 days for the water lilies to cover the entire lake. How many **days** will it take to cover half the lake with water lilies? _____

Question 3

If it takes five machines five minutes to make five products. How many **minutes** does it take 100 machines to make 100 products? _____

Part 4: Financial literacy questions

There will be five questions which help us make an estimate of your financial literacy level. Each question is followed by a slider that allows you to indicate how confident you are that you have answered the question correctly.

Financial literacy refers to the knowledge of financial concepts and risks, and the skills to apply this knowledge to make effective decisions across a range of financial contexts.

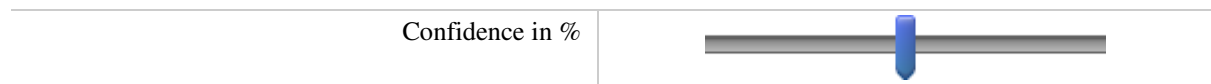
Question 1

Suppose you have €100 in a savings account. The interest rate is **2%** per year. How much euro will be in the savings account after five years? (Assume that you leave the money in the savings account for these five years)

- More than 110 euro
- Exactly 110 euro
- Less than 110 euro
- I don't know

How confident are you that you gave the right answer?

33 43 53 63 73 83 93 100



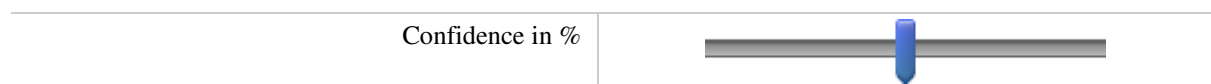
Question 2

Suppose that the interest rate on your savings account is **2%** per year. The inflation rate is **3%** per year. After one year, would you be able to buy more, less or exactly the same as today with the money on your savings account.

- More than today
- Exactly the same as today
- Less than today
- I don't know

How confident are you that you gave the right answer?

33 43 53 63 73 83 93 100



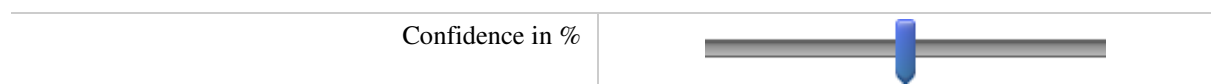
Question 3

Suppose that Tom inherits **€10.000** today. We know with certainty that Jerry will also inherit **€10.000** exactly 3 years from now. Which of the two is richer because of the inheritance? Assume a normal state of the economy.

- Tom
- Jerry
- Tom and Jerry are equally rich
- I don't know

How confident are you that you gave the right answer?

33 43 53 63 73 83 93 100



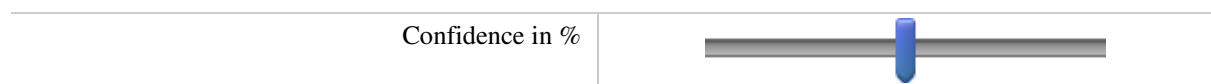
Question 4

Consider the following proposition: *"In general, an investment in an individual company's stock is less risky than an investment in a fund with stocks of multiple companies"*

- True
- False
- I don't know

How confident are you that you gave the right answer?

33 43 53 63 73 83 93 100



Question 5

What happens to the prices of bonds if the interest rate declines?

- The prices of bonds fall
- The prices of bonds rise
- The prices of bonds will stay the same
- I don't know

How confident are you that you gave the right answer?



Financial literacy varies among persons. What is your estimation of your own financial literacy?

- Very low
- Low
- Below average
- Above average
- High
- Very high
- I don't know

Part 5: The investment decision

First there will be some questions and propositions on your investment knowledge and your experience in investing.

After that, information is presented for the investment decision that you are about to make which is the core part of this survey.

"I have experience with investing in financial products like stocks, bonds and investment funds"

- Completely disagree
- Disagree
- Neutral
- Agree
- Completely agree

How many years of work experience do you have (including full-time jobs and internships)?

- None
- Less than 1 year
- Between 1 and 5 years
- More than 5 years

Do you have work experience in the financial sector?

- Yes
- No

General background information on investment funds

Your task is to invest money into one or more MSCI Europe Index funds.

What is an investment fund?

