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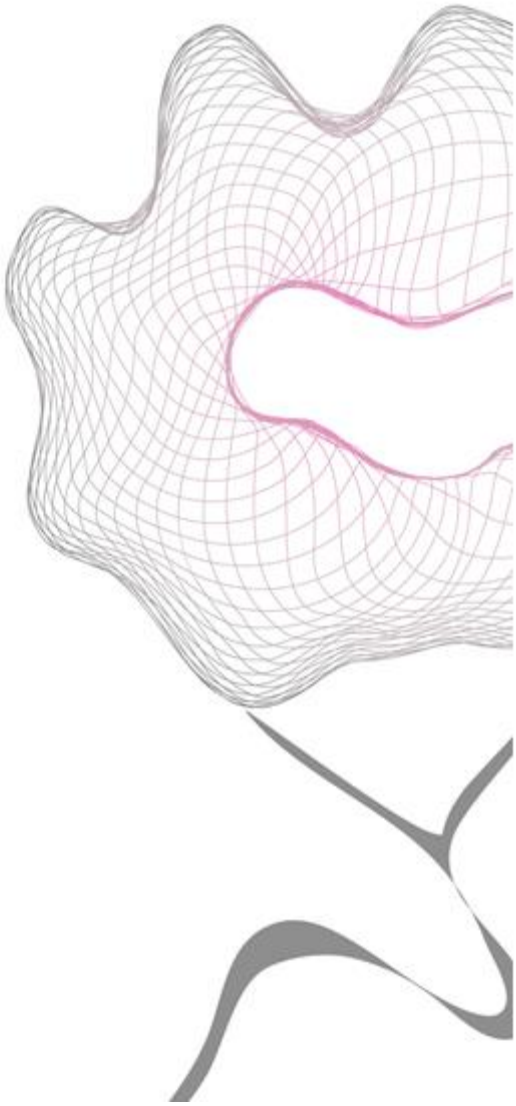

Bachelor Thesis - Psychology

The Effect of Financial Self-Efficacy on Myopic Loss Aversion in Financial Decision Making

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Abstract

For decades, researchers were confused by a phenomenon that is known as the equity premium puzzle. It describes a tendency of individuals to invest in low returning instead of the higher returning financial products. Predominant economic theories, like the utility theory, could not explain this occurrence. Research on the topic indicates that to solve this puzzle, psychological factors must be considered. Two promising concepts are Myopic Loss Aversion and Financial Self-Efficacy. Myopic Loss Aversion is a combination of a tendency to overemphasize possible losses compared to gains (Loss Aversion) with a short-sighted decision horizon (Myopia), whereas Financial Self-Efficacy describes the perceived believe system in the own financial capabilities and skills. To supplement the gap in existing research and better understand behaviour in the financial domain, an explorative study about the mentioned concepts was conducted in the frame of this paper.

To investigate this topic, an online questionnaire was filled out by 153 participants. Likert scale questionnaires were employed for Myopia and Financial Self-Efficacy while Loss Aversion was measured by questions concerning potential losses and gains. Myopia and Loss Aversion were investigated as separate variables. Multiple regression analyses and correlation analyses were executed to examine the connections between the constructs.

The results partly confirm findings of past literature and support the thesis that (Financial) Self-Efficacy does have a negative influence on Myopia. However, the connection of Loss Aversion with the other constructs could not be consistently demonstrated.

These findings suggest that Myopia plays an important role in the equity premium puzzle and could potentially help to explain this conundrum. Future research might investigate the role of Loss Aversion and the measurement method used to collect data concerning it. Finally, strengths and limitations of this research are discussed that must be minded when interpreting these results.

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Introduction

Since early human societies, money has been a persistent topic, even before the rise of current capitalistic systems. Individuals without money seek to get some and the ones having money seek opportunities to maintain it enduringly. For the latter one, investments represent a possibility to keep and increase their wealth. Besides private loans, two ways of investing capital are to buy shares of a company or to lend money to the government. This brings us to the advent of the capital market and with it the rise of various investment opportunities.

The first stock market was found many hundred years ago in the Netherlands. In 1602, it was announced to the public that all Dutch residents were now able to buy shares of the Dutch East India Company. This date resembles the first real stock market opening in history and should mark the beginning of new possibilities to invest and earn money (Silber, 2014). Even earlier than the stock market, grants were given to governmental or municipality institutions. The first mentioned grant was given in 1280 by the town of Hulst even though there are doubts that it was the first one (Usher, 1934). These two systems resemble different opportunities for money possessors to store and invest their capital, giving them the possibility to increase their wealth. While both are still available today, grants are nowadays called treasury bills, notes and bonds (Kenny, 2019) and will subsequently be referred to as loans.

Thanks to the large historical background, long-term records were gathered and allow the identification of the average profits for both financial products. Since around the beginning of the 20th century, these records are precise enough to allow a longitudinal comparison on return rates of sovereign loans and stocks. One observable pattern is that stocks have a rather high annual real return rate of 7% (=average profit for an investor), but also a standard deviation of 20%. This makes it a risky choice, compared to treasury loans which offer less than 1% annual real return but (till now) a guaranty for pay-out (Benartzi & Thaler, 1995; Mehra & Prescott, 1985). From a rational point of view, this leads to the conclusion that it is far more prosperous to invest in stocks, than in loans in the long run. The difference lies in 6% of equity premium. According to the utility theory, the consumer (or investor) who is assumed to be a rational, risk-neutral subject should rank these alternatives and choose the option with a higher utility margin (Stigler, 1950).

But why are investors still investing in loans, even though they empirically return a far smaller surplus? This coincidence is known as the equity premium puzzle as described by Mehra and Prescott (1985) and leaves some doubts about the rationality assumption of the utility theory

in this context. For this reason, past research has investigated, a number of psychological mechanisms, namely loss aversion (Tversky & Kahneman, 1991) and self-efficacy (Bandura, 1994), that might have an effect on investment decision.
Therefore, this paper will focus on the equity premium puzzle and its potential psychological explanations. To do so, the following question will be answered.

Do psychological factors, like loss aversion and self-efficacy, have an influence on the occurrence of the equity premium puzzle?

