

INVESTOR PERCEPTION OF ALGORITHMS

**A STUDY ON SWEDISH RETAIL INVESTORS' PERCEPTION OF
ALGORITHMS IN QUANTITATIVE EXCHANGE TRADED FUNDS**

ISAK ANDERSSON

VERONICA TÖRNBOM

Bachelor Thesis

Stockholm School of Economics

2021

Investor perception of algorithms: A study on Swedish retail investors' perception of algorithms in quantitative exchange traded funds

ETFs are increasing in popularity, enabling short-term trading to a much higher degree than mutual funds. The ETFs with the highest average management fee are those utilising quantitative models. This incentivises providers to market such products as they earn a higher kickback commission from quantitative ETF sales than they do others. Studies on bullshit and behavioural psychology have shown that mathematics could create a false sense of meaningfulness. Quantitative funds are fundamentally reliant on their algorithms and may therefore be tempted to utilise their mathematical models in their presentations. This quantitative study examined if, and if so how, retail investors may be manipulated by the addition of an algorithm out of context when exposed to information of ETFs. Data was gathered through an online self-completion questionnaire. Results suggest respondents are attentive as there is no effect on the perception of the ETF when an algorithm is included. This finding was true both for positively and negatively framed ETFs. These general findings are furthermore unaffected by the competence of the investor, with a minor exception in ETF knowledge and the perceived risk of the ETF.

Keywords:

ETFs, Algorithms, Bullshit, Nonsense mathematics, Decision-making

Authors:

Isak Andersson (24049)

Veronica Törnbom (24223)

Tutor:

Patric Andersson, Associate Professor, Department of Marketing and Strategy

Examiner:

Gustav Almqvist, Visiting Researcher, Department of Marketing and Strategy

Bachelor Thesis

Bachelor Program in Business & Economics

Stockholm School of Economics

© Isak Andersson and Veronica Törnbom, 2021

Contents

1. BACKGROUND	6
1.1 Introduction	6
1.1.1. Investment manipulation	6
1.1.2. Retail investing in Sweden	6
1.1.3. The global financial crisis	7
1.1.4. Exchange Traded Funds	7
1.1.5. Consumer protection in securities	7
1.2. Problem formulation	8
1.3. Purpose and research questions	9
1.6. Research gap/Contribution	9
2. THEORETICAL FRAMEWORK/LITERATURE	10
2.1. Theory of bullshit	10
2.1.1. The definition of bullshit	10
2.1.2. Criticism of bullshit theory	11
2.1.3. Mathematical nonsense	11
2.1.4. The mathematical nonsense hypotheses	12
2.2. Prospect theory	13
2.2.1. The definition of prospect theory	13
2.2.2. Criticism of prospect theory	14
2.2.3. Behavioural finance	14
2.2.4. The behavioural finance hypotheses	15
2.3. Mitigating effects	15
2.3.1. ETF knowledge, financial literacy & numeracy	15
2.3.2. The mitigating effects hypotheses	17
3. METHOD	19
3.1. Scientific approach	19
3.2. Questionnaire design	20

3.2.2. Questionnaire	20
3.3. Stimuli development	21
3.3.1. Treatment group A: Positive returns, algorithm present	22
3.3.2. Treatment group B: Positive returns, algorithm absent	22
3.3.3. Treatment group C: Negative returns, algorithm absent	22
3.3.4. Treatment group D: Negative returns, algorithm present	22
3.4. Preparatory study insights	23
3.5. Participants	24
3.5.1. Dropout analysis	24
3.6. Main study	25
3.6.1. Measurements	25
3.7. Data analysis	26
3.7.1. Data analysis	26
3.7.2. Analysis procedure	27
3.8. Reliability and validity	27
3.8.1. Reliability	28
3.8.2. Validity	29
3.8.3. Data quality	29
4. RESULTS	31
4.1. Descriptive statistics	31
4.1.1. Respondents' saving habits	32
4.1.2. Respondents' competence profiles and risk preference	32
4.2. Experimental data	34
4.3. Hypotheses testing	36
4.3.3. Competency profiles	36
4.4. Additional findings	38
4.4.2. Informational significance of algorithm presence	39
4.4.3. Exploring variable correlations	40
5. DISCUSSION	41

5.1. Conclusions and implications	41
5.1.1. Hypotheses rejected	41
5.1.2. Theoretical implications - Theory of Bullshit	42
5.1.3. Theoretical alignment - Prospect Theory	43
5.1.4. Additional findings	44
5.2. Summary of key findings	45
5.3. Limitations and suggestions for future research	45
6. REFERENCES	47
7. APPENDICES	53

Definitions

Bullshit: “something that is designed to impress but that was constructed absent direct *concern* for the truth. This distinguishes bullshit from lying, which entails a deliberate manipulation and subversion of truth” (Frankfurt, 2005)

Exchange Traded Funds (ETFs): a financial product that allows investors to pool their money in a fund that has a predetermined allocation of assets (SEC, 2012). An ETF is more available in terms of turnover rate compared to conventional mutual funds that are not traded on an exchange.

Quantitative Funds: a type of fund utilising mathematical models to determine what assets to invest in.

Complexity: a state or quality of being intricate or complicated; hard to grasp.

Nonsense mathematics: mathematics containing information irrelevant for the context (Eriksson, 2012). In this thesis it will be presented as an algebraic equation that does not contribute to the information provided.

Word of Mouth (WOM): “oral, person-to-person communication between a receiver and a communicator whom the receiver perceives as non-commercial, regarding a brand, product or service” (Arndt, 1967)

Retail investors: private individuals that regularly invest in financial products without a professional license or knowledge.

1. BACKGROUND

1.1 Introduction

Retail investors of today are exposed to a myriad of different asset classes. The supply of complex and leveraged investment opportunities, previously only available to institutional investors, has risen dramatically in the last decade. Much of this is due to the popularisation of exchange traded funds (ETFs) since the turn of the millennium (Statista Research Department, 2021). The escalation of complexity in retail investments is reminiscent of the course of events for institutional investors that caused the latest financial crisis that shook economies worldwide. The situation is potentially alarming and may result in financial institutions, through biased presentations, misleading retail investors to trade with instruments whose content they do not understand.

1.1.1. Investment manipulation

Complexity in financial products has functioned as allurements towards both professionals and, more pertinent, laymen's speculation in investment opportunities when marketed. The Allra scandal, previously offering financial services such as pension, insurance, loan-agreements and savings to private individuals, have been a well-known example of the matter. The firm was a distributor of complicated derivative instruments with the objective to earn an unethically large amount themselves, succeeding due to the complex strategy (Privata Affärer, 2017).

1.1.2. Retail investing in Sweden

Further, the early days of 2021 have seen the media highlight a phenomenon known as *kickback*, a term used to describe financial brokerages operating on a provision-based business model. They therefore have incentives to market funds to customers that are not the most economically rational decision in terms of risk, but rather on the return that the brokerage will receive. In turn, financial products presented to retail investors increase in complexity as complicated and technical funds, operating through quantitative models, generally can charge higher fees (Sveriges Television, 2017).

1.1.3. The global financial crisis

In 2008, the greatest financial crisis since the Great Depression commenced. The complex financial products that ultimately created the crash were marketed to investors through mathematical risk derivations that gave solid impressions. The crisis resulted in the first worldwide drop of GDP since the second world war (U.S. Department of Commerce, 2021).

What has come to be called the Great Recession was spurred heavily by the creation of investment grade-rated securities consisting of risky underlying assets. The primary of these securities were collateralised debt obligations, or CDOs, containing large numbers of low-rated tranches of mortgage bonds. The CDOs were marketed to investors and rating agencies with complex mathematical derivations that concluded that the diversification benefits from many low-rated tranches generated a risk level in line with AAA-rated bonds (Financial Crisis Inquiry Commission, 2011).

1.1.4. Exchange Traded Funds

What differentiates an ETF from other types of funds is the advantage of being priced in real-time on an exchange, similar to stocks. While still outclassed by mutual funds in terms of popularity, ETFs have amassed \$7,7 trillion in assets worldwide. This is a major development from 2003 when the total asset allocation amounted to a meagre \$204,3 billion (Statista Research Department, 2021). The asset class shows no signs of losing traction and coupled with an increased prevalence on the Swedish market (ETF-marknaden, 2021) it is the most interesting investment product to investigate.

The increase of ETF market size has consequently given rise to a diverse offering of ETF-types, ranging from basic index trackers, e.g. Vanguard's \$VOO tracking the S&P 500 (Vanguard, 2021a), to complex quantitative securities such as Vanguard's \$VFMF using value, momentum, quality and volatility factors to determine allocation (Vanguard, 2021b).

1.1.5. Consumer protection in securities

Protection against fraudulent behaviour on the part of marketers toward consumers has long been part of domestic legislation across the world (Hájková, 2003). Most commonly

this protection is pertinent in physical goods and services but is not delimited to these. Financial goods and services is one of the most heavily regulated areas of consumer protection due to the complexity of the goods and services sold and the economic risk that the consumer faces (Finansinspektionen, 2021). Financial consumer protection is constantly re-evaluated and looks to shield retail investors from new schemes and manipulations on an ongoing basis. In 2018, regulations on the Swedish capital market were implemented, such as the EU directives and regulations on the securities market *MiFID II* and *MiFIR*¹, that includes the aim to strengthen investor protection. It ensures, among other things, transparency into the financial products offered to retail investors (Finansinspektionen, 2019).

1.2. Problem formulation

ETFs are increasing in popularity compared to mutual funds due their diversity and agility (Svetina & Wahal, 2008). A more volatile market is thus to be expected as ETFs enable short-term trading in a much higher fashion than mutual funds while still allowing for the same, or even more complex, underlying allocations (Agapova, 2011). This is further amplified by a provisional system in the financial market that incentivises biased marketing from fund providers. This may in turn lead to an exploitation of psychological fallacies. A toxic spiral of excessive risk-taking could therefore commence as knowledgeable fund providers utilise manipulative presentations toward less financially literate consumers.

While psychological fallacies are abundant, the research conducted by Sokal (1996a, 1996b) and Eriksson (2012) on manipulation through the use of mathematics is of special interest. With complex quantitative funds generally charging higher fees, thus incentivising fund providers to market said products the hardest (Sveriges Television, 2017), algorithms may be assumed to be a factor of potential use similar to how CDOs were marketed in the early 2000's. While some protective measures have been put in place (Finansinspektionen, 2019), it is yet unclear if the use of mathematics in funds

¹ MiFID II (directive) and MiFIR (regulation). Regulations are directly applicable within the EU. The directive, MiFID 2, has been implemented in Swedish law, primarily in the Securities Market Act (2007: 528).

targeted at retail investors, arising from transparency regulations, need further regulations to ensure the integrity of consumers.

1.3. Purpose and research questions

The purpose of this thesis is to examine if, and if so how, retail investors may be manipulated by the addition of an algorithm out of context when exposed to information of ETFs. To answer this, three research questions will be addressed:

- 1) Does the addition of an algorithm in the product description of ETFs affect retail investors' perception of the security, and if so, how?*
- 2) Is the inclusion of an algorithm strictly good or bad, or may the direction be affected by other factors?*
- 3) Is the perception effect of the algorithm shaped by the competence of the investor?*

1.4. Delimitations

This thesis is delimited to only examining the presentations of ETFs from financial brokerages. Heavily regulated information sheets such as key investor information documents will not be examined. Neither will factors such as illustrations or examples be studied. Instead, the study will focus solely on the use of mathematical formulas in the presentation.

1.6. Research gap/Contribution

The study aims at providing information of whether fund providers profit from presenting any mathematics that may be derived from the fund and thus knowledge of how retail investors may be unethically lured into investments that are more profitable for the providers than they are the investor. While presentation of financial products is a thoroughly researched area, some aspects are still unexamined. One of these is the perceptions of algorithms, i.e. mathematics and use of it in product presentation. This study will thus try to fill the gap and contribute to the discussion of unethical practices connected to the capital market.

2. THEORETICAL FRAMEWORK/LITERATURE

This section presents theories relevant to the development of hypotheses. First the theory of bullshit and how it relates to nonsense mathematics is presented. Then prospect theory and its implications on financial research are explained. Lastly, mitigating effects of the two aforementioned theories are conferred.

2.1. Theory of bullshit

To explore the effect of nonsense mathematics, the theory of bullshit will be outlined. Moreover, one of the two scientific proven mechanisms for bullshit statements will be connected to biased application of mathematics that further frame the so-called nonsense mathematics effect.

2.1.1. The definition of bullshit

Research on bullshit has increased heavily since the turn of the century, sparked by philosopher Harry Frankfurt (2005) who differentiated bullshit from lying. While lying directly conceals the truth, bullshit has no concern for it. It tries to impress rather than deceive. This may be done in several ways; e.g. through pseudo-profound statements, hyperbolic claims or scientific nonsense (Pennycook *et al.*, 2015).

In the theory of bullshit, there are two mechanisms that have been defined to cause individuals to erroneously rate pseudo-profound bullshit as profound. The first mechanism that has been found relates to the individual having a bias towards accepting the bullshit statement or content as true due to a false sense of meaningfulness. However, it has been proven that people authentically have to believe something in order to create the meaning that is out of the context. Thus, earlier experience that has created an association for the conception in the bullshit statement may contribute to a false sense of meaningfulness (Pennycook *et al.*, 2015).

The second mechanism relates to the individual's general scepticism, i.e. their ability to detect bullshit as non-profound. Evidence has found that developing scepticism is dependent on the individual's knowledge or logical thinking within the investigated field. When lacking such insights, presentation of bullshit may cause a false sense of

meaningfulness and thus be classified as profound. Successfully detecting bullshit is dependent on common knowledge or expertise within the area (Pennycook et al., 2015).

2.1.2. Criticism of bullshit theory

Bullshit as a theory is significantly vague in terms of demarcation as the definition of the concept is suitable to be heavily discussed. The bullshit theory presented in this thesis is solely focused on one type of definition. There are several definitions and studies on what bullshit could mean, for instance Frankfurt's (2005) definition differs significantly from this thesis that focuses on scientific nonsense (Pennycook et al., 2015). Frankfurt rather defines bullshit as the so-called *bull session* wherein the "bullshitter" is unconcerned with the truth. He focuses on the intention of the individual rather than the bullshit itself. Bullshit defined within pseudo-profound science is rather the presentation of impressive assertions that could appear meaningful when actually vacuous (Pennycook et al., 2015).

Further, bullshit as a concept could have misperceptions already before the incorporation in studies. It is up to discussion whether the word "bullshit" creates a bias for the viewer, associating it with non-seriousness (Meibauer, 2016).

The main theory developed regarding bullshit has been criticised by Dalton (2006). He questioned their definition of meaningless that is further applied to statements to be classified as bullshit. One statement perceived meaningless in the study might not be to the respondent. The methodical concerns relate to the assumptions that played out in predetermined "bullshit" statements that were randomly generated to be synthetically correct (Dalton, 2006; Čavojová et al, 2020).

2.1.3. Mathematical nonsense

Biased application of mathematics

The possibility to not classify information as bullshit increases when individuals have bias towards accepting something as true (Pennycook et al., 2015.). Studies on mathematics literacy, or the understanding of when, how and where to apply mathematics, have shown that individuals tend to misuse mathematics (Ojose, 2011). Because of misconceptions of its application due to being mathematically illiterate, people tend to think mathematical theory taught in school is applicable even when not (Ojose, 2011).

Mathematics as a subject teaches truth and logic, which contributes to creating a bias of meaningfulness. Thus, misconceptions about mathematics as a theory might create a false sense of meaningfulness and increase credibility (Pennycook et al, 2015). Evidence of confidence towards scientific nonsense has been found by Alan Sokal, a mathematical physicist, who tried, and managed, to write a paper that was deliberately unclear and nonsensical but still got published (Sokal 1996a, 1996b). That due to praxis i.e. the experience by those reviewing, that such a paper should be published (Pennycook et al, 2015).