People can put their money (= invest) in an investment fund. This investment fund will invest your money for you. The fund will realize a certain return. The return on *your* investment is determined by subtracting the costs of the investment fund of their realized return.

What is a index fund?

An index fund is a type of investment fund that tracks the components of a market index. An MSCI Europe Index fund is an index fund that aims to realize a return that matches the MSCI Europe Index.

What is the MSCI Europe Index?

The MSCI Europe Index is a stock index of large and medium-sized companies across 15 developed European countries. It represents approximately 85% of the market capitalization across the European Developed Markets equity universe.

The task

You have a fictional amount of **€500** to invest in one or more MSCI Europe Index funds.

These index funds are managed by respected companies. These companies will definitely not go bankrupt during the investment period. If your investment decision realizes a positive return, you will get that return with certainty.

The funds are based on a combination of information of existing funds. The names of the index funds are renamed to prevent you from deciding to invest in funds you might know from your own investing experience. For the sake of this experiment you might be presented with information that is not allowed according to the law.

The rules

You have to make an investment decision based on the information presented on the following page. You are required to invest the full amount of €500.

You don't have to invest the full amount into one index fund hence you can diversify across the funds. You are not allowed to make negative investments (go short).

What is your reward?

For every 100 participants that complete the survey, 25 winners will be randomly selected. Every winner earns the return of their individual investment over the investment period of one month. The return is equal to the index funds' realized return minus the costs involved with the investment (with a maximum of €10). The better your investment decision, the higher your return.

Finally, among all participants that were not drawn as winners, 2 participants will be randomly selected and win a gift coupon of €20 each.

The return of your investment decision will be determined by an investment period of **1 month**, that is, from **1 June 2018 to 30 June 2018**.

OBJECTIVES AND INVESTMENT STRATEGY OF THE FUNDS

Index fund A

The Fund aims to achieve a return on your investment, through a combination of capital growth and income on the Fund's assets, which reflects the return of the MSCI Europe Index, the Fund's benchmark index.

The Fund aims to invest so far as possible and practicable in the equity securities that make up the benchmark index.

The shares are listed on one or more stock exchanges and may be traded in currencies other than their base currency. The performance of your shares may be affected by this currency difference.

Index fund B

The objective of this Fund is to track the performance of MSCI Europe Index, and to minimize the tracking error between the net asset value of the Fund and the performance of the Index. The Fund aims to achieve a level of tracking error of the Fund and its index that will normally not exceed 1%.

The Index is a Net Total Return Index: dividends net of tax paid by the index constituents are included in the Index return.

Index fund C

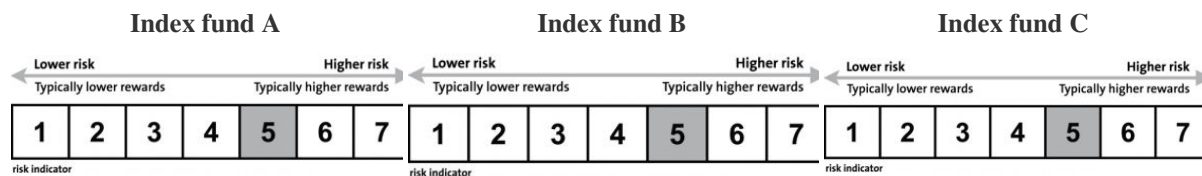
The investment objective of the Fund is to closely match the risk and return characteristics of the MSCI Europe Index. The Fund invests in equities issued by or relating to companies included in the Index. The equities will be traded on stock exchanges in the countries included in the index.

The Investment Manager will be able to use derivatives in order to deal with inflows and outflows and also if it allows a better exposition to an Index constituent.

The Index is a Net Total Return Index: dividends net of tax paid by the index constituents are included in the Index return.

RISK AND REWARD PROFILE

The indicators below are based on historical data and may not be reliable indicators of the future risk profile of the Funds. The risk categories shown are not guaranteed and may change over time. The lowest category does not mean risk free.



The Fund is rated five due to the nature of its investments which include the risks described below. These factors may impact the value of the Fund's investments or expose the Fund to losses.

The value of equities and equity-related securities can be affected by daily stock market movements. Other influential factors include political, economic news, company earnings and significant corporate events.