Literature review

Expected Utility Theory

After the equity premium puzzle was discovered, the academic world recognized the magnitude of this phenomenon and focused research efforts towards solving this puzzle. One of the most prominent theories used was the expected utility theory. The origin of the utility theory is not quite certain. Academic literature often sees its origin when the Weber-Fechner law was combined with propositions the Swiss mathematician Nicholas Bernoulli sent in 1713 to the French mathematician Pierre Raymond de Montmort concerning problems in probability theory (Stigler, 1950). These problems were later known as the St. Petersburg paradox. In this context, also Nicholas brother Daniel Bernoulli achieved fame when he published his brother's paradox in 1738 together with a number of solutions suggesting a logarithmic function of wealth as an explanation of utility (Stigler, 1950). But traces of the theory can be traced back till ancient Greece and Aristoteles which influenced economists like Adam Smith or the philosopher John Locke (Kauder, 1953).

Prospect Theory

Kahneman and Tversky (1979) criticised the expected utility theory for its assumption of rational decision making. They developed their own model that includes pervasive effects on human decision making. The new model is called prospect theory and includes the certainty effect, which describes the underestimation of merely probable outcomes compared to certainties. This is

manifested in the fact that decision weights (which determine our decisions) are generally lower than the according probabilities (Kahneman & Tversky, 1979). This phenomenon is best depicted by examples Kahneman and Tversky (1979) used. Faced with the choice of (A) winning 4,000€ with a probability of 80% or (B) winning 3,000€ with certainty, most people go for B which is not the most rational decision as A has a higher expected return (0.80x4,000=3,200 vs 1.00x3,000=3,000).

There are only a few exceptions from this rule. One exception is that very low probabilities are often overestimated, like in the famous example of lottery gambling. The chances to win a national lottery are diminishingly small with a probability of around 1:140,000,000 for winning 4,000,000€ (Lotto.de, 2019). People overestimate their probability of winning because the occasion of a win is highly tempting leading them to make irrational decisions.

Another construct included by Kahneman and Tversky (1979) is the isolation effect. It makes people neglect components that are shared by all choices considered, which can lead to inconsistent preferences depending on the way each choice is presented (Kahneman & Tversky, 1979). Having the choice of (A) winning 4,000€ with a probability of 20% or (B) winning 3,000€ with a probability of 25% most people go for A which is the most rational decision (0.20x4,000=800 vs 0.25x3,000=750). It looks different if we offer a two-stage gamble with the probability of 75% to exit the game and 25% to move to the second stage and in the second stage give the choice between (A) a probability of 80% to win 4,000€ or (B) a certain win of 3,000€. It must be decided which choice is taken before the game starts. In this case most people choose B even though this is not the most rational decision (0.25x0.80x4,000=1,000 vs 0.25x1.00x3,000=750). The reason lies in the fact that people neglect the first stage since it is common for both choices and only regard the second stage as relevant (Kahneman & Tversky, 1979). As part of the prospect theory, these two effects, help explain behaviour that seemed irrational and thus could not be explained by the expected utility theory.

Accordingly, Benartzi and Thaler (1995) found that on the basis of the prospect theory the equity premium puzzle can be explained under the assumption that investors evaluate their portfolios and the investment decisions on an annual base. In their work, Benartzi and Thaler (1995) analysed the findings of the equity premium puzzle and described two psychological concepts, Loss Aversion and Mental Accounting, that influence the decision making of the investors.

Loss Aversion and Mental Accounting

Loss Aversion[1] describes a tendency of being more sensitive to losses than to gains. Intuitively, losing 100€ feels more negative than winning 100€ feels positive. The difference between those two emotions can be decisive, and as Tversky and Kahneman (1991) concluded, the impact of a loss is about twice as high as the impact of a gain. Accordingly, a loss of 100€ has a similar emotional impact as winning 200€. This causes people to spend more energy and time on preventing losses than on increasing their profits.

The second concept is mental accounting, describing the effect of infrequent evaluation on the strength of loss aversion for an individual (Benartzi & Thaler, 1995). People that display Loss Aversion are more open to accepting risks if they are not evaluating the decision frequently. A frequent mental evaluation is often driven by short-term interests that must be evaluated and adjusted on a regular base, whereas a long-term motivated investment does not rely on frequent evaluation as a longer investment horizon relies on fewer adjustments. Since high-risk products like stocks show a high return with high volatility, whereas a bond shows a small return with no volatility, an investor is more inclined to choose the stock if he is oriented on a long-term base. If the investment horizon covers a shorter time period, the uncertainty of stock returns scare the investor with potential losses and let him choose the save bond instead (Benartzi & Thaler, 1995).

Myopic Loss Aversion

Combining the concepts of Loss Aversion and mental accounting and the connection between them, Benartzi and Thaler (1995) refer to the synthesized concept as Myopic Loss Aversion (MLA). Myopic (or Myopia) describes, in this context, short-sightedness and a lack of future awareness that indicates a shorter decision horizon. Therefore, the concept of MLA describes the rejection of high-risk options, which are affiliated with losses, in the setting of a short-term period, with disregard of mid- or long-term results. Further research, by Hopfensitz and Wranik (2008) found that MLA is not a fixed general characteristic but varies between individuals. Thereby the scale of this bias can reach from no effect to a strong effect on an individual's behaviour. These personal differences were shown to be stable over time (Hopfensitz & Wranik, 2008), which makes MLA a permanent character trait that can be measured and compared.

[1] All constructs used in this research are capitalized to make them distinguishable from other theoretical background mentioned from past literature

Self-Efficacy

In order to investigate the phenomena of MLA, past research focused on identifying interacting factors. The paper, by Hopfensitz and Wranik (2008) examined environmental and psychological factors in an experimental setup. Participants played an investment game with varying feedback frequencies to identify their degree of MLA. Before and during the game, they were requested to fill out questionnaires minding their emotional experiences as well as their degree of self-efficacy (Hopfensitz & Wranik, 2008).