The nonsense mathematics effect

When switching from pure mathematics to interdisciplinary studies in social and cultural sciences, mathematician Kimmo Eriksson (2012) found that mathematics was used in illegitimate ways within subjects such as sociology and anthropology. Inspired by Sokal, he decided to review the matter. An experiment was thus conducted in which academics of different disciplines were exposed to two abstracts of scientific reports; one of which randomly was assigned a completely irrelevant sentence, including a non-associated mathematical model. Eriksson found that the paper with nonsense mathematics in the abstract was judged of higher quality. However, this was not the case for students of “hard” sciences such as mathematics and physics.

2.1.4. The mathematical nonsense hypotheses

Previous research has shown a general tendency of increased quality assessments of nonsense mathematics if respondents are biased. Analogous application of this finding to an investment decision would suggest a more positive perception of the ETF when nonsense mathematics is present in the presentation. To investigate general perception, all of the predominant factors of a purchase situation were included. These are purchase intention, perceived risk, and word-of-mouth (WOM) intention, which have been tailored to suit an investment scenario rather than traditional commerce. Using an algorithm as a proxy for nonsense mathematics thus leads to the four primary hypotheses:

H1: Algorithm presence in the presentation of an ETF has a positive effect on the propensity to invest.

H2: Algorithm presence in the presentation of an ETF has a positive effect on the safety assessment.

H3: Algorithm presence in the presentation of an ETF has a positive effect on the perceived risk.

H4: Algorithm presence in the presentation of an ETF has a positive effect on WOM intention.

2.2. Prospect theory

To explore irrational decision-making and potential explanations, prospect theory is outlined. It has heavily impacted financial research and this section therefore presents literature on behavioural finance and more specifically the role of historic performance when investors make decisions.

2.2.1. The definition of prospect theory

Prospect theory is a cognitive psychology theory that describes how people make probabilistic decisions between risky options when the probabilities are unknown. The theory expresses that individuals settle on choices dependent on expected valuations of gains and losses instead of the final outcome, and that individuals assess these gains and losses utilising heuristic methodologies. The theoretical model is descriptive; it subsequently aims to depict genuine conduct in people instead of characterising ideal choices, as some normative models do. The theory was first dispatched, and further built upon, as a psychologically more precise model of dynamic decisions compared to the theory of expected utility (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992).

Recent studies on the matter within the area of finance found that historic returns of stocks affect investors' decisions in the way that prospect theory describes; i.e. positive returns are seen as support for a continued trend while the opposite is true for negative returns (Barberis et al., 2016). It is reasonable to assume that similar behavioural tendencies are found when investors evaluate funds.

2.2.2. Criticism of prospect theory

Pundits from the field of psychology contended that regardless of whether prospect theory emerged as a descriptive model, it offers no mental clarifications for the decision processes expressed in it. The critique comes from other researchers within the subject who noticed that components such as affective reactions and human emotions, that are significant in the process of decision-making, are missing in the model (Newell et al., 2007; Staddon, 2017). Critics also question whether real human risk-preferences can be explained by prospect theory as replications differ in their results (Millroth et al., 2020).

Additional criticism has been raised with the argument of prospect theory utilising mathematical calculations that exceed the level of understanding of an average person and that there is a lack of investigation in information processing of tested subjects (Nwogugu, 2006). The small amount of investigation in the area of information processing that does exist has, however, shown a low rate of general replicability to the paradoxes proposed by Kahneman and Tversky (Millroth et al., 2019). Further backlash has been delivered with the notion that the framing technique used in experiments is detached from reality; the one-sided presentations are said to be “unethical in most consumer behaviour situations” and thus lack practical implications (Rossiter, 2019).

2.2.3. Behavioural finance

The, at least previously, predominant assumption of financial research is that investors are rational and make financial decisions based on logic (Thaler, 2000). This theory has received increasing criticism as behavioural literature has shown a myriad of cognitive fallacies and irrational decision-making, including prospect theory (Tversky & Kahneman, 1981). Several aspects of financial decision-making have thus been studied based on behavioural theories. Of special interest for this thesis is the work conducted on retail investing and savings, which have shown that individuals experience difficulties in making rational long-term investments and are easily influenced when evaluating investment opportunities (Benartzi & Thaler, 2001, 2002; Mitchell & Utkus, 2004; Sandler, 2002).

Decades of research within the area of finance conducted in the U.S. and Europe have concluded that prior performance cannot be used as a reliable predictor of future returns

(Brown & Goetzman, 1995; Carhart, 1997; Fama, 1970; Rhodes, 2000). It has, however, still been found to have major influence when investors, both retail and professional, make financial decisions (Mussweiler & Schneller, 2003).

While the inclusion of mathematics has shown to increase quality assessments, the experiment was only conducted on well-cited articles published in recognised journals (Eriksson, 2012). This indicates a generally high quality of the papers. It is possible that the addition of mathematics thus acted as an amplifier of the already good quality rather than a strict rating advantage. A negatively presented fund could thus see a rating *disadvantage* when presented with mathematics.

2.2.4. The behavioural finance hypotheses

There is considerable empirical support of investors using past returns as a gauge of future probability of success, and vice versa. Combining this with nonsense mathematics having a positive effect on high-quality research papers, i.e. potentially acting as an amplifier, the following secondary hypotheses are developed:

- a):** Algorithm presence in the presentation of an ETF has a positive effect only when presented with positive past returns.
- b):** Algorithm presence in the presentation of an ETF has a negative effect when presented with negative past returns.

2.3. Mitigating effects

In this section mitigating effects of the two aforementioned sections with theories are presented. The bullshit theory outlined two mechanisms of which the second relates to the *ability* to detect bullshit as non-profound. Thus, it relates to knowledge about ETFs and common financial and numeric concepts.

2.3.1. ETF knowledge, financial literacy & numeracy

The second mechanism of bullshit theory proposes that the ability to detect bullshit depends on the individual's knowledge and expertise within the area. The specific area that is studied in this thesis is ETFs. Knowledge of ETFs should thus increase the ability

to decipher nonsense in fund presentations. Two other areas connected to perceiving mathematics as profound or not in financial products are financial literacy and numeracy; the first due to its connection to the subject and the second due to its connection with the nonsense.

ETF knowledge

Differences in individual receptivity of different types of bullshit has been found not only within the area of nonsense mathematics, but also within pseudo-profound and scientific bullshit (Pennycook et al., 2015; Evans et al., 2020). Further, the receptivity of pseudo-profound and scientific bullshit has been found to be correlated. Another correlation was found between high scientific literacy and low scientific bullshit receptivity, supporting the findings on nonsense mathematics showing less receptivity if the respondent is knowledgeable in the bullshitted area (Eriksson, 2012; Evans et al., 2020). This suggests that when presented with ETFs, the receptivity to the bullshit should be negatively correlated with knowledge of the financial product in question.

Financial literacy

Research on financial literacy and decision-making have shown that individuals with less literacy are less likely to invest in stocks. Financial literacy, or basic knowledge about financial concepts such as interest compounding, inflation and cause-effect on the stock market, is shown to be low among the average population (van Rooij et al., 2011). However, groups that have an expressed interest within the area could be considered well-informed (Lusardi, 2008). These respondents have a past performance of successful financial decisions regarding retirement, borrowing behaviour and interest terms due to attention to basic financial concepts.

Numeracy

Extensive tests, most notably the Berlin Numeracy Test, have been developed in the last decade to examine levels of numeracy, i.e. the ability to understand and work with numbers (Cokely et al., 2012). Previous research has compared numeracy scores between respondents while observing choices of two alternatives framed differently in mathematical terms, where one is the least preferable decision and the other choice is the

most preferable decision. It has been established that the more numerate respondent will select the optimal alternative due to their ability to choose more rationally (Peters et al., 2006). It has however been found that even well-educated individuals experience difficulties in finding the optimal answer to simple numerical problems (Lipkus et al., 2001).

2.3.2. The mitigating effects hypotheses

Given the research on well-informed decisions involving financial literacy, one could assume that nonsense mathematics presented to such respondents would be mitigated compared to less financially literate respondents. In other words, their knowledge enables them to classify the mathematics as bullshit (Evans et al., 2020). With previous research suggesting people scoring high in numeracy being less receptive to ambiguous mathematical expressions, it is further assumed that they will detect nonsense mathematics as bullshit. Additionally, findings on bullshit at large indicate that respondents knowledgeable in ETFs should be less receptive to the nonsense when presented in their area of expertise. This led to the formulation of the secondary hypotheses presented below:

- c):** Knowledge in ETFs mitigates the effects of algorithm presence in the presentation of an ETF.
- d):** Financial literacy mitigates the effects of algorithm presence in the presentation of an ETF.
- e):** Numeracy mitigates the effects of algorithm presence in the presentation of an ETF.

Table 1. Summary of hypotheses

Primary hypotheses:	
H1	Algorithm presence in the presentation of an ETF has a positive effect on propensity to invest
H2	Algorithm presence in the presentation of an ETF has a positive effect on safety assessments
H3	Algorithm presence in the presentation of an ETF has a positive effect on the perceived risk
H4	Algorithm presence in the presentation of an ETF has a positive effect on WOM intentions
Secondary hypotheses:	
a)	Algorithm presence in the presentation of an ETF has a positive effect only when presented with positive past returns
b)	Algorithm presence in the presentation of an ETF has a negative effect only when presented with negative past returns
c)	Knowledge in ETFs mitigates the effects of algorithm presence in the presentation of an ETF.
d)	Financial literacy mitigates the effects of algorithm presence in the presentation of an ETF
e)	Numeracy mitigates the effects of algorithm presence in the presentation of an ETF

Note: Secondary as they rely on the assumed effect in the primary hypotheses.

3. METHOD

3.1. Scientific approach

While bullshit is a fairly researched area and financial behaviour very well-researched, the combination of the two has never been tested. Nor so has the critique against the kickback system currently in place for Swedish fund providers. In the pursuit of examining the recent criticism and potentially misleading presentations, it was found to be of particular importance to use a causal questionnaire study. To allow for the use of previous research on financial behaviour and bullshit when establishing hypotheses and the academic framework, a deductive approach was adopted (Bryman & Bell, 2015). In order to assure external validity of the study, the stimuli used have been designed to resemble the standard presentation of ETFs in Sweden. Using stimuli that are close to the real presentations retail investors face enables an isolated investigation of whether algorithm presence has an effect on investment decisions (Malhotra, 2010).

To increase the potential contribution of knowledge from the thesis and arrive at as generalisable conclusions as possible, we have chosen to test our hypotheses on a large and for the subject relevant population (Malhotra, 2010). The study has thus adopted a quantitative approach and has as such the main intention to test the causal relationship of the included parameters. A detailed investigation of the underlying factors to the obtained results was consequently foregone (Bryman & Bell, 2015).

Alternative methods, in particular the verbal protocol approach, was not adopted due to time and resource constraints. The method would have, by allowing respondents to think out loud and comment on the survey, enabled a deeper understanding of the processes that the respondents went through (Bryman & Bell, 2015). However, this would, as stated in the earlier paragraph, have drawn the focus away from causal relationships and turned it to an investigation of underlying factors.

3.2. Questionnaire design

3.2.2. Questionnaire

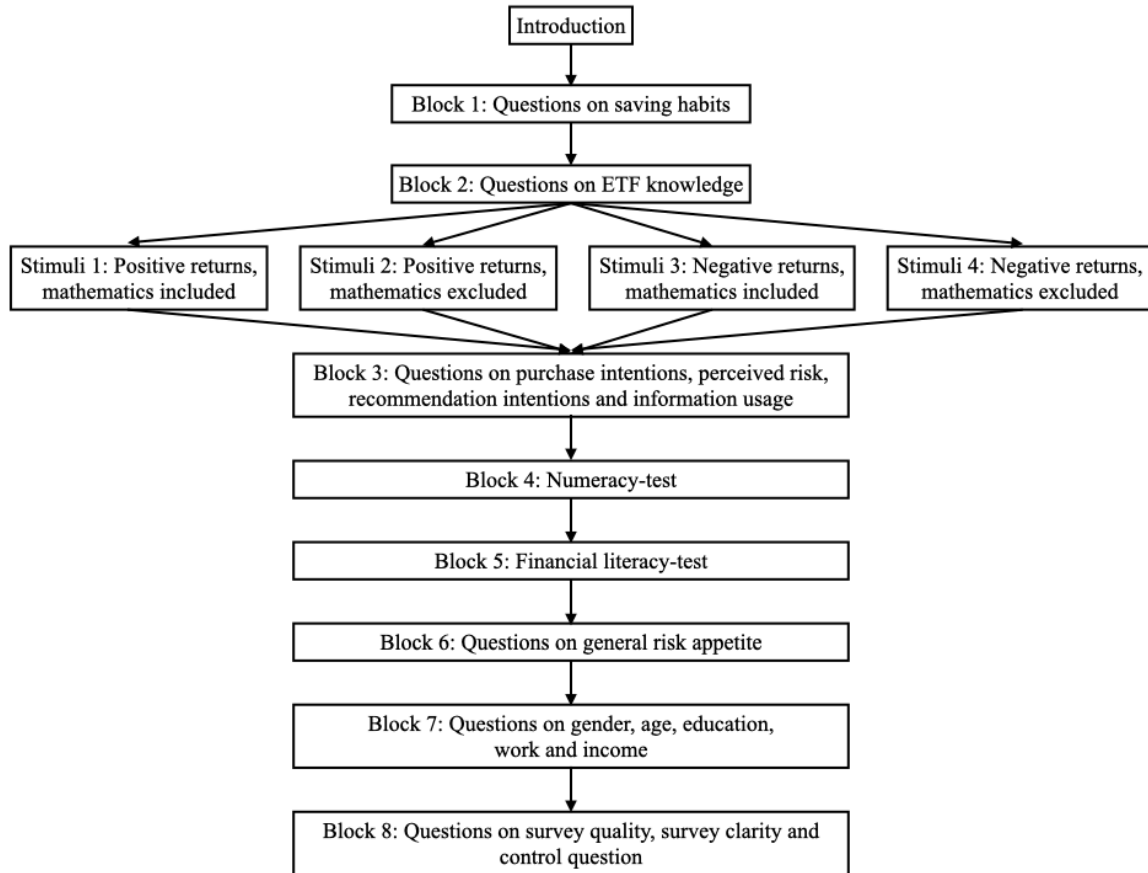


Figure 1. Visualisation of survey flow

In order to conduct the survey with time-constraints in mind, an anonymous self-completed questionnaire was created. 40 mandatory questions were presented to the respondents along with a few optional open-ended questions where respondents could clarify their answers. The entirety of the questionnaire was written in Swedish since it was addressed to Swedish retail investors.

Firstly, the respondents were introduced to the purpose of the questionnaire, estimation of completion time, and anonymity. They were also made aware of the raffle open to all participants of SEK 1 000. Information regarding GDPR was also presented and to continue with the survey all participants were required to sign with their initials and current date to confirm consent.

After the introduction the respondents were introduced to the first block consisting of questions aimed at collecting information regarding saving habits. In the second block participants were presented technical multiple-choice questions on general fund and ETF knowledge.

The third block assigned the participants to one of four groups with separate unique stimuli presented. The questions that followed were the same for all groups. These examined the purchase intentions, perceived risk, recommendation intentions and information usage, all connected to the stimuli presented.

In block four and five the respondents' numerical and financial competences respectively were examined. This was done through the Berlin Numeracy Test multiple choice format (Cokely et al., 2012) and the generally accepted financial literacy test developed by the World Bank (Standard & Poor, 2014; Lusardi & Mitchell 2014). To complement numeracy and financial literacy the sixth block asked questions regarding the respondents' attitudes toward risk.

The seventh block collected demographic information. The eighth and final block allowed the participants to evaluate the survey regarding quality, clarity and objectivity. An optional open-ended question was included to ensure any and all criticism on the questionnaire would be voiced.

3.3. Stimuli development

To examine the effects of algorithm presence in the presentation of ETFs, and allowing for different frames of historic returns, the respondents were divided into four possible groups. In order to test the hypotheses, the stimuli presented resembled as closely as possible the standard presentation of funds in an online investment scenario. See appendix for the stimuli developed and the mimicked format.