The risk level of this Fund mainly reflects the market risk arising from investments in European equities. Your initial investment does not benefit from any guarantee or protection.

Important risks materially relevant to the Fund which are not adequately captured by the indicator are: liquidity risk, counterparty risk, operational risk and currency risk. The occurrence of any of these risks may have an impact on the net asset value of your portfolio.

The risk category is based on an estimation of the volatility of the fund.

The fund is grouped in risk category 5 because the volatility of the returns is high. Investors need to be willing and capable to carry increased risk. The value of a fund share can drop below the purchase price.

CHARGES

The charges are used to pay the costs of running the Fund, including the costs of marketing and distributing it. These charges reduce the potential growth of your investment.

Index fund A

One-off charges taken before or after you invest	
Entry charge:	0.00%
Exit charge:	0.00%
Charges taken from the fund over the period of one year	
Ongoing charges:	0.35%

The ongoing charges figure is based on the fixed annualized fee charged to the Fund.

Index fund B

One-off charges taken before or after you invest	
Entry charge:	4.5%
Exit charge:	0%
Charges taken from the fund over the period of one year	
Ongoing charges:	0.30%

The ongoing charges figure is based on expenses for the current year.

Index fund C

One-off charges taken before or after you invest	
Entry charge:	2.5%
Exit charge:	0%
Charges taken from the fund over the period of one year	
Ongoing charges:	0.15%

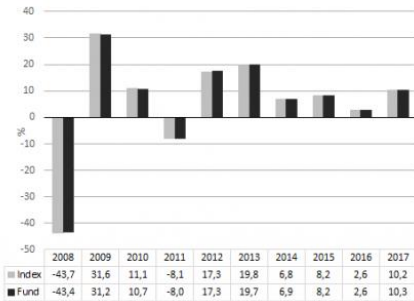
The ongoing charges are based on the expenses in the period of 12 months which ended on the 31st of December.

→ Only for the control group

PAST PERFORMANCE

The graphs show the funds' annual performance in EUR for each full calendar year over the period displayed in the chart. Past performance is not a guide to future performance.

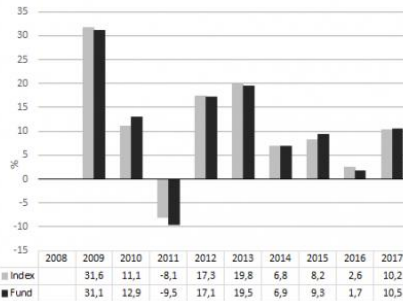
Index fund A



The Fund was launched in 2007. Performance is shown after deduction of ongoing charges. Any entry/exit charges are excluded from the calculation.

Reference index: MSCI Europe (EUR)

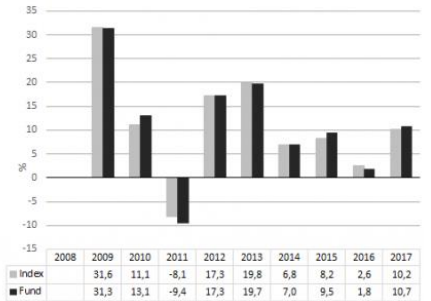
Index fund B



The annualized performances displayed in this diagram are calculated net income reinvested and net of all charges taken by the Fund.

The reference currency is the Euro.
The reference Index is: MSCI Europe

Index fund C



The displayed performance are in Euro and are shown after deduction of ongoing charges. Any entry/exit charges are excluded from the calculation.

The reference index is: MSCI Europe

The investment decision

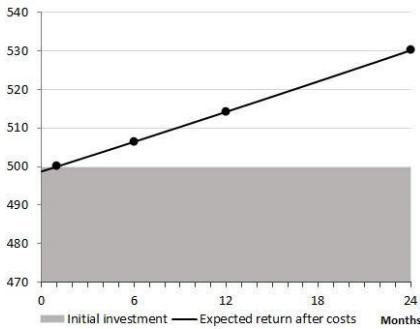
In which fund(s) do you invest your €500?