(Perceived) self-efficacy, as defined by Bandura (1994), describes a person's beliefs about their own capability to perform a certain task in certain situations. It can arise through a variety of sources, for example through earlier successful mastery experience of oneself or a social role model (Bandura, 1994). The resulting level of self-efficacy influences a large variety of human behaviours and cognitive processes. The results of Hopfensitz and Wranik (2008) indicated that while emotional experience could not predict investment decision, self-efficacy showed a significant pattern. Participants with low self-efficacy showed a strong exhibition of MLA, whereas a higher degree of self-efficacy diminished the occurrence of the bias (Hopfensitz & Wranik, 2008).

This indicates that self-efficacy could have a mitigating influence on the degree of MLA influencing an individual's future behaviour. Hopfensitz and Wranik (2008) explained their finding with confidence in decision-making, general optimism and absence of anxiety. A lack of self-efficacy is likewise characterised with uncertainty, pessimism and a stronger reaction to feedback (Hopfensitz & Wranik, 2008). Especially the last point indicates a direct relation between the level of self-efficacy a person has and the effect of high feedback frequencies (possibly initiated through a myopic thought horizon). Therefore, low self-efficacy individuals profit most from a low feedback or evaluation situation and reduced flexibility (Hopfensitz & Wranik, 2008).

Since self-efficacy can be applied to a large bandwidth of domains, it can be subcategorized to specific topics. Focusing on self-efficacy in the domain of financial decisions and behaviour, the resulting Financial Self-Efficacy (FSE) describes the perceived amount of control a person has over handling money related issues (Dietz, Carrozza, & Ritchey, 2003).

Hopfensitz and Wranik (2008) included a general degree of self-efficacy in their experiment, with the inclusion of factors like general optimism and lack of anxiety. Since a high degree of general self-efficacy correlated with a low exhibition of MLA in the financial domain,

it can be assumed that a similar or stronger pattern might occur by the inclusion of domain-specific self-efficacy. This leads to the question, that guides the current study:

To what extent does Financial Self-Efficacy influence the level of Myopic Loss Aversion in financial decision-making?

Method

Design

To answer this research question, the current research employed an online survey for data collection. Therein, Qualtrics was employed, which guided each participant through the questionnaire in the time period between the 8th and 29th of April 2019. All participants were either students of the University of Twente which were recruited via the Sona platform and through direct participation requests or individuals unrelated to the University of Twente recruited directly through the personal social networks of the researcher (convenience sampling). Students of the University of Twente received credits for their participation which is necessary for their graduation. In order to take part in the study, a participant needed access to a device connected to the internet, which logged into the online data collection platform. The consent form and contact details of the researcher for further questions were provided electronically as part of the survey. A set of questions for each construct was included.

Participants

A total of 185 individuals participated in this research. The raw data from all participants had to be prepared before the analysis could take place. For this purpose, all results were screened for exclusion criteria that prevent any meaningful result calculation. From the 185 participations, 22 had to be excluded because they did not complete the survey. Furthermore, 9 were excluded as outliers since their Loss Aversion scores lied far above the overall score of the sample. One participant was excluded, who stated the same answer throughout the questionnaire with the smallest participation duration from all participations, which indicates a non-serious intention

taking part in the study. Additionally, 14 participants gave answers that prevent any meaningful indication of their Loss Aversion score.

This yielded in a final data set of 153 participants (121 women, 32 men, M(age) = 20.6, age range: 18 - 31 years), or 139 participants for calculations involved with Loss Aversion, which are referred to as participants in the following.

Students are overrepresented in the sample due to the sampling through the University Sona system (n=127, raw data) and the social network of the researcher. The majority of participants (88,3%) rated high school as their highest education and (98%) indicated that their most important daily activity is focused on a course of study or going to school. This shows the predominance of a student population. Most participants (94,8%) indicated to have an income of less than 1,500€ which shows that the sample is biased towards a low-income population.

Measures and Questionnaires

To explore the research question, certain psychological characteristics had to be identified in each participant, namely Myopic Loss Aversion (MLA) and Financial Self-Efficacy (FSE).

Myopic Loss Aversion. The construct is split into Myopia and Loss Aversion, being measured independently. This research design choice was influenced by the work of Lee and Veld-Merkoulova (2016) which used the same design for measuring MLA. Academic literature offers only a very limited amount of non-experimental measurements in investigating MLA in the financial domain since most studies use an experimental design with extrinsic monetary motivation for participants. Examples for this are Gneezy, Kapteyn, and Potters (2003) and Haigh and List (2005), who both employed a gambling game that used financial rewards as extrinsic motivation to perform. The difference in the gambling behaviour indicated MLA tendencies. As the current thesis does not have the financial resources to execute such an experimental data collection, a design similar to Lee and Veld-Merkoulova (2016) is used. Lee and Veld-Merkoulova (2016) derived the used questions from the annual Dutch National Bank Household Survey (CentERdata, 2019) which employed those questionnaires in large surveys over the past 25 years. From this database, both questionnaires covering Myopia and Loss Aversion were derived.

Loss Aversion. Loss Aversion was tested with a questionnaire used by Lee and Veld-Merkoulova (2016) as well as the annual Dutch National Bank Household Survey in the years 1997-2002 (CentERdata, 2019). It was developed on the basis of Loewenstein (1988). The only

change to the questions was replacing ‘dutch guilders’ with ‘Euros’, due to the different currency used by the participants of annual Dutch National Bank Household Survey in the years 1997-2002 and the current study.

The questionnaire relies on two question settings, one in which the participant wins a lottery and one in which the participant must pay a tax assessment. These questions include two further dimensions. The first one is “Delay vs Speedup” which indicates that the participant either has to wait for a year or fastens up by a year the reception of the gain or the payment of the loss and indicate the amount of discount or bonus the participant expects as a minimum. The second one is a different amount used as gain or loss, which includes 1,000€ and 100,000€. Two example questions for the lottery win and the tax assessment are:

‘Imagine you win a prize of € 1,000 in the National Lottery. The prize is to be paid out today. Imagine, however, that the lottery asks if you are prepared to wait a year before you get the prize. There is no risk involved in this wait. How much extra money would you ask to receive at least to compensate for the waiting term of a year? If you agree on the waiting term without the need to receive extra money for that, please type 0 (zero). AT LEAST a compensation of (in €):’.