The decision to present a quantitative fund was made with the reasoning of quantitative ETFs being the most likely to present their algorithms as they are fundamental for the operation of the fund. They are also accompanied with higher average management fees than more conventional index ETFs (Sveriges Television, 2017). This incentivises providers to market said products more effectively as they consequently earn a higher

average kickback commission from quantitative ETF sales. The practical implications of the effect of algorithm presence in ETFs are thus higher for quantitative ones than for e.g. index ETFs.

3.3.1. Treatment group A: Positive returns, algorithm present

The addition of mathematics has shown to increase quality assessments of research papers despite being nonsense. Applying these findings analogously to ETFs suggest that adding mathematics will increase purchase intentions. The ETF was thus presented together with a nonsensical algorithm with the equation used being the same that Eriksson utilised in his experiment (2012):

The allocation of the fund's assets is determined by the following
algorithm: $T_{pp} = T_0 - fT_0d_f^2 - fT_p d_f$

3.3.2. Treatment group B: Positive returns, algorithm absent

To examine if algorithm presence has an effect compared to when absent, treatment group B was required to have the exact same information as treatment group A but without the algorithm.

3.3.3. Treatment group C: Negative returns, algorithm absent

Prospect theory suggests that past returns may be used as heuristics for decision-making in financial investments. This has received empirical support from the field of behavioural finance. To examine these theories within the scope of quantitative ETFs, treatment group C was identical to treatment group B except for an inversion of historic performance.

3.3.4. Treatment group D: Negative returns, algorithm present

As the study conducted by Eriksson (2012) was only done on high quality research papers that received higher average quality assessments from the addition of mathematics, it is possible that it acted as an amplifier. Supported by prospect theory, a fund with negative returns presented with mathematics may strengthen the belief that the fund is perpetually ineffective and therefore decrease the purchase intention. With inverted historic

performance, treatment group D was thus assigned the same algorithm as treatment group A:

The allocation of the fund's assets is determined by the following algorithm: $T_{pp} = T_0 - fT_0d_f^2 - fT_p d_f$

Table 2. Summary of treatment groups

Designation	Treatment group
A	Positive returns, algorithm present
B	Positive returns, algorithm absent
C	Negative returns, algorithm absent
D	Negative returns, algorithm present

3.4. Preparatory study insights

In order to evaluate the questions, a pre-study was conducted giving significant insights on our experiment design (Connelly, 2008). Connelly recommends a 10 % sample size of the parent study. Expecting at least 240 answers with regards to four manipulations which require 60 answers each, 24 respondents were part of the pre-study. Between 5th and 10th of March 2021 the preliminary questionnaire was distributed and completed whereof five did so in our presence, verbally explaining their thought processes. All pre-study participants were representative of the intended main study population.

Adjustments that evolved from the preparatory study related to clarification of purpose behind sections testing competencies. Further, with regards to the questionnaire being long and potentially exhausting, the incentive program offering the chance to win SEK 1000 was implemented. Furthermore, the nonsense algorithm equations were evaluated, leading to be borrowed from Eriksson's (2012) study on the nonsense mathematics effect.

3.5. Participants

Table 3. Distribution channels (Facebook groups) of survey and number of members

Group	N
Aktier och Sparande	29 600
Fonder Sverige	11 300
Aktier, sparande och privatekonomi	42 900
Total channel audience	83 800
Total data collection	555
Dropouts	312
Complete answers	243

Note: Dropouts referred to as non-completed or unserious answers.

An invitation (see Appendix 12) to participate in the study and fill in the questionnaire was distributed to three Facebook groups. All of these groups discuss either funds, savings, stocks, personal finance, or a combination of the aforementioned. Some overlap of members between groups did exist but it is unclear to what extent. The questionnaire was posted on the 23rd of March and closed the 20th of April. One of the respondents was randomly chosen to receive SEK 1 000 at the date of closing the questionnaire. The reason for choosing a convenience sample was with regards to complexity in retrieving answers. However, this should be taken into account when viewing the data as it is not a representative sample (Bryman & Bell, 2015).

3.5.1. Dropout analysis

The questionnaire was answered by a total of 576 respondents, of which 245 completed it. Several factors may have contributed to the dropout of 331 people. There were specifically two blocks; Block 2 and Block 5 (see Appendix 12), where the majority of dropouts arose from. Block 2 was covering GDPR information and further the required consent from participants. Thus, one can assume that the GDPR requirement contributed to dropouts. Secondly, Block 5 was the experimental section presenting a fund in line with the above stimulus. The experiment block required a high degree of attention and engagement which likely contributed to respondents' decision to drop out.

3.6. Main study

3.6.1. Measurements

This thesis primarily examines four different dependent variables: Propensity to invest, Safety assessment, Perceived risk and WOM intention. The scale used for each dependent variable is a 7-point balanced Likert scale. The scale was adopted with regards to its suggestable comparable means and possible neutral alternative. It is an established scale in marketing research and was chosen over a 5-point Likert scale due to more alternatives giving more accurate data (Finstad, 2010; Leung, 2011).

Propensity to invest

To measure the direct differences of the stimuli shown, the following question was asked: *How likely are you to invest in the ETF presented on the previous page?* The scale ranged from 1 (Very unlikely) to 7 (Very likely).

Safety assessment

To capture the effects on perception, the following question was asked: *How safe do you think the ETF presented in the previous page is to invest in?* Furthermore, the 7-point Likert scale was used ranging from 1 (Very unsafe) to 7 (Very safe).

Perceived risk

To complement safety assessment, the perceived risk of the ETF was examined. The following question was thus asked: *How big do you think the risk is in the ETF presented on the previous page?* Likewise, the scale ranged from 1 (Very small) to 7 (Very big).

WOM intention

To further explore the respondents' attitudes to the ETF, one question was asked regarding their WOM intention: *How likely is it that you would recommend a friend to invest in the ETF presented on the previous page?* The scale used was ranging from 1 (Very unlikely) to 7 (Very likely).

Considered factors

To understand the respondents' decision making, they were asked to: *Think of the ETF you have now assessed. How much or little importance did you place on the following factors when assessing the ETF?* The factors were: historical performance, product description, fees, risk level, recommended holding period and the algorithm. The scales used ranged from 1 (Not important) to 7 (Very important).

Open question

Continuously a final question was displayed: *Do you think there was any information missing in the ETF's presentation?* If the respondent answered *Yes*, an open question was presented asking the respondents what they thought was missing.

3.7. Data analysis

3.7.1. Data analysis

Variables were coded into groups based on the respondents' answers to facilitate the analysis of gathered data. The stimuli presented were coded into four groups, one for each unique manipulation. Competence bases were grouped into *Low* and *High*, as was risk preference. Dummy variables were also created for gender (female), workforce status (employed) and algorithm presence (present), enabling comparative analyses of said factors.

Apart from the treatment groups which were divided solely based on what stimuli they were exposed to, all divisions have been made by placing the scales' lower halves in one group and the upper halves in another one. Competence levels were evaluated on a 5-point scale (only full integers, 0-4) while risk was evaluated on a 7-point scale (allowing fractions, 1-7), leading to the breaking point being drawn at 2 and 4 respectively. As competence bases could only amount to full integers, the decision was made that a score of 2 would be considered low. This was based partly on generally high scores, enabling a more even distribution between groups, but also due to some questions being deductively decipherable leading to a possibility of false positives.

3.7.2. Analysis procedure

The entirety of survey responses, exported from Qualtrics, have been analysed using the statistical tool SPSS in which all tests and analyses were conducted. Figures visualising the data and corresponding analyses have been created both in SPSS and Excel. An initial analysis of the descriptive data was made based on means and standard deviations. Demographic information alongside the results from the competence tests were analysed using the entire sample. Experimental data was subsequently presented based on treatment groups. To analyse whether the answers of the groups differed significantly from the mid-point of the dependent variables a related one sample t-test was performed. Following this, the hypotheses were tested according to the following structure:

- Hypotheses **H1, H2, H3, H4, a)** and **b)** were evaluated by conducting ANOVA tests on the dependent variables. To compare the means of the treatment groups, specifically positive versus negative past returns and within these a present versus absent algorithm, Post-Hoc Tukey was applied.
- Hypotheses **c), d)** and **e)** were evaluated using Two-Way ANOVA tests on the dependent variables with regard to the interaction between the stimuli presented and the three competence bases.
- Explorative analyses were conducted on the interaction between competence levels and other independent variables through correlation tests.

Due to significant differences in Levene's test, nonparametric tests in the form of Kruskal-Wallis and Dunn's test were performed to complement the results from the main tests and ensure validity. All statistical tests performed were analysed using 0.05 as the maximum level of alpha to determine significance. This decision was made as it is the highest conventional risk that can be taken for statistical surveys and is supported by literature (Bryman & Bell, 2015).

3.8. Reliability and validity

These concepts determine the quality of the research conducted. Reliability is the concept that measures consistency in a certain method, generally defined as the ability to achieve an identical result again under the same circumstances (Bryman & Bell, 2015). Validity is whether a concept is actually measured, e.g. if this thesis measures the effect alleged (Bryman & Bell, 2015.).

3.8.1. Reliability

To satisfy the condition of reliable results, each section applicable in the study will be assessed. Respondents' competences regarding numeracy and financial literacy were measured; numeracy through the Berlin Numeracy Test (Cokely et al., 2012) and financial literacy through the test developed by the World Bank (Standard & Poor, 2014) and examined in relation to financial decision making by Lusardi and Mitchell (2007) and McArdle, Smith and Willis (2009). Respondents' risk score was measured using a scientifically developed scale (Wärneryd, 1996).

Their stability over time was evaluated to make sure results did not fluctuate. Thus, stability was assessed using other studies and results from this thesis. A study validating the Berlin Numeracy Test using a randomised sample from the Swedish population, found a mean score of 2.47 (Lindskog et al., 2015). The mean score in this study was 1.93 (see section 4.1.2.) which, although fairly lower, were considered to be reliable as the scale is established and the sample could not be generalised (Lindskog et al., 2015).

Furthermore, a study on financial literacy, using a randomised sample from the Swedish population, found that men had higher financial literacy than women at a mean score of 3.15 (78.8 %) (Almenberg & Dreber, 2012). In this thesis, the mean score was found to be 2.91 (72.8 %). Considering the sample contained 30 % women, it is a reasonable lower score with no significant difference between the studies. Thus, the results from financial literacy could be assessed as stable.

Further, the psychological scale measuring risk profiles have been developed by a study and adopted by others (Wärneryd, 1996). The yielded results are tested through Cronbach's alpha, measuring how the effect is incorporated from this scale. The scale had an alpha at 0.533 in our sample which was accepted due having an alpha over 0.7 in other studies (Flink et al., 1999). The sample in this thesis were shown to be young retail investors with special interest in stocks. The scale showed that people, no matter their other answers, are less willing to take on loans. Thus, respondents prefer taking risks day-to-day of losing money (the first part of the scale) but not long-term through loans (the second part of the scale), giving an inconsistent alpha.

Furthermore, the experiment contained four different randomised treatment groups. Thus, it is crucial to see that no groups differ significantly in e.g. competency or risk profiles. An ANOVA test between groups showed no significant difference. The test and visualisation of it can be found in Appendix 3. The dependent variables were also

analysed using a partial correlation test, controlled for treatment, and found to be significantly correlated. The test can be found in Appendix 4.

3.8.2. Validity

External validity is the concept that states whether the results could be generalised. Specifically, if the findings from this experiment would be applicable to other situations (Söderlund, 2010). With regards to the convenience sample used the results cannot be generalised (Bryman & Bell, 2015). The respondents have been approached in niche Facebook groups with interest in savings and investing. Thus, the sample does not conform to a general population.

Regarding ecological validity, the experiment is designed to apply in reality. The fund is presented with explanatory information that usually is exposed to retail investors. Further, the experiment's layout and design resembled reality in order to stage the situation and put the respondent in a similar setting. The fund presented to respondents is considered to be representative for quantitative ETFs in terms of historical development, risk level, fees and recommended holding period. This was concluded by examining the most popular type of quantitative ETFs on the Swedish market and using the means for each factor. Furthermore, respondents were asked to evaluate the information provided of the ETF presented in the experiment sections. 52.3 % thought the information was fulfilling, indicating a moderately satisfied reality setting.

Further, it is relevant concurring with face validity, as the experiment is a new setting measuring the concept of investment perceptions in ETFs (Bryman & Bell, 2015). Moreover, a knowledge test in the stock market was provided yielding an ETF score. To know whether the concept concerned is measured, respondents in the pilot study were asked to evaluate the setting (see Appendix 1) and the knowledge test, yielding positive results. Due to the sample being experienced within retail investing, they were considered appropriate.

3.8.3. Data quality

Before presenting the findings, it is crucial to evaluate the perceived quality of the survey and its validity. At the end of the questionnaire respondents were asked four questions

about their experience taking it (see Appendix 6). Regarding the question formulations, 90.1 % believed they were clear while 93.5 % thought the answer formulations were. When asking whether the survey was meaningful, 87.8 % believed so. Moreover, 66.1 % agreed that the answers were not influencing respondents in a certain direction. Lastly, respondents evaluated whether the questions were too complicated with regards to the pre-study insights and drop out analysis (see Appendix 6). Only 33.1 % thought the questionnaire was too complicated. This question was not affected by competence levels but respondents in treatment group D found the survey more complicated than respondents from treatment group C did. No other difference was found.

4. RESULTS

This section presents the findings from the main study. Firstly, the relevant descriptive statistics will be outlined followed by the findings from the experimental design. Moreover, the hypotheses will be tested and evaluated. Lastly, the additional findings will be presented.

4.1. Descriptive statistics

In total, the survey generated 243 valid responses. The average age and disposable income was 32 and SEK 21 000 respectively. The majority conducting the survey was men (70 %). Moreover, most people conducting the survey had a disposable income after tax between SEK 20 001 - SEK 30 000 (35 %) or between SEK 30 001 - SEK 40 000 (30 %) (see Appendix 7). Table 4 presents details of socio-demographic variables.

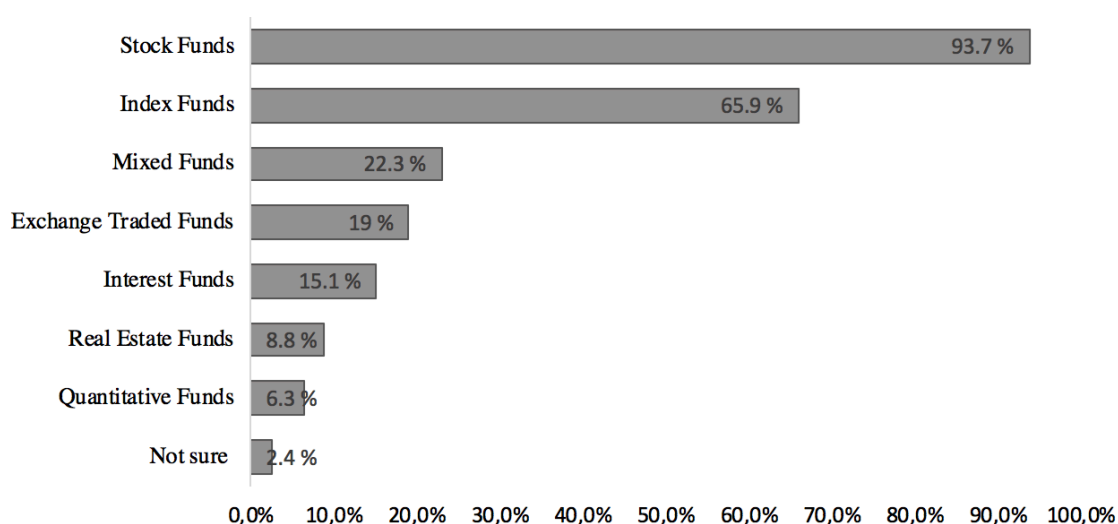
Table 4. Overview of socio-demographic variables

Variable	N	n	% of total sample
	243		
Gender			
Male		170	70 %
Female		71	29.2 %
Age (years)			
15-25		93	38.3 %
26-35		73	30.0 %
36-50		52	21.4 %
51-65		24	9.9 %
Occupation			
Student		89	36.6 %
Employed		137	56.4 %
Other		17	6.7 %
Education			
Elementary school		17	6.9 %
Upper secondary school		95	38.8 %
Vocational education		17	6.9 %
Bachelor's degree		81	33.1 %
Master's degree		33	13.5 %
Doctoral studies		2	0.8 %

4.1.1. Respondents' saving habits

This section shows the saving habits of participants. The overwhelming majority of respondents save on a monthly basis (81.9 %). They primarily save in stocks (91.4 %), funds (84.4 %) and savings accounts (61.7 %). The type of funds invested in is presented in figure 2. Approximately half of respondents had previously invested in Exchange Traded Funds (56 %) and very few in quantitative funds (7 %). See Appendix 7 for details.