- Fund A : _____
- Fund B : _____
- Fund C : _____
- Total : **€500,-**

→ Only for treatment group 1

EXPECTED RETURN AFTER COSTS

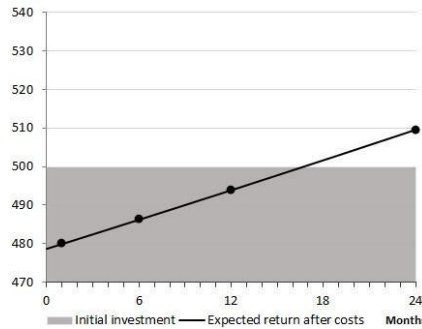
Index funds A



The graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The grey area also show the initial investment amount, in which it is assumed that the full amount is invested in the fund.

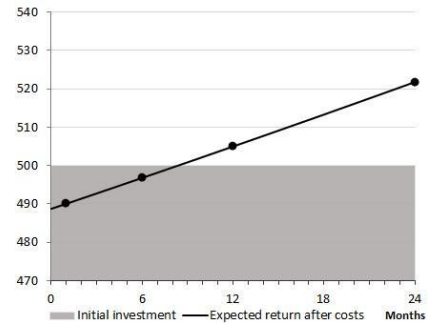
Index fund B



The graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

Index fund C



The graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The grey area show the initial investment amount, in which it is assumed that the full amount is invested in the fund.

The investment decision

In which fund(s) do you invest your €500?

Fund A : _____

Fund B : _____

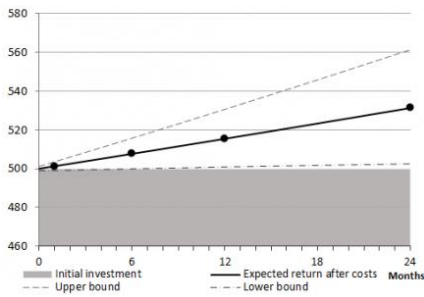
Fund C : _____

Total : **€500,-**

→ Only for treatment group 2

EXPECTED RETURN AFTER COSTS

Index funds A

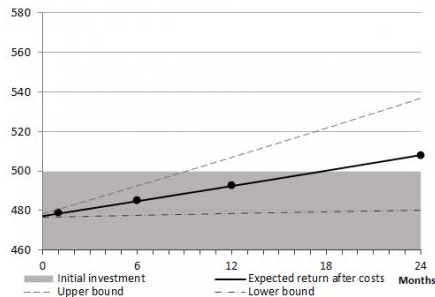


This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur. These views are calculated in such a way that 68% of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

Index fund B

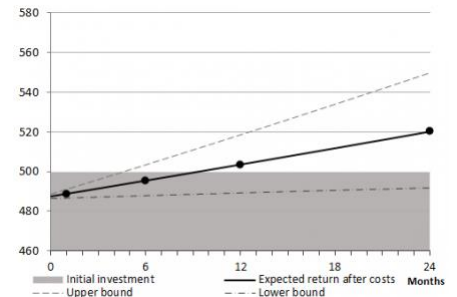


This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur. These views are calculated in such a way that 68% of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

Index Fund C



This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur. These views are calculated in such a way that 68% of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

The investment decision

In which fund(s) do you invest your €500?

Fund A : _____

Fund B : _____

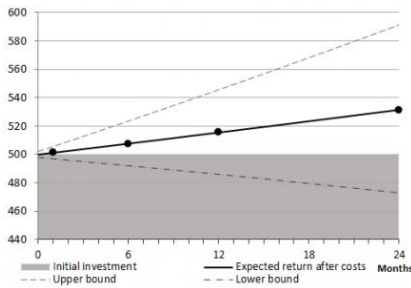
Fund C : _____

Total : **€500,-**

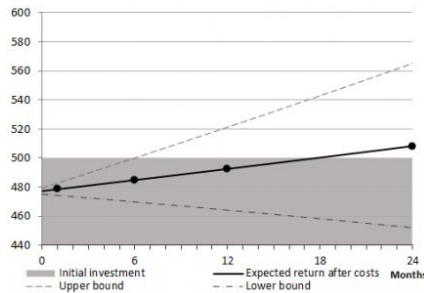
→ Only for treatment group 3

EXPECTED RETURN AFTER COSTS

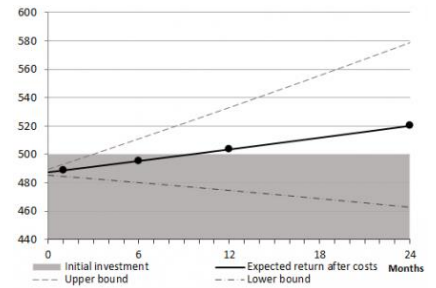
Index funds A



Index fund B



Index fund C



This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

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The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur. These views are calculated in such a way that 95% of expected returns lie within the bounds.