‘Imagine you receive a tax assessment of € 100,000. The assessment has to be settled within a year. It is, however, possible to settle the assessment now, and in that case you will get a reduction. How much reduction would you like to get at least for settling the assessment now instead of after a year? If you are not interested in getting a reduction for paying early or if you think there is no need to get a reduction for paying early, please type 0 (zero). AT LEAST a reduction of (in €):’

One additional dimension used by Lee and Veld-Merkoulova (2016) and CentERdata (2019) is the time period of the speedup and delay which included one-year and 3 months. As mentioned earlier, the equity premium puzzle can be explained by the prospect theory under the assumption that investors have an evaluate time frame of one year (Benartzi & Thaler, 1995), and therefore the time frame of 3 months was excluded. This leads to a final set of eight questions (see Appendix B). To identify and exclude outliers, a meaningful cut-off score was set. The chosen cut-off point was taken from Lee and Veld-Merkoulova (2016), which used 40 as their maximum score to be included in the calculations.

The individual answers for the Loss Aversion questionnaire regarding the indicated minimum or maximum premium or discount were transferred into percentages. By doing so, the

answers were made comparable. The average premium or discount was 14.71% for the overall population. Investors indicate an average premium or discount of 22.65%, while Non-Investors state an average premium or discount of 13.03% (for the grouping explanation see next paragraph). With these percentages, a Loss Aversion score was calculated by taking the factor between the answers regarding a gain to a similar loss. Averaging the different scores out, a final Loss Aversion score above 0 was achieved, with a score higher than 1 indicating a Loss Aversion bias.

Investment Experience. Since the study of Lee and Veld-Merkoulova (2016) as well as the annual Dutch National Bank Household Survey (CentERdata, 2019) included only investors in their target population and excluded all non-investor participants, the used questions were tailored towards the investor sub-population. For this reason, two additional control questions regarding the previous Investment Experience in the stock market as well as in cryptocurrencies were included. These questions are '*Do you have a stock portfolio that you personally manage?'* and *'Do you have any experience with cryptocurrencies that you personally manage?'* (see Appendix D).

Myopia. Myopia was measured by a questionnaire including twelve items (α=0.74) used in the annual Dutch National Bank Household Survey of 2018. Each participant indicates on a five-point Likert scale their degree of (dis-)agreement to each statement. This indication is translated into scores which are partly reversed since some questions were formulated negatively. The corresponding questions (1, 2, 5, 6, 7, 8) were recoded by reversing the answers (for the full questionnaire see Appendix C). An example is question 9 *'In general, I ignore warnings about future problems because I think these problems will be solved before they get critical.'* which had to be revised compared to question 1 '*I think about how things can change in the future, and try to influence those things in my everyday life.'* which did not need revision. The average of all yielded answers lies on a scale between 1 and 7 and indicates a final score which is used as an indication for Myopia.

Financial Self-Efficacy. For FSE, a questionnaire used by Magendans, Gutteling, and Zebel (2017) was chosen. It covers eight items(α=0.77), that identify how strongly a participant agrees with statements concerning their self-efficacy within the financial domain. A five-point Likert scale is used to indicate the degree of (dis-)agreement. Some questions were formulated negatively. The related questions (1, 2, 3, 7, 8) were recoded and the average of all answers resulted in a final FSE score on a scale between 1 and 5 which indicates the amount of FSE the participant has (for

the full questionnaire see Appendix D). For example, question 1 '*I only have little influence on the financial things that happen to me.'* needed to be recoded while question 4 '*I am convinced that how I deal with money influences my future.'* had no need for recoding.

Demographics. Lastly, a number of demographic and socio-economic questions were asked as these variables have to be controlled for as intervening factors in any statistical relationship. The questions include aspects like gender, age, primary occupation, highest completed education level and level of income (for the full questionnaire see Appendix F). The decision was taken to put these questions at the end of the questionnaire as previous studies have used the same approach. Examples of the question are '*What is your gender?', 'What is your highest completed education?'* and *'What is your monthly net income?'.*

Results

Descriptive statistics

Descriptives. The data covering the variables Loss Aversion (M = 1.75, SD = 3.37), Myopia (M = 3.01, SD = 0.65) and FSE (M = 3.37, SD = 0.70) can be seen in Table 1. Part of the investigation was the Investment Experience of the participants, here 28 (18,3%) indicated to have a stock portfolio that they personally manage, whereas 14 (9,15%) did not want to answer this question. As this represents an important part of the population, the data of Investors and Non-Investors is separately included in Table 1. The share of the sample that has experience with cryptocurrencies covers 4 participants (2,6%) from which only 1 does not concurrently manage a stock portfolio. The criterion was not included in further investigations due to the small group size.

As visible in table 1, an independent t-test revealed that there was a difference between the Investor and Non-Investor group in their Loss Aversion scores [t=1.55, d.f.=123; p=0.012]. This indicates that Investors are more loss averse than their Non-Investor counterparts. No statistically significant difference could not be reported for the scores in Myopia [t-0.96, d.f.=137; p>0.05] and FSE [t=153, d.f.=137; p>0.05] between the two groups. Furthermore, the relatively high scores in skewness and kurtosis indicate a non-parametric distribution for the scale of Loss Aversion.

Table 1

Distribution and Descriptives of the Myopia, Financial Self-Efficacy and Loss Aversion Scores in Total and for Investors and Non-Investors Split Groups.

	Valid Cases	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis	t-test & Cohen‘s d
Myopia	153	3.01	0.65	1.42	5.00	0.24	0.19	
➔ Investors	28	2.89	0.51	1.83	4.08	0.40	0.17	t = -0.96
➔ Non-Investors	111	3.02	0.70	1.42	5.00	0.21	0.03	p = .084 d = .221
Financial Self-Efficacy	153	3.37	0.70	1.25	5.00	-0.17	-0.35	
➔ Investors	28	3.55	0.61	2.25	4.63	-0.06	-0.68	t = 1.53
➔ Non-Investors	111	3.32	0.72	1.25	5.00	-0.11	-0.23	p = .361 d = .338
Loss Aversion	139	1.75	3.37	0.00	26.00	4.57	26.17	
➔ Investors	27	2.63	5.29	0.00	26	3.68	15.40	t = 1.55
➔ Non-Investors	98	1.47	2.70	0.00	20.69	4.60	27.46	p = .012 d = .275

Note: From the total population 14 participants did not want to indicate if they were investing or not and were excluded from the (Non-)Investor split.
The independent t-test investigated the difference between the two groups (Investor vs Non-Investor) for the mentioned variable with Cohen's indicating the effect size.