Figure 2. Visualisation of saving sort of funds



4.1.2. Respondents' competence profiles and risk preference

The results indicate a generally high level of ETF knowledge with 88,1 % of respondents scoring high (3-4 correct answers) and an exceptionally small fraction of the sample displaying a low level of knowledge with 11,9 % scoring low (0-2 correct answers).

The results indicate a low level of numeracy for the vast majority of the sample with 67,9 % scoring low (0-2 correct answers) and 32,1 % scoring high (3-4 correct answers).

The results indicate a generally decent level of financial literacy, somewhat skewed toward the high end. 26,7 % of respondents displayed a low knowledge base (0-2 correct answers) while 73,3 % showed a high level of financial literacy (3-4 correct answers). Visualisation of respondents' competence levels can be found in Appendix 7.

Table 5. Summary of respondents' competence levels

Variable	n	% of total sample	M	SD
ETF knowledge (min 0, max 4)			3.39	0.85
0 correct answers	1	0.4 %		
1 correct answer	12	4.9 %		
2 correct answers	16	6.6 %		
3 correct answers	77	31.7 %		
4 correct answers	137	56.4 %		
Numeracy (min 0, max 4)			1.93	1.18
0 correct answers	25	10.3 %		
1 correct answer	75	30.9 %		
2 correct answers	65	26.7 %		
3 correct answers	49	20.2 %		
4 correct answers	29	11.9 %		
Financial literacy (min 0, max 4)			2.91	0.96
0 correct answers	6	2.5 %		
1 correct answer	14	5.8 %		
2 correct answers	45	18.5 %		
3 correct answers	110	45.3 %		
4 correct answers	68	28.0 %		

The results show a relatively even distribution between the two risk profiles, with the sample only exhibiting a slight leniency toward risk seeking with 54.3 % of the sample compared to 45,7 % risk averse. 69.5% of all respondents deviate less than one (1) point from the dividing point. Visualisation of respondents' competence levels can be found in Appendix 7.

Table 6. Summary of respondents' risk preference

Variable	M	SD
Q1	3.75	1.76
Q2	2.67	1.70
Q3	2.73	1.93
Q4	3.38	1.84
Q5	4.70	1.72
Risk preference	4.08	1.06

Note: Q1: 'I prefer a somewhat safe investment with guaranteed returns over a riskier investment with the possibility of higher returns'. Q2: 'I want to be sure that my investments are risk free'. Q3: 'If I believe an investment will be profitable I am ready to borrow money to finance it'. Q4: 'I am becoming more and more certain that I should be taking more risks to better my economy'. Q5: 'I am willing to risk losing money if there is a chance to make money'. Risk preference: Average score of questions A to F with questions A and B inversely coded.

4.2. Experimental data

The following section will present the results of the experiment measuring the dependent variables. First propensity to invest, safety assessment, perceived risk and WOM intention will be covered. Furthermore, considered factors during the evaluation of the ETF are filled. The dependent variables will be examined in the four treatment groups.

Figure 3. Visualisation of dependent variables means for each treatment group

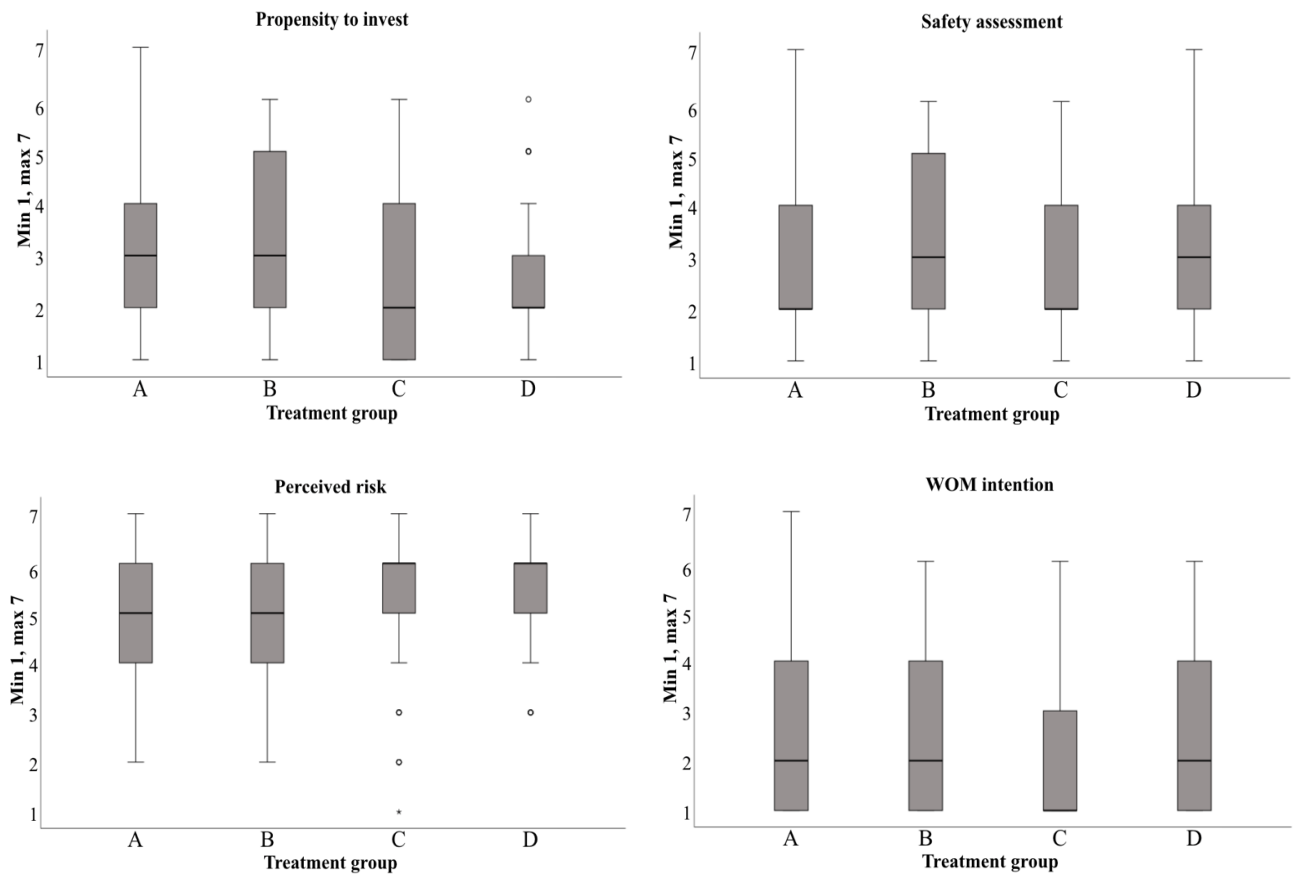


Table 7 shows the means and standard deviations for the dependent variables propensity to invest, safety assessment, perceived risk and WOM intention. Table 8 similar shows that for the dependent variables regarding considered factors. One sample t-test was conducted to explore the differences from the mid- point (4) of the 7-point Likert scale for each treatment group (see Appendix 8). The results indicate that:

- Propensity to invest: All groups were below the midpoint, which means respondents overall rather not invest in the ETF presented. Group B had the highest mean, while group C had the lowest.
- Safety assessment: Identical results are concluded here.

- Perceived risk: For this variable, group A had the highest mean, while group D had the lowest. In total, respondents perceive the ETF, independent of treatment group and past returns, as high in risk (>4).
- WOM intention: Group B had the highest mean while group D had the lowest. Respondents in total would not recommend to a friend, independent of stimuli and past returns.

Table 7. Overview of differences in mean between treatment groups

Variables	A n=65		B n=74		C n=73		D n=74	
	M	SD	M	SD	M	SD	M	SD
Propensity to invest	3.12b	1.51	3.32b	1.62	2.34b	1.34	2.46b	1.24
Safety assessment	3.10b	1.79	3.60c	1.36	2.72b	1.34	3.02b	1.47
Perceived risk	5.12a	1.33	4.94a	1.39	5.31a	1.38	5.52a	1.04
WOM intention	2.53b	1.76	2.65b	1.60	1.99b	1.29	2.22b	1.44

Note: a indicates a significant ($p < 0.001$) positive difference from the mid-point scale (4). b indicated a significant ($p < 0.001$) negative difference from the mid-point scale (4). c indicates a significant ($p < 0.01$) negative difference from the mid-point scale (4). One sample t-test can be found in Appendix 8.

Regarding considered factors, results indicate that:

- Respondents, independent of treatment group, consider past returns, product description, fee and risk level.
- There is no overall empirical support for consideration in either direction regarding recommended holding period or the algorithm among treatment groups.

Table 8. Overview of mean deviations from mid-point between treatment groups

Variables	A n=65		B n=74		C n=73		D n=74	
	M	SD	M	SD	M	SD	M	SD
Past returns	4.48d	1.84	4.71a	1.72	5.30a	1.61	5.04a	1.67
Product description	5.12a	1.51	5.25a	1.62	5.12a	1.52	5.26a	1.45
Fee	5.06a	1.82	5.20a	1.74	5.31a	1.65	5.57a	1.58
Risk level	4.58a	1.91	4.48d	1.85	4.69a	1.68	4.45d	1.58
Holding period	3.52	2.05	3.95b	1.97	4.11	2.08	4.09	2.05
The algorithm	3.80	1.97	3.77	1.81	3.85	1.75	3.61	1.99

Note: a indicates a significant ($p < 0.001$) positive difference from the mid-point scale (4). b indicated a significant ($p < 0.001$) negative difference from the mid-point scale (4). c indicates a significant ($p < 0.05$) negative difference from the mid-point scale (4). d indicates a significant ($p < 0.05$) positive difference from the mid-point scale (4). One sample t-test can be found in Appendix 8.

4.3. Hypotheses testing

Levene's test for homogeneity of variance was used to examine if parametric tests could be conducted. The test rejected the null hypothesis on a $p > 0.05$ for all dependent variables (see Appendix 9). This was not a large concern as all other assumptions needed to perform an ANOVA were fulfilled. Together with the superior statistical power of parametric tests over nonparametric tests, these were used despite the results from Levene's test. To control for the possibility that Levene's test indeed did undermine the reliability of parametric tests, all tests were complemented and ensured by nonparametric equivalents.

4.3.1. Effects of bullshit

Findings from ANOVA tests are summarised in table 9 and found consistent with Kruskal-Wallis in Appendix 10. Post-Hoc Tukey tests, consistent with Dunn's tests, were used to compare the treatment groups' means for primary hypotheses ranging from H1 to H4 and secondary hypotheses a) to e). Comparing groups containing stimuli with algorithm (Treatment group A and D) with each group absent of it (Treatment group B and C) no significant difference was found in either of the four dependent variables. Moreover, secondary hypotheses ranging from a) to e) are dependent on the four primary hypotheses, with a) and b) built upon the assumption that there is an effect from the stimuli.

Primary hypotheses **H1**, **H2**, **H3** and **H4** are thus **not empirically supported** for an effect in either direction related to the stimuli. Secondary hypotheses **a)** and **b)** are consequently **not empirically supported** either.

Table 9. One-way ANOVA (Post-Hoc, Tukey) of hypotheses H1-H4 and a)-b)

Treatment group (in relation to)	Propensity to invest	Safety judgements	Perceived risk	WOM intentions
A (B)	-0.197	-0.500	0.184	0.116
B (C)	0.891*	0.883*	-0.372	0.665
C (D)	0.036	0.298	0.210	0.237

Note: * The mean difference is significant at the 0.05 level.

4.3.3. Competency profiles

The two-way ANOVA test on secondary hypotheses c), d) and e) show a small but insignificant difference between the level of all competence bases on the propensity to invest, safety assessment and WOM intention. Perceived risk was found to be

significantly affected, but only by ETF knowledge which mitigated the effect. Secondary hypotheses **c)** is thus **partially empirically supported** while **d)** and **e)** are **not empirically supported**.

Table 10. Two-way ANOVA of hypotheses c)-e)

Variable	Propensity to invest			Safety assessment		
	Mean square	F	p-value	Mean square	F	p-value
ETF knowledge	0.002	0.001	0.976	3.411	1.522	0.219
Numeracy	0.246	0.105	0.746	0.999	0.446	0.505
Financial literacy	0.075	0.032	0.858	7.171	3.201	0.075

Variable	Perceived risk			WOM intention		
	Mean square	F	p-value	Mean square	F	p-value
ETF knowledge	7.541	4.404	0.037	0.002	0.001	0.976
Numeracy	0.190	0.111	0.740	0.246	0.105	0.746
Financial literacy	0.650	0.379	0.539	0.075	0.032	0.858

Note: Independent variables are divided in two groups, *Low* and *High*, based on their results from each competence test. The results describe if there is an effect between groups, not between each and every point-total.

Table 11. Summary of primary and secondary hypotheses

H1	Algorithm presence in the presentation of an ETF has a positive effect on propensity to invest	Not empirically supported
H2	Algorithm presence in the presentation of an ETF has a positive effect on safety assessments	Not empirically supported
H3	Algorithm presence in the presentation of an ETF has a positive effect on the perceived risk	Not empirically supported
H4	Algorithm presence in the presentation of an ETF has a positive effect on WOM intentions	Not empirically supported
a)	Algorithm presence in the presentation of an ETF has a positive effect only when presented with positive past returns	Not empirically supported
b)	Algorithm presence in the presentation of an ETF has a negative effect only when presented with negative past returns	Not empirically supported
c)	Knowledge in ETFs mitigates the effects of algorithm presence in the presentation of an ETF.	Partially empirically supported
d)	Financial literacy mitigates the effects of algorithm presence in the presentation of an ETF	Not empirically supported
e)	Numeracy mitigates the effects of algorithm presence in the presentation of an ETF	Not empirically supported

4.4. Additional findings

Outlined below are significant additional findings from tests conducted to test proposed hypotheses. Further, results from information related to the algorithm is presented. Followed by relationships between variables in the study.

4.4.1. Findings from hypothesis tests

A relationship was discovered between the two treatment groups B and C forming the control groups for the experiment (algorithm absent). It is empirically supported that propensity to invest and safety assessment is positively affected by positive past returns and vice versa (see table 9).

4.4.2. Informational significance of algorithm presence

While the primary objective of this thesis is to examine the effect of an added algorithm, it is crucial to see to what extent the perception of information sufficiency is affected by an entirely new section in a presentation. To analyse this, an ANOVA test, consistent with Kruskal-Wallis in Appendix 10, was performed on the two questions within the questionnaire aimed at measuring how complete respondents found the stimuli presented. Assessing the questionnaire as too complicated did not vary between competency levels. Another ANOVA test, consistent with Kruskal-Wallis and found in appendix 6 and 10 respectively, was performed to examine differences between treatment groups. The only difference observed between C and D, where D found the questionnaire significantly more complicated than C did.

Table 12. ANOVA of information sufficiency with algorithm present vs. absent

Variable	Kruskal-Wallis H	df	p-value
How complete do you think the information of the ETF was?	0.020	1	0.826
Do you think there was any information missing in the ETF presentation?	0.826	1	0.363

Note: The first question was answered on a scale from 1 (Entirely incomplete) to 7 (Entirely complete). The second question only posed two options: *Yes* or *No*.

A descriptive analysis was made on the answers from respondents answering *Yes* to the question on whether they thought any information was missing in the ETF presentation. A division was made between respondents based on if their stimuli included the algorithm or not. No matter the stimuli presented to the respondents, information regarding the funds' holdings was of premiere interest followed by clarification of the investment model. The results show no tendency for algorithm presence or absence to affect the perceived sufficiency of model explanation.