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The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

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The investment decision

In which fund(s) do you invest your €500?

- Fund A : _____
- Fund B : _____
- Fund C : _____
- Total : **€500,-**

→ **For all groups**

Part 6: Concluding questions

Lastly we will ask some questions on the investment process you just experienced and the graphical representations.

What is the level of risk of the three index funds?

	Risk level 1	Risk level 2	Risk level 3	Risk level 4	Risk level 5	Risk level 6	Risk level 7
Index fund A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Index fund B	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Index fund C	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

"I was presented with sufficient information to make a good estimation of the **level of risk** of the three index funds"

- Totally disagree Disagree Neutral Agree Totally agree

"The investment decision took a lot of time"

- Totally disagree Disagree Neutral Agree Totally agree

"I'm confident that I made the right investment decision"

- Totally disagree Disagree Neutral Agree Totally agree

"I was able to compare the three funds properly based on the information provided"

- Totally disagree Disagree Neutral Agree Totally agree

Please indicate the importance of the following aspects in making your investment decision:

	Not important at all	Not important	Neutral	Important	Very important
The ongoing charges and the entry and exit charges of the fund	<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"/>
Use of derivatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desire to diversify the money across different funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The risk level indicator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

→ Additional for treatment group 1

The figure of net expected returns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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→ Additional for treatment group 2 and 3

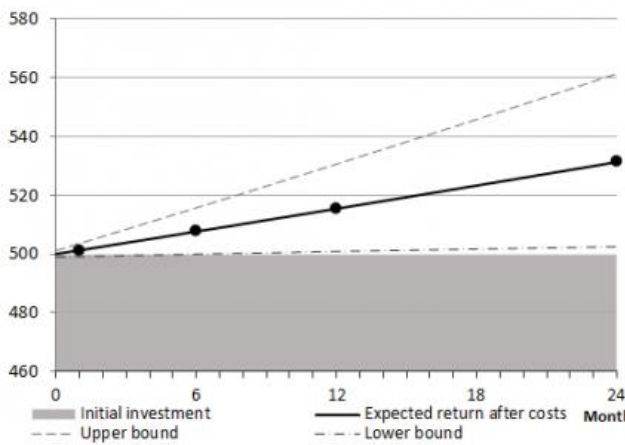
The figure of net expected returns with upper and lower bounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Please indicate the importance of the following aspects in making your investment decision:

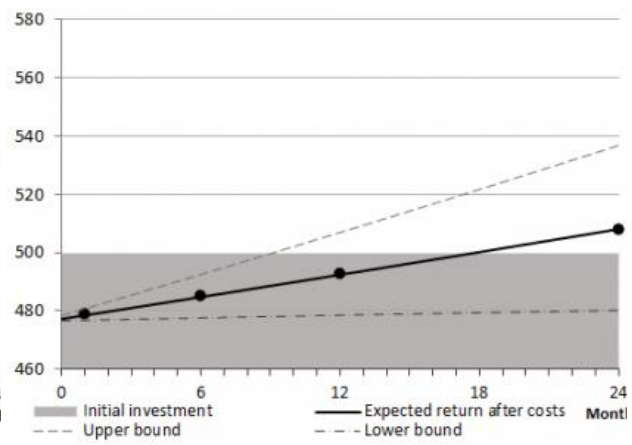
	Not important at all	Not important	Neutral	Important	Very important
The ongoing charges and the entry and exit charges of the fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Past performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of derivatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desire to diversify the money across different funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The risk level indicator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The figure of net expected returns with upper and lower bounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please take a look at the two graphs and answer the question below.