Analysis of the Research Question

In order to analyse the gathered data towards the given research question (*To what extent does Financial Self-Efficacy influence the level of Myopic Loss Aversion in financial decision-making?*), multiple regression analyses were employed with the independent variable FSE and the dependent variables Myopia and Loss Aversion. The control variable Investment Experience was included as an independent variable to check for group differences between Investors and Non-Investors.

Furthermore, correlation analyses were employed. For the parametric results of Myopia and FSE, a Pearson’s correlation test was conducted, while the nonparametric results of Loss Aversion were analysed with a Spearman’s rho correlation test. Since a significant difference between the Investment Experience groups (Investors and Non-Investors) was found for Loss Aversion (see

table 1), the correlation analyses concerning Loss Aversion were additionally executed for both groups individually.

Outcomes

Multiple Regression. Multiple regression analyses were employed to investigate the relation between FSE and Investment Experience (as independent variables) on Myopia and Loss Aversion (as dependent variables) as it can be seen in table 2. For the analysis of FSE and Investment Experience on Myopia, a significant model was observed [$F(2,150)=11.38;p< .001$] with an adjusted R-squared of .12. This indicates that FSE and Investment Experience are weak (12%) predictors of Myopia. The beta values for FSE -.35 ($p< .001$) and Investment Experience .07 ($p=.350$) show that FSE contributes the greatest prediction of the variance in the criterion. This indicates that FSE can explain 12% of the variance of Myopia with an effect of .35.

For the analysis of FSE and Investment Experience on Loss Aversion, an insignificant model was observed [$F(2,136)=0.86;p=.428$] with an adjusted R-squared of < .01. The beta values for FSE -.07 ($p=.393$) and Investment Experience -.09 ($p=.284$) show that neither variable does significantly contribute to the prediction of the variance in the criterion. This indicates that neither FSE nor Investment Experience can significantly explain Loss Aversion.

Table 2

Multiple and Simple Regression Analyses of Financial Self-Efficacy and Investment Experience on Myopia and Loss Aversion with All Results.4

Independent Variable(s)	Dependent Variable	F	t	df	Sig. (p=)	Beta Coefficient	Adjusted R Square
Financial Self-Efficacy and Investment Experience	Myopia	11.38	-	2,150	< .001	-	.12
Financial Self-Efficacy	Myopia	-	-4.558	152	< .001	-.349	-
Investment Experience	Myopia	-	.938	152	.350	.072	-
Financial Self-Efficacy and Investment Experience	Loss Aversion	.86	-	2,136	.428	-	< .01
Financial Self-Efficacy	Loss Aversion	-	-.857	138	.393	-.073	-
Investment Experience	Loss Aversion	-	-1.075	138	.284	-.092	-

Correlation Overall. A Spearman's rho test showed a statistically insignificant correlation between FSE and Loss Aversion ($r = -0.09$, $N = 139$; $p = .297$).

A Spearman's rho test showed a statistically insignificant correlation between Myopia and Loss Aversion ($r = -0.08$, $N = 139$; $p = .334$)

A Pearson's r test showed a statistically significant weak negative correlation between FSE and Myopia ($r = -0.36$, $N = 153$; $p < .001$). This supports the finding of the according multiple regression above. The correlation is illustrated in Figure 1.

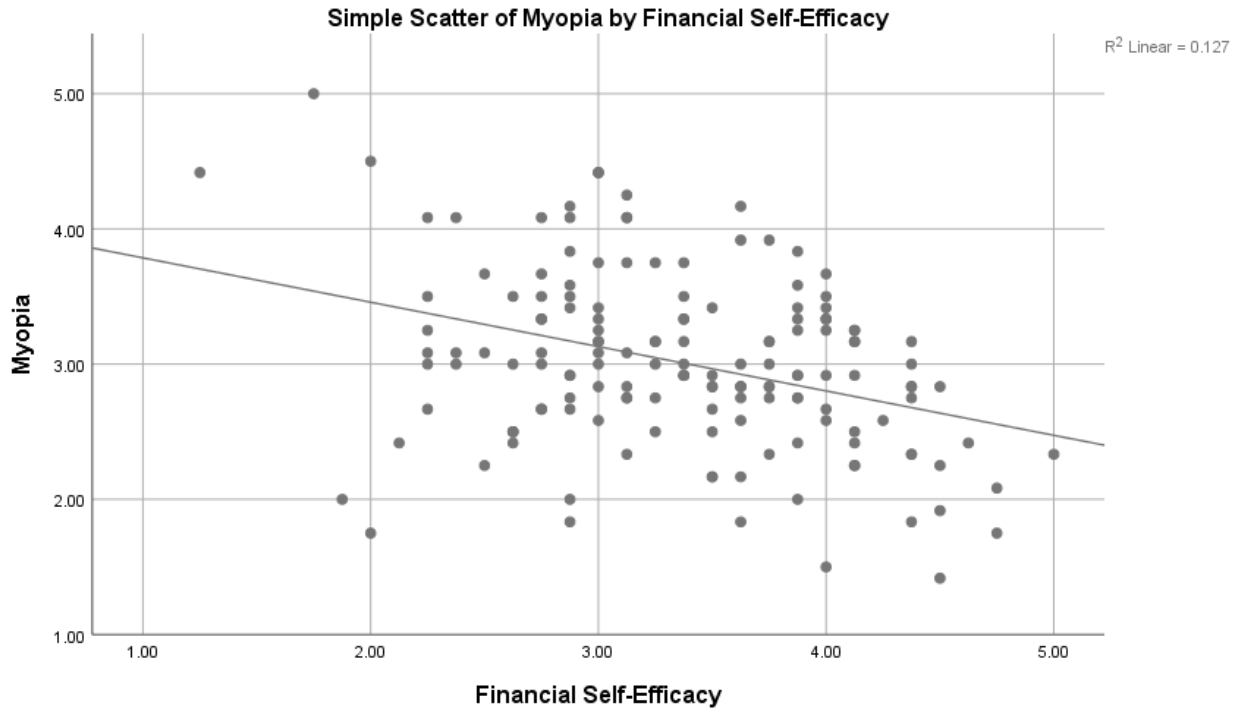

Figure 1. Scatter plot showing the distribution of Myopia and Financial Self-Efficacy scores.