Table 13. Overview of missing information based on algorithm presence or absence

Missing information	Algorithm present			Algorithm absent			Total		
	N	n	% of sample	N	n	% of sample	N	n	% of total sample
	55			72			127		
Holdings		20	36.4 %		39	54.2 %		59	46.5 %
Model clarification		8	14.5 %		11	15.3 %		19	15.0 %
Management inf.		6	10.9 %		6	8.3 %		12	9.4 %
Historic performance		2	3.6 %		5	6.9 %		7	5.5 %
Index comparison		3	5.5 %		4	5.6 %		7	5.5 %
ESG factors		3	5.5 %		1	1.4 %		4	3.1 %
Volatility and risk		3	5.5 %		1	1.4 %		4	3.1 %
Cost structure		2	3.6 %		2	2.8 %		4	3.1 %
Don't know		14	25.5 %		13	18.1 %		27	21.3 %

Note: Some respondents reported more than one information basis missing, why the number of missing information bases exceed the number of respondents.

4.4.3. Exploring variable correlations

To explore findings from the data set not formally hypothesised, correlation tests were conducted on the demographic data. Several significant correlations were found. All competence bases were found to be positively correlated with each other. Both ETF knowledge and financial literacy were found to be correlated with disposable income while the former also displayed a correlation with gender; men exhibited a higher level of ETF knowledge than women. Financial literacy instead showed a positive correlation with risk preference, education and workforce status. Beyond ETF knowledge, gender was also found to be correlated with risk preference; men displayed a higher level of risk tolerance than women.

Disposable income was found to be positively correlated with several independent variables, including ETF knowledge, financial literacy, age, education and workforce status. Further correlations were found for workforce status, including financial literacy, age and education. Education and financial literacy were also found to be correlated. See Appendix 11 for a complete table of correlations among independent variables.

5. DISCUSSION

The purpose of this thesis was to examine if, and if so how, retail investors may be manipulated by the addition of an algorithm out of context when exposed to information of ETFs. The first research question covered the effect of the algorithm. Results indicate that an algorithm in the product description of an ETF does not affect retail investors perception of the security. The second research question evaluated whether the inclusion of an algorithm could be affected by other factors, for instance past returns. The results showed no interference from other factors and the algorithm still had no significant effect. The third research question asked whether relevant competencies of the investor would affect the perception of the algorithm. Results showed that relevant skills did not while specific ETF knowledge did to a very small extent.

Neither of the primary hypotheses were empirically supported. All but one of the secondary hypotheses were not empirically supported since they built on the assumption of an effect from the algorithm. Between individuals scoring low and high in ETF knowledge there was found to be a significant difference in the effect of the algorithm, but only for perceived risk. Secondary hypothesis c) was thus partially empirically supported.

Further it was found that respondents overall perceived the ETF as high in risk and would not recommend it to a friend, independent of treatment group. Moreover, one is more prone to invest with positive past returns, assessing the ETF as safer.

5.1. Conclusions and implications

5.1.1. Hypotheses rejected

As outlined above, no effect from the algorithm was found which led to rejection of all but one hypothesis, which itself was only partially supported. To understand why this outcome came to be, one can evaluate the descriptive data. Approximately half of respondents had previously invested in ETFs and very few in quantitative funds (7 %) which could create a feeling of uncertainty towards the ETF presented. Further, the majority of respondents scored low on the numeracy test, indicating insecurities regarding

numbers and thus it may have affected their evaluation of the financial product; especially as the presentation only provided financial information and no holding companies. This is supported by the data showing that respondents thought the presentation lacked information on companies held in the ETF (46.4 %). However, it was needed to exclude holdings in order to measure the effect without impact from other factors as respondents could favour the ETF based on their preconceived conceptions. The holdings of a quantitative fund fluctuate rapidly anyhow, why it is of miniscule importance compared to an actively managed fund.

The mathematical components in the hypotheses were built upon the study conducted by Eriksson (2012). He concluded that research papers with nonsense mathematics in the abstract were judged to be of higher quality. Eriksson's studies were conducted on academics with regard to research papers, not much different from this thesis focusing on retail investors with regard to securities. His sample had a median education level of master's degree and none below bachelor's. The majority of the sample in this thesis lack a university degree (53 %). Eriksson did find that only degrees within mathematics helped against nonsense mathematics but the less educated sample of ours could explain the nonattention towards the algorithm. Data showed that respondents considered the algorithm the least of all factors when evaluating the ETF (see section 4.2).

Moreover, Swedish investments in ETFs is currently increasing in prevalence. It is still outclassed by mutual funds in terms of popularity but expected to grow with regards to the major international development discussed in section 1.1.4. Thus, respondents in this study could be assumed to be new investors, contributing to the uncertainty towards the ETF presented.

5.1.2. Theoretical implications - Theory of Bullshit

Bullshit theory states two mechanisms that make individuals perceive the bullshit as true. Mechanism 1 is connected to bias and previous experiences which the receiver associates with the bullshit in question and creates a sense of familiarity or idea that the bullshit in fact is true (Pennycook et al., 2015). Our study focused on mathematics, a subject that embodies truth and logic. As such, the addition of an algorithm in an investment scenario should create a sense of meaningfulness and credibility due to misconceptions about

application, fulfilling the assumptions of the first bullshit mechanism (Ojose, 2016; Pennycook et al., 2015). Our results indicate otherwise as no effect from the algorithm was found in any way. It is possible, however, that individuals have bad associations with mathematics from school and thus feel discouraged when exposed to it. Studies show that in both elementary and high schools worldwide, mathematics is the least favourite subject of all (Frenzel, Pekrun & Goetz 2007; Boaler 2017; Furner & Duffy 2002). Local studies on the Swedish population support this (Olén, 2016) If this is assumed to be the case for our sample as well, mechanism 1 suggests that while perhaps discerning the bullshit, individuals are not receptive to nonsense mathematics due to their negative associations with mathematics in general.

Mechanism 2 says that an individual's ability to detect bullshit is dependent on their knowledge and logical thinking within the researched subject (Pennycook et al., 2015). Our results do not directly contradict these claims; indeed, they rather confirm them with secondary hypothesis c) being partially supported. However, the bullshit presented to respondents was directly connected to numeracy and indirectly to financial literacy. No matter the level of respective competence, the algorithm was ineffective. It is therefore unclear if mechanism 2 can really be considered a general function of bullshit receptivity or if it is delimited to scientific bullshit from which it was first formulated (Pennycook et al., 2015).

5.1.3. Theoretical alignment - Prospect Theory

While bullshit theory led our hypotheses development astray, prospect theory and behavioural finance gain additional support from this thesis. A significant difference was found on propensity to invest and safety assessment between framing the historic performance of the ETF as positive versus negative, despite all other information kept identical. Conventional research tells us that past returns are non-indicative of future performance and that risk-adjusted returns from investing based on historic performance is virtually the same as attempting to follow trends (Brown & Goetzman, 1995; Carhart, 1997; Fama, 1970; Rhodes, 2000). However, studies show that despite this, past returns act as one of the defining factors considered when investing (Mussweiler & Schneller, 2003). While our respondents report past returns as the third most important factor they consider (ranging from second to fourth depending on treatment group), the results

indicate a much higher actual importance. All information was identical but the mean difference between positive and negative framing of returns affected the perception of the ETF with between 0.37 to 0.89 on a 7-point scale. While it cannot be ruled out that changes made to product description, fees or any other area of the ETF presentation would affect the perception as well, it is reasonable to assume that the mean difference would be less than it was for differences in historic performance. This thesis therefore finds no results contradicting prospect theory or behavioural finance but gives additional support to them.

5.1.4. Additional findings

While retail investors lack the highly sophisticated tools that hedge funds and portfolio managers possess, their investment decisions are generally made based on fundamental analysis. These require not only a basic understanding of accounting information and how to interpret them, but also decent arithmetic abilities to conduct numerical valuations. Research on the Swedish population suggests that these two are related (Almenberg & Dreber, 2012). Results from this study support the conventional theory as all competence bases, including ETF knowledge which is a narrower and niche subject than that of financial literacy and numeracy, show a positive correlation with each other. As others have pointed out, this is likely due to the common denominator in logical reasoning and clear parallels between the areas (Almenberg & Dreber, 2012). Another finding on financial literacy is the correlation with risk preference; a more financially literate person is more akin to take risks, which could be explained by their higher understanding of what they are actually investing in.

Literature has found a general tendency for women to be less prone to take risks than men in most situations, including financial decisions, which the results from this study support (Jianakoplos & Bernasek, 2007). This may explain the lower level of ETF knowledge that women exhibit as these securities are, not fundamentally but generally, more speculative compared to mutual funds and thus impose more risk on the investor, scaring off women (Guedj & Huang, 2009).

5.2. Summary of key findings

Findings from this study can be summarised as followed:

Swedish retail investors' perception of an ETF is not affected by algorithm presence in the product description, independent of other factors such as past returns and competency. However, there is a significant difference in the algorithm's effect between investors scoring low and high in ETF knowledge, where less knowledgeable individuals view the ETF as safer if presented with mathematics. Moreover, one is more prone to invest with positive past returns while simultaneously assessing the ETF as safer.

5.3. Limitations and suggestions for future research

The sample in this study could be assessed as biased and homogeneous due to being a convenience sample. Results could not be generalised as respondents were drawn from interest groups on social media discussing the stock market. However, it was intended to test the effect on retail investors specifically, not complete laymen. The sample can however not represent a general investor in the stock market as an open membership in a Facebook group does not necessarily classify one as experienced. Furthermore, the issue of survey self-completion is limiting the results. It is not certain that individuals report their correct behaviours when reporting themselves (Bryman & Bell, 2015). However, the method progressed due to limited resources.

Further, the experiment could be evaluated from an ethical and legal perspective. When investing in a real similar setting it is unlikely that the algorithm would be presented. It is not containing relevant information and including it would directly be attentively misleading the investor (Kågerman, 2008). Thus, the ethics of this experiment could be questioned. Furthermore, there are regulations on the Swedish capital market such as the EU directives and regulations on the securities market *MiFID II* and *MiFID*², that includes the aim to strengthen investor protection and thus an algorithm *without motivation* would not be approved.

² MiFID II (directive) and MiFIR (regulation). Regulations are directly applicable within the EU. The directive, Mifid 2, has been implemented in Swedish law, primarily in the Securities Market Act (2007: 528).

With regards to the limitations, the authors propose some recommendations for future research. Firstly, a more representative sample is recommended from either the Swedish population or official membership groups such as Aktiespararna. Further, this study could be applied to a similar sample as Eriksson (2012) tested to see if the effect may be found. Moreover, the USA as a foreign exchange would be more suitable to study as the prevalence of investment in ETFs is larger there. If replicating the study on a Swedish sample, authors recommend simpler and more common financial products such as mutual funds. Even though this study's experiments were designed and aimed to test the rising quantitative ETFs as a financial product, the sample affected the algorithm's hypothesised effect (discussed in section 5.1.1.). Furthermore, regarding ethics and regulation, future research could try to test a more common setting in reality with real algorithms instead of using a nonsense algorithm as a proxy.

Final words

The escalation of complexity in financial products is reminiscent of earlier courses of events for both institutional and retail investors. The latest financial crisis arose from it and shook economies worldwide. It is essential to be attentive towards financial products, which our respondents are – at least in an experimental setting.

6. REFERENCES

Agapova, A. (2011). *Conventional mutual index funds versus exchange-traded funds. Journal of Financial Markets*, volume 14, 323-343.

Almenberg, J., & Dreber, A. (2012). Gender, Stock Market Participation and Financial Literacy. *SSE/EFI in Economics and Finance*.

Arndt, J. (1967). Role of Product-Related Conversations in the Diffusion of a New Product. *Journal of Marketing Research*, volume 4(3), 291–295.

Barberis, N., Mukherjee, A., & Wang, B. (2016). Prospect Theory and Stock Returns: An Empirical Test. *The Review of Financial Studies*, Volume 29(11), pp. 3068–3107.

Benartzi, S., & Thaler, R. (2001). Naïve diversification strategies in defined contribution saving plans. *American Economic Review*, volume 91, pp. 79–98.

Benartzi, S., & Thaler, R. (2002). How much is investor autonomy worth? *Journal of Finance*, volume 57, pp. 1593–1616.

Boaler, J. (2017). *Matematik med dynamiskt mindset- hur du frigör dina elevers potential*. Natur & Kultur.

Čavojová, V., Brezina, I., & Jurkovič, M. (2020). Expanding the bullshit research out of pseudo-transcendental domain. *Current Psychology*.

Conelly, L. (2008). *Pilot studies*. MEDSURG Nursing, volume 17(6), pp. 411-412.

Cokely, E. T., Galesic, M., Schulz, E., Ghazal, S., & Garcia-Retamero, R. (2012). Measuring risk literacy: The Berlin Numeracy Test. *Judgment and Decision Making*, volume 7(1), pp. 25–47.

Dalton, C. (2016). Bullshit for you; transcendence for me: A commentary on “On the reception and detection of pseudo-profound bullshit”. *Judgment and Decision making*, 11(1), pp. 121–122.

Erik Modig (2017). *Bang for the Buck*. Rheologica Publishing.

ETFmarknaden (2021, april 19). *Den nordiska ETF-marknaden mars 2021*.
<https://www.etfmarknaden.se/den-nordiska-etf-marknaden-mars-2021/>

Financial Crisis Inquiry Commission (2011). *The Financial Crisis Inquiry Report*.
Authenticated U.S. Government Information, 127-155.

Finansinspektionen (2019). *Om Mifid/Mifir EU direktiv*. Retrieved 2021-05-10
<https://www.fi.se/sv/marknad/vardepappersmarknad-mifidmifir/om-mifidmifir/>.

Finansinspektionen (2021). *Konsumentskyddsrapport 2021*. Konsumentrapporter.

Finstad, K. (2010). Response Interpolation and Scale Sensitivity: Evidence Against 5-Point Scales. *Journal of Usability Studies*, volume 5(3), pp. 104-110.

Flink, H., Gunnarsson, J., och Wahlund, R., (1999). Svenska hushållens sparande och skuldsättning - ett konsumentbeteendeperspektiv. *Stockholm School of Economics, Business Administration*.

Frankfurt, H. (2005). *On Bullshit*. Princeton University Press.

Frenzel, A. C., Pekrun, R., & Goetz, T. (2007). Girls and mathematics - A "hopeless" issue? A control-value approach to gender differences in emotions towards mathematics. *European Journal of Psychology of Education*, 22(4), pp. 497–514.

Furner, J., & Duffy, M. L. (2002). Equality for students in the new Millennium: disabling math anxiety. *Intervention in School and Clinic*, 38(2), pp. 67–74.

Hájková, K. (2003). *History of Consumer Rights Protection*. Czech Trade Inspection Authority.

Huang, J. C., & Guedj, I. (2009). Are ETFs Replacing Index Mutual Funds? *AFA 2009 San Francisco Meetings Paper*.

Jianakoplos, N. A., & Bernasek, A. (2007). Are women more risk-averse? *Economic Inquiry*, volume 36(4), pp. 620-630.

Kahneman, D., & Tversky, A. (1979) Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, volume 47(2), pp. 263-292.