Index fund 1



Index fund 2



This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur.

These views are calculated in such a way that 68% of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

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The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur.

These views are calculated in such a way that 68% of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

Looking at the graphs you should be able to conclude that they show the expected return based on the average of historical data in the solid line and that this expected return will not be certain in the future. It might be the case that the realized return is higher or lower.

Was this clear to you?

- Extremely clear
- Somewhat clear
- Neither clear nor unclear
- Somewhat unclear
- Extremely unclear

Based on the graphs you should be able to conclude that both funds have the same level of risk because the upper and lower bound (dotted lines) were drawn at the same distance from the solid line in both graphs.

Was this clear to you?

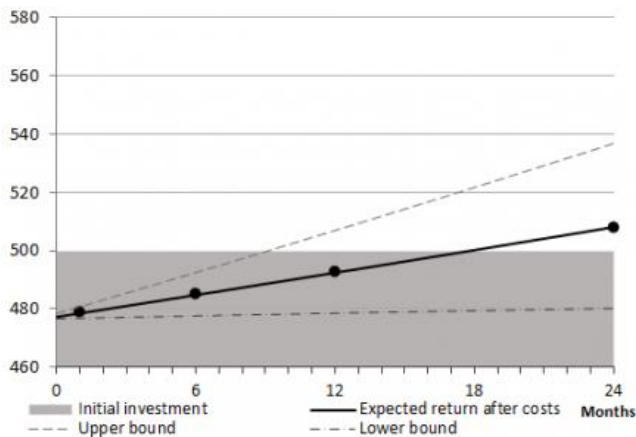
- Extremely clear
- Somewhat clear
- Neither clear nor unclear
- Somewhat unclear
- Extremely unclear

Comparing the graphs you should be able to conclude that Index fund 1 is cheaper compared to Index fund 2 because the solid line starts at a higher level in the left graph.

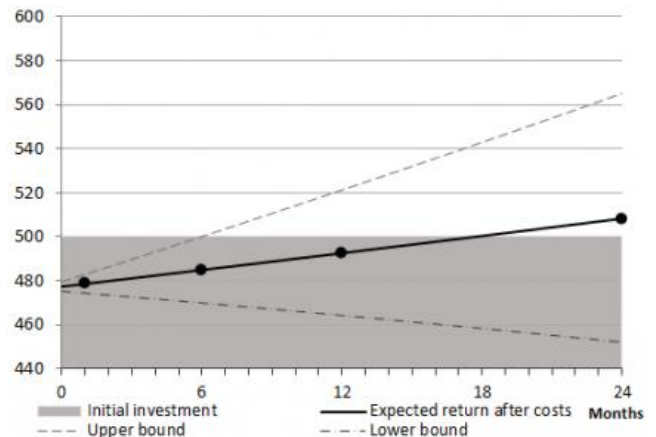
Was this clear to you?

- Extremely clear
- Somewhat clear
- Neither clear nor unclear
- Somewhat unclear
- Extremely unclear

Graph 1



Graph 2



This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur.

These views are calculated in such a way that **68%** of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

This graph shows the growth of the expected return of the fund after subtracting all the costs charged by fund. It is based on the 20-year average return of the MSCI Europe Index for a period of 24 months.

The graph also shows upper and lower bounds around the expected return after costs that represent potential optimistic and pessimistic views that might occur.

These views are calculated in such a way that **95%** of expected returns lie within the bounds.

The grey area shows the initial investment amount, in which it is assumed that the full amount is invested in the fund.

The difference in the graphs is the spread of the lower and upper bound. These graphs should explain clearly the fact that investing in the stock market is risky and that there is a possibility that you will end up with more or less money than you expected.

In your opinion, which graph make this more clear?

- Graph 1
- Graph 2
- No difference
- No opinion

Dear participant,

Thanks for participating! Below there are two concluding questions on the potential payout of your reward and the use of your answers.

Would you like to participate to win the net return of your investment decision (with a maximum of **€10**) over the period of **1-6-2018 to 30-06-2018**?

- Yes. In case I win, you can contact me by the following email-address: _____
- No

May other researchers use your answers for future research? Your answers will be treated anonymously.

- Yes
- No