Correlation (Non-)Investor. A Spearman's rho test showed a statistically insignificant correlation between FSE and Loss Aversion for the Investor group ($r = 0.01$, $N = 27$; $p = .965$) and the Non-Investor group ($r = -0.10$, $N = 98$; $p = .323$). A Spearman's rho test showed a statistically significant negative correlation between Loss Aversion and Myopia for the Investor group ($r = -0.51$, $N = 27$; $p = .007$). The correlation is illustrated in Figure 2. The same correlation was insignificant for the non-investor group ($r = -0.01$, $N = 98$; $p = .930$). This indicates that the relation between Loss Aversion and Myopia might be only true for Investors.

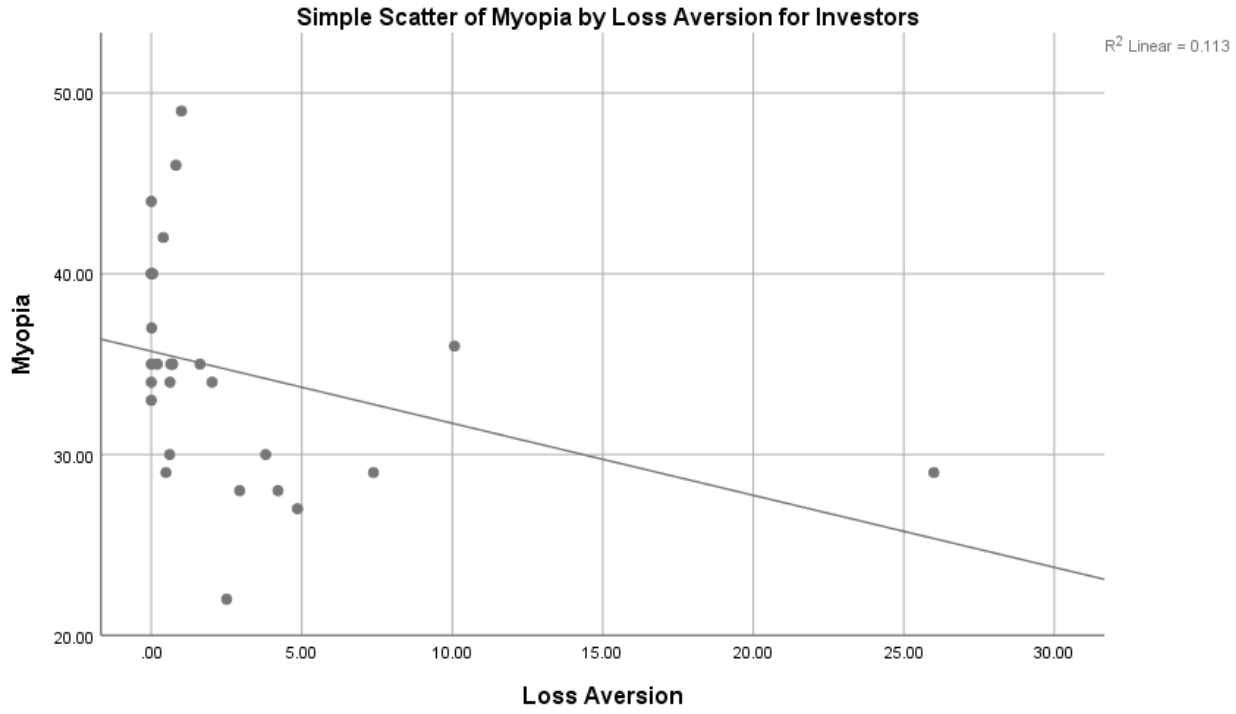

Figure 2. Scatter plot showing the distribution of Myopia and Loss Aversion scores for investing participants.

Discussion

Conclusion

Financial Self-Efficacy on Myopic Loss Aversion. The current research investigated the effect of FSE, which describes the perceived amount of control a person has in handling money related issues (Dietz et al., 2003), on MLA, a bias to overemphasize losses compared to gains influenced by a short decision horizon (Benartzi & Thaler, 1995), in financial decisions. Since MLA was split into Myopia and Loss Aversion, separate correlation analyses were performed. A regression and correlation analysis between FSE and Myopia indicated that this relation is weak and negative. This means that people with high FSE tend to be less myopic than people with low FSE. In other words, people that have a strong belief system in their financial ability and perceive a high amount of control in this matter tend to be less short-sighted and have a longer decision horizon then people with low believe in their own abilities. Between FSE and Loss Aversion no significant relation

could be identified. This leaves doubts on the relation of FSE on MLA as one construct since only Myopia showed to have a significant relationship to FSE.

Myopic Loss Aversion. The construct MLA was separated as a measure to investigate both variables, Myopia and Loss Aversion independently. Since past research investigated the effects of MLA it could have been assumed that there is a significant relationship between the single constructs (Benartzi & Thaler, 1995; Hopfensitz & Wranik, 2008). Results derived from the dataset indicate that no such relation could be found for the overall sample. A separation of the sample in Investors and Non-Investors showed that only for the Investor group a significant correlation between those constructs could be found. This indicates that the combination MLA might only be true for an investing subpopulation.

Explanation

Research Question. These results help to answer the research questions that initiated this research:

To what extent does Financial Self-Efficacy influence the level of Myopic Loss Aversion in financial decision-making?

The findings indicate that participants showing high FSE were less myopic than participants with low FSE. This partly confirms the findings of Hopfensitz and Wranik (2008) which came to a similar conclusion but with self-efficacy without the financial domain focus as their predictor and the addition of Loss Aversion. FSE can, therefore, be regarded as a moderate predictor with a weak and negative effect on Myopia. This supports the assumption that FSE shows a similar connection to Myopia as the superordinate concept of self-efficacy.