- Kågerman, P., Lohmander, C., & De Ridder, A. (2008). *Etik, regler och värdering på kapitalmarknaden*. Norstedts Juridik.
- Leung, S. (2011). A Comparison of Psychometric Properties and Normality in 4-, 5-, 6-, and 11-Point Likert Scales. *Journal of Social Service Research*, volume 37, pp. 412-421.
- Lipkus, I., Samsa, G., & Rimer, B. K. (2001). General Performance on a Numeracy Scale among Highly Educated Samples. *Medical Decision Making*, volume 21(1), pp. 37-44.
- Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, volume 52(1), pp. 5-44.
- Lusardi, A., Mitchell, O., 2008. Planning and financial literacy: How do women fare? *American Economic Review*, volume 98, 413-417.
- Malhotra, N. K. (2010). *Marketing Research: An Applied Orientation* (6th ed.). Pearson Education.
- McArdle, J. J., Smith, P., & Willis, R. (2009). *Cognition and economic outcomes in the health and retirement survey*. National Bureau of Economic Research, working paper 15266.
- Meibauer, J. (2016). Aspects of a theory of bullshit. *Pragmatics & Cognition*, 23(1), 68–91.
- Millroth, P., Nilsson, H., & Juslin, P. (2019). The decision paradoxes motivating Prospect Theory: The prevalence of the paradoxes increases with numerical ability. *Judgment and Decision Making*, volume 14(4), pp. 513–533.
- Millroth, P., Nilsson, H., & Juslin, P. (2020). Replications will not help: The paradoxes motivating Prospect Theory still don't tell us much about human risk-preferences. *Nature Human Behavior*.
- Mitchell, O., & Utkus, S. (2004). *Pensions design and structure: New lessons from behavioral Finance*. Oxford University Press.

Mussweiler, T., & Schneller, K. (2003). "What Goes Up Must Come Down": How Charts Influence Decisions to Buy and Sell Stocks, *Journal of Behavioral Finance*, volume 4(3), pp. 121-130.

Newell, B. R., Lagnado, D. A., & Shanks, D. R. (2007). *Straight choices: The psychology of decision making*. Psychology Press.

Nwogugu, M. C. (2006). A further critique of cumulative prospect theory and related approaches. *Applied Mathematics and Computation*, 179(2), pp. 451-465.

Olén, S. (2016). *Attityden till matte – ett hinder för svensk konkurrenskraft?* Västsvenska handelskammaren.

Ojose, Bobby. (2011). Mathematics Literacy: Are We Able To Put The Mathematics We Learn Into Everyday Use? *Journal of Mathematics Education*, volume 4(1), pp. 89-100.

Pallant, J. (2016). *SPSS Survival Manual* (6th ed.). Open University Press.

Pennycook, G., Allan Cheyne, J., Barr, N., Koehler, D. J., & Fugelsang, J. A. (2015). On the reception and detection of pseudo-profound bullshit. *Judgment and Decision Making*, volume 10(6), pp. 549–563.

Pensionsmyndigheten (2017, february), *Pensionsmyndigheten köpstoppar Allras fonder*. <https://www.pensionsmyndigheten.se/nyheter-och-press/pressrum/pensionsmyndigheten-kopstoppar-allras-fonder>

Peters, E., Västfjäll, D., Slovic, D., Mertz, C. K., Mazzocco, K., & Dicker, S. (2006) Numeracy and Decision Making. *Psychological Science*, volume 17(5), pp. 407-413.

Petram, L. O. (2011). *The World's First Stock Exchange: How the Amsterdam Market for Dutch East India Company Shares Became a Modern Securities Market, 1602–1700*. Eigen Beheer.

Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*, volume 101(2), pp. 449-472.

Rossiter, J. R. (2019). A critique of prospect theory and framing with particular reference to consumer decisions. *Journal of Consumer Behaviour*, 18(5), pp. 399-405.

Sandler, R. (2002). *Medium and long-term retail savings in the UK – A review*. HM Treasury.

SEC (2012). *Investor Bulletin: Exchange-Traded Funds (ETFs)*. Investor Assistance.

Sokal, A. (1996a). Transgressing the boundaries: Towards a transformative hermeneutics of quantum gravity. *Social Text*, volume 46/47, pp. 217–252.

Sokal, A. (1996b). A physicist experiments with cultural studies. *Lingua Franca* (May/June), pp. 62–64.

Staddon, J. (2017). *Scientific Method: How Science Works, Fails to Work, and Pretends to Work*. Routledge.

Statista Research Department. *Development of assets of global Exchange Traded Funds (ETFs) from 2003 to 2020*. <https://www.statista.com/statistics/224579/worldwide-etf-assets-under-management-since-1997/>

Svenska Bankföreningen (2020). *Den svenska finansmarknaden*. <https://www.swedishbankers.se/fakta-och-rapporter/svensk-bankmarknad/den-svenska-finansmarknaden/>

Svetina, M., & Wahal, S. (2008). Exchange Traded Funds: Performance and Competition. *SSRN Electronic Journal*, 10.2139/ssrn.1303643.

Sveriges Television (2021), *Finansinspektionen kräver kickback-förbud*. <https://www.svt.se/nyheter/inrikes/finansinspektionen-kraver-kickback-forbud>

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, volume 211(4481), pp. 453–458.

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, volume 5, pp. 297–323.

Thaler, R. H. 2000. From Homo Economicus to Homo Sapiens. *Journal of Economic Perspectives*, 14 (1), pp. 133-141.

U.S. Department of Commerce: Bureau of Economic Analysis. Bea.gov his wife. 2009-12-22. Archived from the original on 2010-04-07.

Vanguard (2021a), *Vanguard S&P 500 ETF (VOO)*.

<https://investor.vanguard.com/etf/profile/VFMF>

Vanguard (2021b), *Vanguard U.S. Multifactor ETF (VFMF)*.

<https://investor.vanguard.com/etf/profile/VFMF>

Wärneryd, K. E. (1996). Risk attitudes and risky behavior. *Journal of Economic Psychology*, 17(6), pp. 749-770.

7. APPENDICES

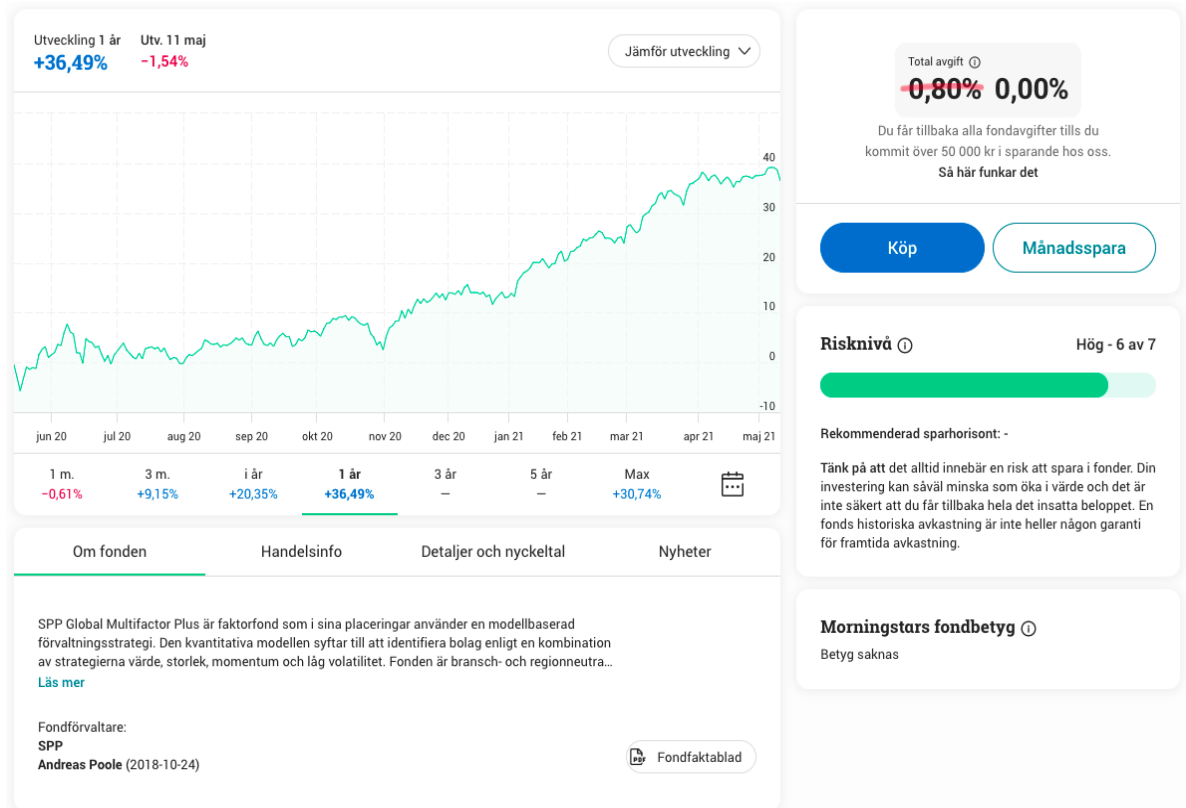
Appendix 1 - Pilot study

Adjustments that evolved from the preparatory study related to clarification of purpose behind sections. Specifically, the tests on numeracy, financial literacy and risk attitude had to be motivated in order for the respondent to not feel confused. Further, with regards to the questionnaire being long and potentially exhausting, two different incentive programs to conduct the survey were evaluated. The choice was between giving SEK 2 to Cancerfonden (a Swedish charity for cancer research) and offering the chance to win SEK 1 000. The latter was estimated to be the most effective through discussions with respondents from the preliminary study.

The pre-study furthermore led to an update of the equation that was aimed to be tested within Face validity. Initially the Black-Scholes formula was used due to its connection to financial products. However, the pre-study showed that parts of the sample had associations with Black-Scholes, which in turn would undermine the classification as bullshit with regards to the nonsense mathematics effect. Further it would not measure the concept of perception of investing in the ETF as respondents only focused on the formula, having associations with it. To satisfy the condition of “experts” evaluating the setting in line with face validity, Respondents in the pre-study could be considered experienced within the area, as the sample was taken from individuals continuously retail investing and thus is exposed to similar settings with ETFs (Bryman & Bell, 2016). The study was therefore altered to use an equation completely out of context, borrowed from Eriksson’s (2012) study on the nonsense mathematics effect.

Appendix 2 - Fund presentation in experiment

Figure 4. Example of Swedish fund presentation that was mimicked



Appendix 3 - Dependent variable correlations

Table 14. Partial correlation between dependent variables, controlling for treatment

Variable	Propensity to invest	Safety assessment	Perceived risk	WOM intention
Propensity to invest	1	0.530	-0.276***	0.537***
Safety assessment	0.530***	1	-0.428***	0.542***
Perceived risk	-0.276***	-0.428***	1	-0.329***
WOM intention	0.537***	0.542***	-0.329***	1

Note: The correlations were controlled for the different treatments presented to respondents.

Appendix 4 - ANOVA test for competence between treatment groups

Table 15. Respondents different scores among treatment groups

Competency group	Treatment group	Mean square	F	p value
ETF score	Between groups	0.335	0.464	0.708
NUM score	Between groups	1.249	0.891	0.446
FIN score	Between groups	0.552	0.601	0.615
RISK score	Between groups	0.689	0.689	0.560

Note: * The mean difference is significant at the 0.05 level.

Appendix 5 - Cronbach alpha on risk scale

Table 16. Cronbach alpha

Cronbach's Alpha	Number of items
0.533	5

Appendix 6 - Judgement of survey (data quality)

Table 17. Judgement of survey

Statement	N	M	Min	Max	SD
The questions were clearly formulated	243	4.93	1	7	1.086
The answers were clearly formulated	243	4.98	1	7	1.040
The questionnaire was meaningful	243	5.07	1	7	1.157
The questions influenced one in a certain direction	243	3.10	1	7	2.340
The questions were too complicated	243	3.10	1	7	1.964

Table 18. Judgement of survey, distributions of answers in %

	Do not agree	Do agree to a very small extent	Do agree to a small extent	Do agree to a high extent	Do agree to a very high extent	Do agree	Doubtful
The questions were clearly formulated	1.2 %	1.2 %	2.0%	31.4%	32.2%	26.5%	5.3%
The answers were clearly formulated	1.6 %	0.8 %	2.1%	31.4%	30.2%	31.9%	4.1%
The questionnaire was meaningful	2.0 %	0.4 %	0.4%	29.8%	29.4%	28.6%	9.4%
The questions influenced one in a certain direction	40.4 %	14.7%	11%	4.9%	3.7%	7.8%	17.6%
The questions were too complicated	22.4 %	26.5%	18.0%	2.0%	0.4%	0.4%	15.1%

Table 19. Correlation with respondents answering “Questions too complicated” with competency and risk profile

Variable	Questions too complicated	ETF knowledge	Numeracy	Financial literacy	Risk preference
Questions too complicated	1	-0.09	-0.12	-0.04	-0.083
ETF knowledge	-0.09	1	0.29**	0.34**	0.10
Numeracy	-0.12	0.26**	1	0.37**	0.05
Financial literacy	-0.04	0.34**	0.37**	1	0.15*
Risk preference	-0.083	0.10	0.05	0.15*	1

Table 20. One-way ANOVA (Post-Hoc Tukey) between treatment groups on “Questions too complicated”

Treatment group (in relation to)	Kruskal-Wallis H	df
A (B)	0.003	1
B (C)	3.530	1
C (D)	10.532**	1

Note: ** The mean difference is significant at the 0.01 level.

Appendix 7 – Descriptive data

Table 21. Respondent's saving habits

Variable	N	n	% of total sample
	243		
Disposable income (after tax) SEK			
0 – 10 000		39	16 %
10 001 – 20 000		73	30 %
20 001 – 30 000		85	35 %
30 001 – 40 000		39	16 %
40 001 – 50 000		7	3 %
Saving frequency			
Monthly saving		199	81.9 %
Individual deposits		97	39.9 %
No saving		3	1.2 %
Sort of saving			
Savings account		150	61.7 %
Funds		205	84.4 %
Stocks		222	91.4 %
Amortization mortgage		81	33.3 %
Pension insurance		35	14.4 %
Real estate		32	13.3 %
Other		12	2.9 %

Note: Respondents can fall into multiple categories. Thus, if an answer contains both 'Monthly saving' and 'Individual deposits', both are counted separately in each category.

Figure 5. Visualisation of competence levels among respondents

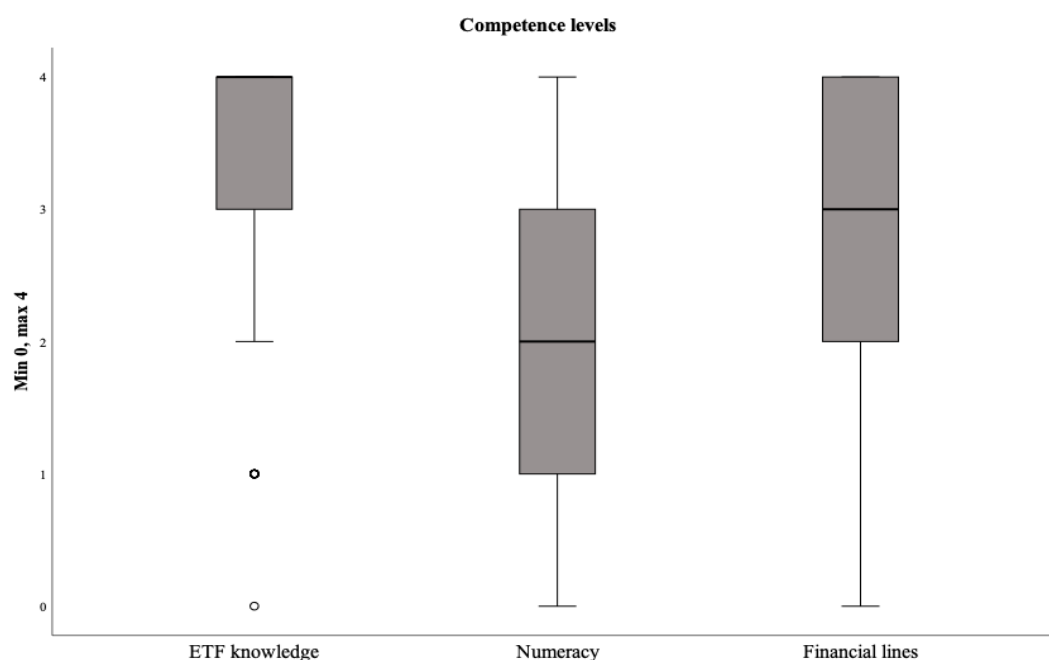
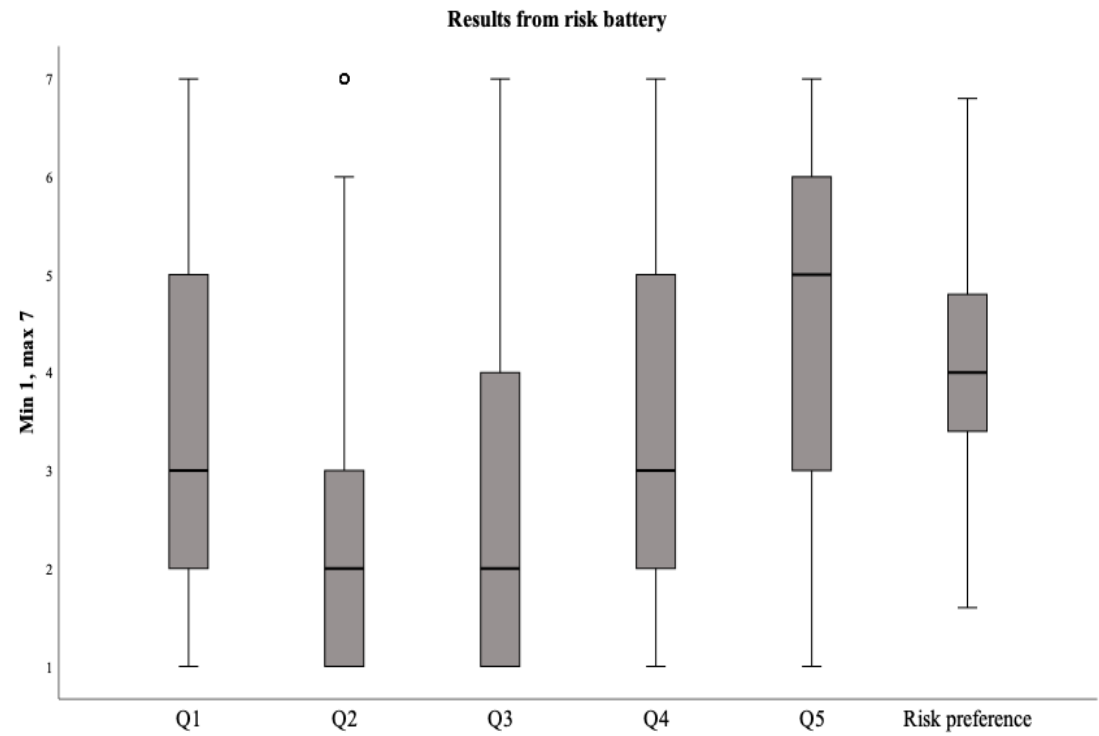


Figure 6. Results from test on risk preference



Note: Q1: 'I prefer a somewhat safe investment with guaranteed returns over a more risky investment with the possibility of higher returns'. Q2: I want to be sure that my investments are risk free'. Q3: 'If I believe an investment will be profitable I am ready to borrow money to finance it'. Q4: 'I am becoming more and more certain that I should be taking more risks to better my economy'. Q5: 'I am willing to risk losing money if there is a chance to make money'. Risk preference: Average score of questions A to F with questions A and B inversely coded.

Appendix 8 - One sample t-tests

Table 22. One sample t-test dependent variables (middle value=4)

Groups	df	t	M.dif	p-value
Propensity to invest (A)	65	-4.838	-0.909	< 0.001
Propensity to invest (B)	74	-3.678	-0.693	< 0.001
Propensity to invest (C)	73	-8.708	-1.432	< 0.001
Propensity to invest (D)	74	-8.711	-1.360	< 0.001
Safety assessment (A)	65	-4.339	-0.924	< 0.001
Safety assessment (B)	74	-2.827	-0.440	0.006
Safety assessment (C)	73	-7.695	-1.203	< 0.001
Safety assessment (D)	74	-5.084	-0.827	< 0.001
Perceived risk (A)	65	7.679	1.227	< 0.001
Perceived risk (B)	74	5.761	0.920	< 0.001
Perceived risk (C)	73	7.711	1.270	< 0.001
Perceived risk (D)	74	8.662	1.253	< 0.001
WOM intention (A)	65	-7.521	-1.591	< 0.001
WOM intention (B)	74	-7.499	-1.347	< 0.001
WOM intention (C)	73	-13.099	-1.959	< 0.001
WOM intention (D)	74	-9.681	-1.640	< 0.001

Table 23. One sample t-test considered factors (middle value=4)

Groups	df	t	M.dif	p-value
Past returns (A)	65	2.139	0.485	0.036
Past returns (B)	74	3.533	0.707	< 0.001
Past returns (C)	73	6.927	1.192	< 0.001
Past returns (D)	74	5.726	1.093	< 0.001
Product description (A)	65	6.016	1.121	< 0.001
Product description (B)	74	6.700	1.253	< 0.001
Product description (C)	73	6.263	1.122	< 0.001
Product description (D)	74	7.688	\$.267	< 0.001
Fee (A)	65	4.729	1.061	< 0.001
Fee (B)	74	2.249	0.480	< 0.001
Fee (C)	73	6.815	1.311	< 0.001
Fee (D)	74	9.735	1.667	< 0.001
Risk level (A)	65	2.444	0.576	< 0.001
Risk level (B)	74	2.249	0.480	0.027
Risk level (C)	73	3.531	0.689	< 0.001
Risk level (D)	74	2.486	0.435	0.015
Recommended holding period (A)	65	-1.924	-0.485	0.059
Recommended holding period (B)	74	-0.234	-0.053	< 0.001
Recommended holding period (C)	73	0.448	0.108	0.656
Recommended holding period (D)	74	0.526	0.133	0.576
The algorithm (A)	65	-0.812	-0.197	0.420
The algorithm (B)	74	-1.087	-0.277	0.280
The algorithm (C)	73	-0.731	-0.149	0.467
The algorithm (D)	74	-1.795	-0.413	0.077

Appendix 9 - Levene's test

Table 24. Levene's test

Dependent variables	Levene statistic	p-value
Propensity to invest	3.612	0.014
Safety assessment	3.139	0.026
Percieved risk	1.804	0.147
WOM intention	4.770	0.003

Note: * The differences in variances is significant at the 0.05 level. Reject the null hypothesis.

Appendix 10 - Nonparametric equivalent tests

Table 25. Kruskal-Wallis one-way ANOVA (Dunn's test) of hypotheses H1-H4 and a)-b)

Treatment group (in relation to)	Propensity to invest	Safety judgments	Percieved risk	WOM intentions
A (B)	0.458	1.190	0.523	0.353
B (C)	10.493***	12.961***	2.851	2.113
C (D)	0.138	1.149	0.154	0.740

Note: *** The mean difference is significant at the 0.001 level.

Table 26. Kruskal-Wallis one-way ANOVA of information sufficiency with algorithm present vs. absent

Variable	Kruskal- Wallis H	df	p-value
How complete do you think the information of the ETF was?	0.020	1	0.826
Do you think there was any information missing in the ETF presentation?	0.826	1	0.363

Note: The first question was answered on a scale from 1 (Entirely incomplete) to 7 (Entirely complete). The second question only posed two options: *Yes* or *No*.

Treatment group (in relation to)	Kruskal-Wallis H	df
A (B)	0.003	0.347
B (C)	3.530	0.333

C (D)	1.324**	0.347
-------	---------	-------

Table 27. Kruskal-Wallis one way ANOVA (Dunn’s test) between treatment groups on “Questions too complicated”

Note: ** The mean difference is significant at the 0.01 level.

Appendix 11 - Correlation among independent variables

Table 28. Correlation between independent variables

Variable	ETF knowledge	Numeracy	Financial literacy	Risk preference	Gender	Age	Disposable income	Education	In workforce
ETF knowledge	1	0.29**	0.34**	0.10	-0.17**	-0.01	0.22**	0.12	0.08
Numeracy	0.26**	1	0.37**	0.05	-0.06	-0.10	0.09	0.11	0.08
Financial literacy	0.34**	0.37**	1	0.15*	-0.07	0.05	0.21**	0.13*	0.20**
Risk preference	0.10	0.05	0.15*	1	-0.16*	-0.08	0.02	-0.04	-0.09
Gender	-0.17**	-0.06	-0.07	-0.16*	1	0.05	-0.03	0.10	-0.06
Age	-0.01	-0.10	0.05	-0.08	0.05	1	0.52**	0.07	0.35**
Disposable income	0.22**	0.09	0.21**	0.02	-0.03	0.52**	1	0.29**	0.71**
Education	0.12	0.11	0.13*	-0.04	0.10	0.07	0.29**	1	0.22**
Workforce status	0.08	0.08	0.20**	-0.09	-0.06	0.35**	0.71**	0.22**	1

Note: Gender is coded with 1 as male and 2 as female, education coded with rising values for higher degrees and workforce status with 1 as outwith the workforce (in any form) and 2 as in the workforce. A positive correlation thus suggest a higher value for females while a negative correlation suggests a higher value for males. * indicates a significant correlation at the 0.05 level. ** indicates a significant correlation at the 0.01 level. All correlations, except for Age and Disposable income, have a small correlation strength according to Pallant’s guidelines where small implies $r=0.10$ to 0.29 , medium $r=0.30$ to 0.49 and large $r=0.50$ to 1 (Pallant, 2016).

Appendix 12 - Detailed Questionnaire (in Swedish)



Isak Andersson har delat en länk

...

9 april kl. 10:48 · 🌐

Hjälp två studenter ta examen och få chansen att vinna 1 000 kronor!

Hej allihopa!

Vi är två studenter som skriver examensuppsats inom marknadsföring vid Handelshögskolan i Stockholm och behöver din hjälp. Vi är intresserade av att titta på hur investerare tar beslut.

För att undersöka detta har vi skapat en enkät. I enkäten finns ett par roliga test där ni får pröva era investeringskunskaper och andra färdigheter som är viktiga vid investeringar.

Dessutom har **du chans att vinna 1 000 kronor** om du deltar i vår undersökning. Den tar mellan 10-15 minuter. Enkäten når ni via denna länk:

https://hhs.qualtrics.com/jfe/form/SV_elYAM9btChcrzYG...

Vi tackar ödmjukt för svar och önskar er alla god avkastning!

Isak & Veronica

Introduktion

Information och finansiella produkter

Vi är två studenter som skriver kandidatexamensuppsats vid Handelshögskolan i Stockholm och behöver din hjälp. Uppsatsen kommer att undersöka presentation av finansiella produkter gällande ETF:er (Exchange Traded Funds).

Vissa frågor i enkäten kan påminna om varandra. De finns med av undersökningstekniska skäl. Vi rekommenderar dig att ta enkäten på en dator. Det kan även vara bra att ha papper och penna till hands.

Vi lottar ut 1 000 kronor till en av våra respondenter. Glöm inte att klicka på länken i slutet av enkäten för att bli berättigade en plats i utlottningen.

Enkäten beräknas ta ungefär 15 minuter att besvara. Vi vill tydliggöra att **alla svar är anonyma och behandlas konfidentiellt**.

Kontakt: Veronica Törnbom, 24223@student.hhs.se

Tack för att du hjälper oss genomföra den här studien!

GDPR

Vänligen läs följande information relaterat till dataskyddsförordningen GDPR.

Projekt: BSc thesis in Business & Economics

År och termin: 2021, vårterminen

Ansvariga studenter för studien: Isak Andersson, BSc-student (24049@student.hhs.se (<mailto:24049@student.hhs.se>));

Veronica Törnbom, BSc-student (24223@student.hhs.se (<mailto:24223@student.hhs.se>))

Handledare och avdelning vid SSE: Patric Andersson, Associate Professor; Institutionen för marknadsföring och strategi

Handledarens e-postadress: patric.andersson@hhs.se (<mailto:patric.andersson@hhs.se>)

Typ av personuppgifter om dig som ska behandlas: Initialer, kön, ålder, utbildningsnivå, inkomst

Information relating to GDPR:

The student's project. As an integral part of the educational program at the Stockholm School of Economics, enrolled students complete an individual thesis. This work is sometimes based upon surveys and interviews connected to the subject.

Participation is naturally entirely voluntary, and this text is intended to provide you with necessary information about that may concern your participation in the study or interview. You can at any time withdraw your consent and your data will thereafter be permanently erased.

Confidentiality. Anything you say or state in the survey or to the interviewers will be held strictly confidential and will only be made available to supervisors, tutors and the course management team.

No personal data will be published. The thesis written by the students will not contain any information that may identify you as participant to the survey or interview subject.

Your rights under GDPR. You are welcome to visit <https://www.hhs.se/en/about-us/data-protection/> in order read more and obtain information on your rights related to personal data.

Samtycke

- ☐ Jag har tagit del av informationen ovan och samtycker till att delta i denna studie
- ☐ Nej tack, jag samtycker inte till att delta i studien

Vänligen skriv dina initialer och dagens datum som signatur till föregående fråga om du valde alternativet: "Jag har tagit del av informationen ovan och samtycker till att delta i denna studie"

Respondenternas sparande

I kommande avsnitt ber vi dig svara på hur ditt privata sparande ser ut.

Hur ofta avsätter du pengar för att spara?

- ☐ Jag sparar månatligt
- ☐ Jag sparar i enskilda insättningar
- ☐ Jag sparar inte över huvud taget

Vilken typ av sparande har du?

- ☐ Sparkonto
 - ☐ Fonder
 - ☐ Aktier
 - ☐ Amortering av lån
 - ☐ Pensionsförsäkring
 - ☐ Fastigheter
 - ☐ Annat
-

I vilka fonder sparar du?

- ☐ Aktiefonder
- ☐ Kvantitativa fonder
- ☐ Indexfonder
- ☐ Exchange Traded Funds
- ☐ Räntefonder
- ☐ Blandfonder
- ☐ Fastighetsfonder
- ☐ Vet ej

Har du tidigare investerat i ETF:er?

- ☐ Ja
 - ☐ Nej
 - ☐ Vet ej
-

Har du tidigare investerat i kvantitativa fonder?

- ☐ Ja
 - ☐ Nej
 - ☐ Vet ej
-

Kunskap om fonder - test

I detta avsnitt presenteras ett kunskapstest. Vänligen ta dig tid men använd inga hjälpmedel så som sökmotorer för att besvara frågorna.

Vad är skillnaden på en ETF (Exchange Traded Fund) och en traditionell fond?

- ☐ En ETF prissätts i realtid likt en aktie
 - ☐ En traditionell fond investerar enbart i obligationer
 - ☐ Du kan bara köpa en ETF genom amerikanska banker
-

Vad är ett index?

- ☐ En indikator för en samling av tillgångar
 - ☐ Ett annat ord för aktier
 - ☐ En sorts option
-

Vad är en indexfond?

- ☐ En indexfond är en aktivt förvaltd fond
 - ☐ En indexfond efterliknar avkastningen på ett underliggande index
 - ☐ En indexfond innehåller enbart optioner
-

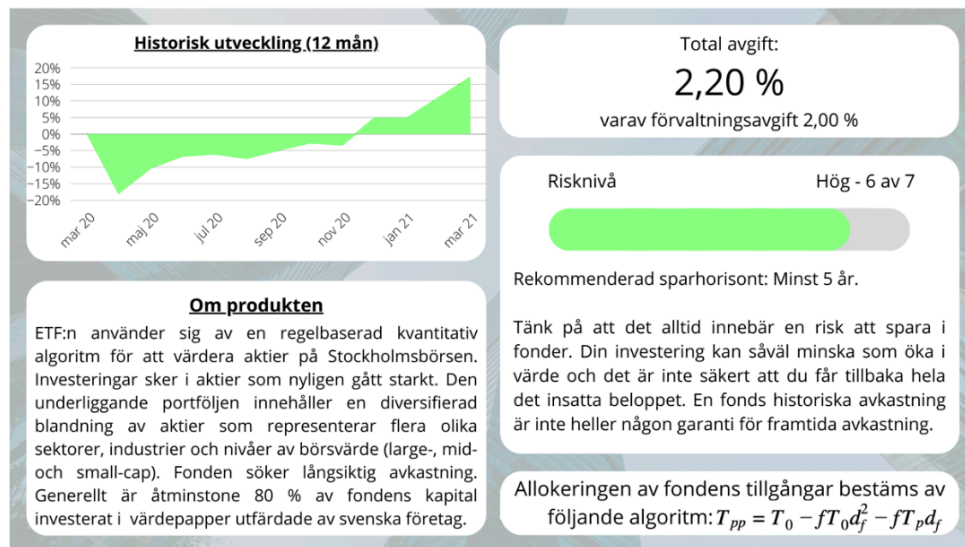
Vad är en kvantitativ fond?