Do psychological factors, like loss aversion and self-efficacy, have an influence on the occurrence of the equity premium puzzle?

The current findings indicate that FSE predicts negative Myopia. Past research by Benartzi and Thaler (1995) reported that MLA offers one explanation for the occurrence of the equity premium puzzle. Since Myopia is an important sub-segment of MLA, it can be concluded that the psychological factor FSE has a negative effect on the behaviour which underlies the equity

premium puzzle. This is an important insight since it helps to understand the origin of the equity premium puzzle, which kept research busy for decades (Benartzi & Thaler, 1995).

Loss Aversion and Financial Self-Efficacy. The results indicate that there is no relation of FSE with the construct Loss Aversion, which means that participants with high FSE were neither more nor less loss-averse than their low FSE peers. The reasoning for this can be diverse.

One reason might lie in the employed questionnaire used for data collection. The questions derived from a large questionnaire used by the annual Dutch National Bank Household Survey in the years 1997-2002 (CentERdata, 2019). Since the executing institution represents a rather valid source, internal consistency was assumed. Nonetheless, there might be several reasons why the questionnaire was excluded from the survey in later years which could include a possible insufficiency of the measurement. This might be supported by the finding that the construct Loss Aversion did not show a parametric distribution as indicated by high Kurtosis and Skewness scores. It makes the regression analysis involving this variable and the following results questionable since a regression analysis presupposes a parametric distribution.

Another reason could lie in the population difference between this research and the by the annual Dutch National Bank Household Survey used sample. While the annual Dutch National Bank Household Survey used data from households offering a heterogeneous sample (CentERdata, 2019), the sample of the current research consisted largely of students (98%).

Myopia and Financial Self-Efficacy. Myopia was shown to have a negative effect on FSE. Accordingly, individuals with high confidence in their financial capabilities and skills showed to be more inclined towards long-sighted aspects in their financial decision making. For this reason, the relation between Myopia and FSE will now be evaluated in detail and some possible explanations will be formulated.

One explanation offers the interpretation that individuals which are characteristically long-sighted in their decision horizon are more inclined to interact with the financial domain. To a certain extent, investing represents the sacrifice of potential current pleasure (in the form of spending money now) for a more long-term oriented pleasure (having more money in the future to spend). In this sense, individuals with low Myopia would be more interested in becoming familiar with the financial domain compared to their counterparts with high Myopia as it offers them a mean to reach a more yielding future orientation. This would leave Myopia as a cause affecting FSE but opposes conclusions of earlier research by Hopfensitz and Wranik (2008).

A different explanation sees self-efficacy as causing factor. As self-efficacy (which is a subjectively perceived construct) can be positively influenced through earlier successful mastery experience (Bandura, 1994), it can be argued that it has a certain correlation with actual knowledge or capabilities. Paunonen and Hong (2010) showed that self-efficacy in a student population correlated with their actual verbal, numerical and spatial capabilities.

Therefore, the second possible explanation for the current finding is that a long-sighted decision horizon (lack of Myopia) is a result of domain-specific knowledge or capabilities. This means that a large amount of financial knowledge and capabilities enables individuals to be more future-oriented in their financial decisions. On a similar note, Hopfensitz and Wranik (2008) claim that the provision of detailed information about financial markets to educate the investors helps to increase their confidence (and self-efficacy) which in turn negatively affects Myopia. Since long-sighted decision-making is an effect of gained knowledge and capabilities it might be part of the financial skill set that is acquired concomitantly with other skill and knowledge components. A negative causality could thereby be formulated from FSE (representing domain-specific knowledge) to Myopia.

Increase of Self-Efficacy. Since both the current study, as well as past research by Hopfensitz and Wranik (2008), conclude that an increased level of self-efficacy results in a lower or diminished occurrence of MLA (and thereby Myopia), ways of increasing one's self-efficacy will be outlined now.

To increase self-efficacy, Hopfensitz and Wranik (2008) suggest increasing one's confidence. This can be achieved by reducing the amount of flexibility a person has, for example by the provision of aggregated feedback. Thereby the feedback occasions are decreased which in turn affects the evaluations that take place at every feedback. This connection is supported by the statement of Benartzi and Thaler (1995) that a decreased evaluation frequency leads individuals with high Loss Aversion to accept more risks, and in this way reduces the effect of their Loss Aversion. In his paper, Bandura (1994) mentioned four ways to increase one's self-efficacy; through earlier mastery experience of a related task; by having a capable social role-model that represents a positive ideal; by being supported by verbal social persuasion from others about the capable own abilities; and by a positive mood and reduction of a stress reaction. For the latter, it is important to interpret occurring stress and tensions not as vulnerability or poor performance but to use them as an energizing facilitator for performance (Bandura, 1994).

According to the insight gained in the current and past research, the application of those measures suggested can have a positive counter effect against Myopia. This can, in turn, diminish the occurrence of irrational investment decisions causing the equity premium puzzle and help to prevent the negative effect arising from it.

Strengths and Limitations

Reliability. The constructs Myopia and FSE were checked by Cronbach's alpha to ensure reliability, which was overall good. The results received by those constructs can be regarded as reliable.

Myopia and Loss Aversion. Concerning the construct MLA, the relationship between the subconstructs of Myopia and Loss Aversion was mostly missing. A possible explanation is the circumstance that most theoretical background in this matter builds on Investors and working population as primary target population (Benartzi & Thaler, 1995; CentERdata, 2019; Lee & Veld-Merkoulova, 2016). This diverges from the sample of the current study which consisted mostly of students (98%).

The formulation of questions regarding Loss Aversion might be framed in such a way that they are tailored towards Investors or working population and are most comprehensible to participants with related economic background knowledge. A negatively affected comprehension of the questions can cause an irregular answer pattern that diminishes any correlation with other constructs. An investor might calculate which amount of additional gain he needs to compensate for the missed capital gain that could have been realized by investing the money for the timeframe of one year which is part of the Loss Aversion questions. A factor that supports this assumption is the significant difference between Investors and Non-Investors seen only in the scores for Loss Aversion. Also, the fact that on average, Investors reported higher premiums and discounts (22.65%) compared to Non-Investors (13.03%) in the Loss Aversion questionnaire raises the question if this questionnaire is applicable for both populations.