- ☐ En kvantitativ fond är detsamma som en fond med högre risk och avgift
 - ☐ En kvantitativ fond är en fond med högre hävstång än traditionella fonder
 - ☐ En kvantitativ fond använder en förutbestämd matematisk modell för att utvärdera var fondens kapital bör placeras
-

Positiv (matte)

Nedan presenteras en investeringsmöjlighet i form av en ETF.

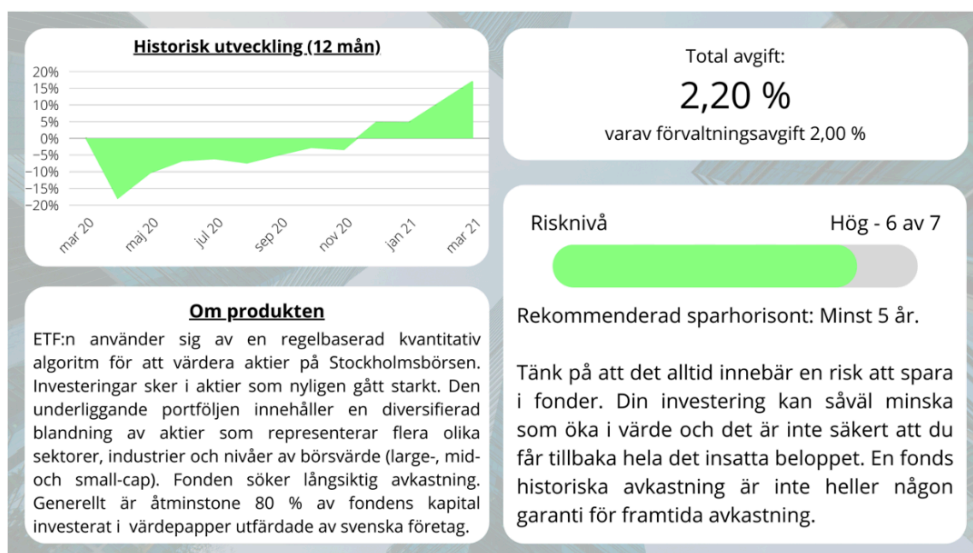
På nästa sida kommer frågor kring investeringsmöjligheten. Du kommer inte att kunna gå tillbaka för att granska informationen igen så ta dig tid och läs noggrant.



Positiv (ingen matte)

Nedan presenteras en investeringsmöjlighet i form av en ETF.

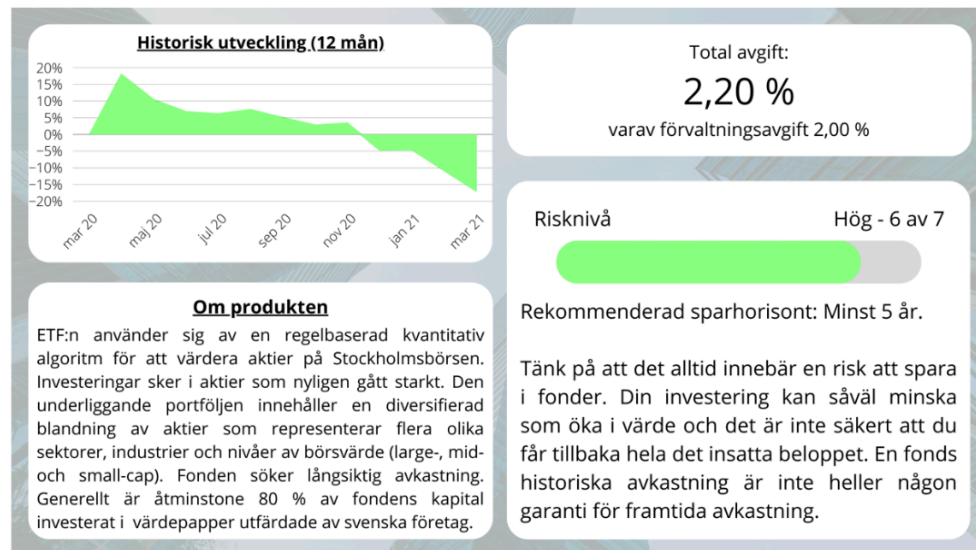
På nästa sida kommer frågor kring investeringsmöjligheten. Du kommer inte att kunna gå tillbaka för att granska informationen igen så ta dig tid och läs noggrant.



Negativ (ingen matte)

Nedan presenteras en investeringsmöjlighet i form av en ETF.

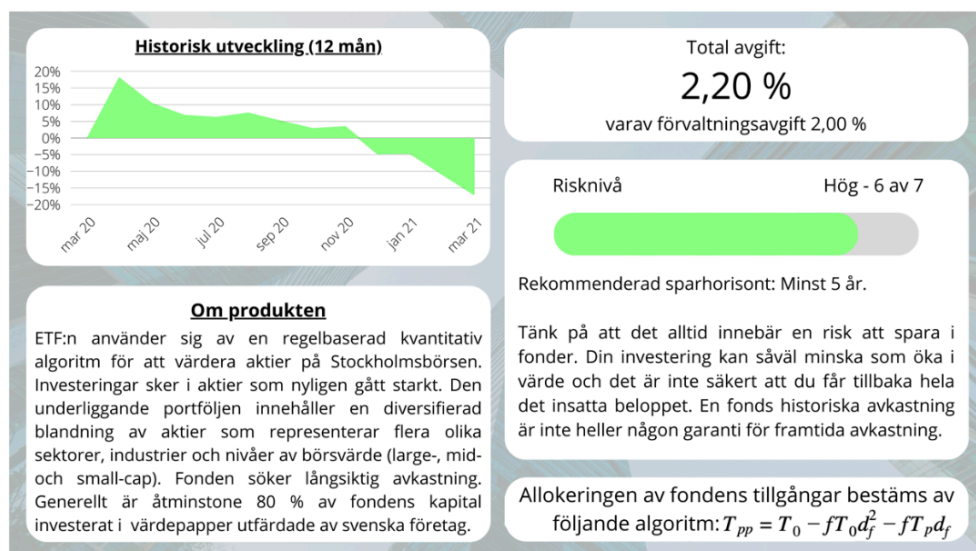
På nästa sida kommer frågor kring investeringsmöjligheten. Du kommer inte att kunna gå tillbaka för att granska informationen igen så ta dig tid och läs noggrant.



Negativ (matte)

Nedan presenteras en investeringsmöjlighet i form av en ETF.

På nästa sida kommer frågor kring investeringsmöjligheten. Du kommer inte att kunna gå tillbaka för att granska informationen igen så ta dig tid och läs noggrant.



Svar på experiment

I detta avsnitt presenteras frågor kring ETF:en som presenterades på föregående sida. Du kan inte gå tillbaka för att titta på informationen igen så besvara frågorna utifrån vad du minns.

Hur troligt är det att du skulle investera i den ETF som presenterades på föregående sida?

Mycket
otroligt

Ganska
otroligt

Något
otroligt

Varken troligt
eller otroligt

Något
troligt

Ganska
troligt

Mycket
troligt

Hur säker anser du att ETF:en som presenterades på föregående sida är att investera i?

Mycket
osäker

Ganska
osäker

Något
osäker

Varken säker
eller osäker

Något
säker

Ganska
säker

Mycket
säker

Hur stor anser du risken vara i ETF:en som presenterades på föregående sida?

Mycket liten

Ganska liten

Något liten

Varken hög
eller liten

Något hög

Ganska hög

Mycket hög

Hur troligt är det att du skulle rekommendera en vän att investera i ETF:en som presenterades på föregående sida?

Mycket
otroligt

Ganska
otroligt

Något
otroligt

Varken troligt
eller otroligt

Något
troligt

Ganska
troligt

Mycket
troligt

Tycker du det saknades någon information i ETF:ns presentation?

- ☐ Ja
- ☐ Nej
-

Vilken information saknade du?

Tänk på den ETF som du nu har bedömt. Hur stor eller liten betydelse lade du på nedanstående faktorer när du bedömde ETF:n?

	Inte alls viktigt						Mycket viktigt
	1	2	3	4	5	6	7
Historisk utveckling	☐	☐	☐	☐	☐	☐	☐
Produktbeskrivning	☐	☐	☐	☐	☐	☐	☐
Avgift	☐	☐	☐	☐	☐	☐	☐
Riskenivå	☐	☐	☐	☐	☐	☐	☐
Rekommenderad sparhorisont	☐	☐	☐	☐	☐	☐	☐
Algoritmen	☐	☐	☐	☐	☐	☐	☐

Inför test

Följande frågor kan upplevas avvika från forskningsområdet men de ger värdefull förklarande data till vår uppsats. Därför uppskattar vi om du svarar så gott du kan. Vi påminner om att ingen insamlad data går att härleda till dig och data kommer inte att sparas eller hanteras oaktsamt.

Objective Numeracy-test

En viktig del vid investeringar är bedömningen av möjliga utfall. I detta avsnittet kommer vi därför testa er förmåga att arbeta med sannolikheter. Vänligen ta dig tid att läsa igenom frågorna noggrant.

Av 1 000 människor i en liten stad är 500 medlemmar i en kör. Av dessa 500 medlemmar i kören är 100 män. Av de 500 invånarna som inte är med i en kör är 300 män. Vad är sannolikheten att en slumpmässigt dragen man är medlem i kören?

Ange sannolikheten i procent.

- ☐ 10 %
 - ☐ 25 %
 - ☐ 40 %
 - ☐ Inget av ovanstående
-

Tänk dig att vi kastar en falsk tärning (6 sidor). Sannolikheten att tärningen visar 6 är dubbelt så stor som sannolikheten för var och en av de andra siffrorna. Tänk dig nu att vi kastar tärningen 70 gånger. Av dessa 70 kast hur många gånger kommer tärningen till slut att visa siffran 6?

- ☐ 20 av 70 kast
 - ☐ 23 av 70 kast
 - ☐ 35 av 70 kast
 - ☐ Inget av ovanstående
-

Tänk dig att vi kastar en femsidig tärning 50 gånger. Av dessa 50 kast hur många gånger kommer denna femsidiga tärning till slut att visa en udda siffra (1, 3 eller 5)?

- ☐ 5 av 50 kast
 - ☐ 25 av 50 kast
 - ☐ 30 av 50 kast
 - ☐ Inget av ovanstående
-

I en skog är 20 % av svamparna röda, 50 % är bruna och 30 % är vita. En röd svamp är giftig med en sannolikhet av 20 %. En svamp som inte är röd är giftig med en sannolikhet av 5 %. Vad är sannolikheten att en giftig svamp i skogen är röd?

Ange sannolikheten i procent.

- ☐ 4 %
 - ☐ 20 %
 - ☐ 50 %
 - ☐ Inget av ovanstående
-

Financial Literacy-test

En viktig del vid investeringar är arbete med räntesatser och olika sorters värdepapper. I detta avsnitt kommer vi därför testa er förmåga att arbeta med finansiella begrepp. Vänligen ta dig tid att läsa igenom frågorna noggrant.

Anta att du har 1000 kr på ett bankkonto med en ränta på 2 % årligen. Efter fem år, hur mycket tror du att du skulle ha på kontot om du låter pengarna växa där?

- ☐ Mer än 1020 kr
 - ☐ Exakt 1020 kr
 - ☐ Mindre än 1020 kr
 - ☐ Vet ej
-

Anta att räntan på ditt bankkonto är 1 % och att inflationen ligger på 2 % årligen. Efter ett år med pengarna på kontot, skulle du kunna köpa...

- ☐ Mer än idag
 - ☐ Lika mycket som idag
 - ☐ Mindre än idag
 - ☐ Vet ej
-

Om räntan höjs, vad händer vanligtvis med värdet på obligationer?

- ☐ Det ökar
 - ☐ Det minskar
 - ☐ Det fortsätter vara på samma nivå
 - ☐ Det finns ingen påvisad relation mellan räntan och obligationsvärde
 - ☐ Vet ej
-

Tycker du följande påstående är sant eller falskt?

"Ett lån på 15 år kräver ofta högre månadsbetalningar än ett på 30 år, men den totala räntan på 15-års lånet livsperiod kommer vara lägre."

- ☐ Sant
 - ☐ Falskt
 - ☐ Vet ej
-

Riskprofil-test

I detta avsnitt kommer din inställning till investeringar mätas. Vänligen ange i vilken utsträckning instämmer med nedanstående påståenden rörande investeringar:

	Instämmer inte alls	Instämmer i mycket liten grad	Instämmer i ganska liten grad	Instämmer i ganska hög grad	Instämmer i mycket hög grad	Instämmer helt	Kan ej ta ställning
Jag föredrar en någorlunda säker investering med garanterad avkastning framför en mer riskfylld investering med möjlighet till högre avkastning.	☐	☐	☐	☐	☐	☐	☐
Jag vill vara säker på att mina investeringar är riskfria.	☐	☐	☐	☐	☐	☐	☐
Om jag tror en investering kommer bli lönsam är jag beredd att låna pengar för att finansiera denna.	☐	☐	☐	☐	☐	☐	☐
Jag blir mer och mer övertygad om att jag borde ta mer risker för att förbättra min ekonomi.	☐	☐	☐	☐	☐	☐	☐
Jag är beredd att ta risken att förlora pengar om det finns chans att tjäna pengar.	☐	☐	☐	☐	☐	☐	☐

Demografiska frågor

I detta avsnitt kommer demografiska frågor presenteras. Vänligen besvara dem ärligt. Vi påminner om att inga svar kan spåras till dig.

Kön

- ☐ Man
 - ☐ Kvinna
 - ☐ Icke-binär
 - ☐ Annat
 - ☐ Vill ej svara
-

Ange ditt födelseår (vänligen använd siffror)

Vilken är din högsta utbildning? Markera den "högsta" utbildning du genomfört med examens- eller avgångsbetyg.

- ☐ Grundskola, realskola, folkskola eller liknande.
 - ☐ Gymnasieskola, folkhögskola eller motsvarande.
 - ☐ Universitets- eller högskoleutbildning på kandidatnivå eller motsvarande
 - ☐ Universitets- eller högskoleutbildning på masternivå eller motsvarande
 - ☐ Yrkesutbildningar eller motsvarande
 - ☐ Forskarutbildning eller motsvarande.
-

Vad är din huvudsakliga sysselsättning?

- ☐ Arbetar
- ☐ Studerar
- ☐ Tjänstledig
- ☐ Permitterad
- ☐ Arbetslös
- ☐ Pensionerad
- ☐ Sjukskriven
- ☐ Annat

Disponibel månadsinkomst (efter skatt)

Utvärdering av enkät

Tack för dina svar! Vad tyckte du om webbenkäten och undersökningen?

	Instämmer inte alls	Instämmer i mycket liten grad	Instämmer i ganska liten grad	Tveksamt	Instämmer i ganska hög grad	Instämmer i mycket hög grad	Instämmer helt
Frågorna var klart formulerade.	☐	☐	☐	☐	☐	☐	☐
Svarsalternativen var klart formulerade.	☐	☐	☐	☐	☐	☐	☐
Undersökningen är meningsfull.	☐	☐	☐	☐	☐	☐	☐
Enkätfrågorna försökte påverka dina svar i någon viss riktning.	☐	☐	☐	☐	☐	☐	☐
Frågorna var för komplicerade.	☐	☐	☐	☐	☐	☐	☐

Vad handlade enkäten om?

- ☐ Amorteringsbetalningar
- ☐ ETF:er

Om du har några tankar kring enkäten som inte kommit fram i tidigare frågor får du gärna dela med dig av dem i rutan nedanför.

Stort tack för att du deltog i vår studie!

För att bli berättigad en plats i utlottningen av 1 000 kronor behöver du klicka på länken nedanför och fylla i din e-postadress.

https://hhs.qualtrics.com/jfe/form/SV_033pMWhkqQCSlaW