Misunderstanding. Another limitation is that participants might have misunderstood the questionnaire about Loss Aversion and indicated a preferred amount of premium or discount and not the absolute minimum or maximum that was asked for. In this sense, they might have indicated to receive a premium of 100€ for waiting for their prize for a year (an amount they wished to

receive) instead of 50€ (an amount that resembles their absolute minimum). Thereby, the questions could not measure the construct they were intended to measure.

Sample Bias. The current sample consists mostly of students (98%), which diverges from the sample of other studies (Benartzi & Thaler, 1995; CentERdata, 2019; Lee & Veld-Merkoulova, 2016). The general working population with a steady income might have different perspectives and capabilities on financial matters compared to a largely financially dependent student population. This can be seen by the indication of most participants to have an income of less than 1,500€ (94,8%) or less than 1,000€ (87,6%). It represents a large proportion compared to the sample of Magendans et al. (2017) from which fewer participants (55%) stated to have an income of less than 1,500€. Such differences in the sample population can also raise doubt about the comparability of the current research with existing academic literature and bear, therefore, a limitation of the results.

Sample Size. The size of the Investor group (n = 27) represents a relatively small sample since meaningful correlation analysis demand a larger group size. This was due to the low proportion of investors within the mostly student population. Any conclusion deriving from this subgroup, like the significant correlation between Myopia and Loss Aversion have to be interpreted with caution.

SONA System. Another factor is the forced participation by the SONA system. Since SONA participants are accountable for most of the participations (68,65%) they represent an important factor for the data collection. All SONA participants earn points in the SONA system which are necessary for requiring their academic degree at the end of their studies. This can cause reluctant participation with little honest consideration of the questions. It bears a threat especially for the questions concerning Loss Aversion where multiple estimations of just acceptable gains and losses have to be indicated.

Final Statement and Future Research

After having conducted this research, it can be recognized that the constructs of FSE and Myopia seem to have a significant negative relation to each other. This might give rise for future research which can investigate this relationship and a possible causality between those variables. Additionally, the missing causal connection between Loss Aversion, and (Financial) Self-Efficacy represents a topic of debate and offers an interesting field for future investigation.

Especially, in light of the equity premium puzzle to which (Financial) Self-Efficacy might offer an additional factor that exact influence is worth investigating. Here, the suggested methods for increasing ones FSE and the effect they have on their Myopia represent potential research material. Insights in this topic could reveal possible measures that can be taken by investors and capital firms to prevent them from falling prey to the equity premium puzzle.

It became clear that FSE shows a similar connection to Myopia as the superordinate concept of self-efficacy. The nature of the differences between overall self-efficacy and FSE might also provide implications for future research aimed towards an investigation of the construct with its subconstructs in detail.

The construct of Loss Aversion raised some questions since it showed no relation with FSE and no normal distribution. An investigation of alternatives in comparison with the currently used methods might shed light on how to best measure this phenomenon. An alternative method to this questionnaire is the regularly used method of an economic game used by past research (Gneezy & Potters, 1997; Hopfensitz & Wranik, 2008). Here, participants are motivated monetarily to play as successful as possible, revealing their bias. Future research might, therefore, consider the inclusion of a different measurement instrument for the construct Loss Aversion. An investigation of the currently used method and the economic game represents a feature which serves to identify methods that are best fit to measure an investigated bias.

Final Words. This study could partially support the findings of earlier research on the topic of psychological aversions and loss perception. The gathered information will benefit future research as well as finance-related stakeholders like investors or capital firms in their strive to cope with phenomena that cause the equity premium puzzle. But this research identified also some complications with certain measurement tools. The current research demonstrated that there are numerous possible psychological influences and explanations regarding this domain. This shows that despite the amount of past research on this topic, there is still much to discover.

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Appendices

A Informed Consent

Q39 Thank you for your participation! In this study, you will be asked to complete a short questionnaire. It is part of a Bachelor thesis which focuses on certain psychological constructs. Therefore, it is important that you answer as honest as possible to the following questions. In case of doubt, follow your gut feeling.
If you agree to participate, please be aware that you are free to withdraw at any point throughout the duration of the experiment without any justification. Your participation is solicited, yet strictly voluntary. All information will be kept confidential and your name will not be associated with any research findings. Your participation in this study will require approximately 15 minutes. When this study is complete you will be provided with the results of the experiment if you request them. In case you want to be provided with the results or have any questions please feel free to contact me through email: n.nettersheim@student.utwente.nl

- ○ I understand my rights and agree to participate in the study. (1)

B Loss Aversion

Q28 Please read carefully!

Q01 Imagine you win a prize of € 1,000 in the National Lottery. The prize is to be paid out today. Imagine, however, that the lottery asks if you are prepared to wait a year before you get the prize. There is no risk involved in this wait. How much extra money would you ask to receive at least to compensate for the waiting term of a year? If you agree on the waiting term without the need to receive extra money for that, please type 0 (zero).
AT LEAST a compensation of (in €):

_____

Q02 Now imagine that the prize you win in the National Lottery is worth € 100,000. The prize is to be paid out today. Imagine, again, that the lottery asks if you are prepared to wait a year before you get the prize. There is no risk involved in this wait. How much extra money would you ask to receive at least to compensate for the waiting term of a year? If you agree on the waiting term without the need to receive extra money for that, please type 0 (zero).
AT LEAST a compensation of (in €):

_____

Q03 Imagine you have to pay a tax assessment of € 1,000 today. Suppose that you could wait a year with settling the tax assessment. How much extra money would you be prepared to pay at most to get the extension of payment of a year? If you are not interested in getting an extension of payment or if you are not prepared to pay more for the extension of payment, please type 0 (zero).
AT MOST an additional charge of (in €):

_____

Q04 Imagine you have to pay a tax assessment of € 100,000 today. Suppose that you could wait a year with settling the tax assessment. How much extra money would you be prepared to pay at most to get the extension of payment of a year? If you are not interested in getting an extension of payment or if you are not prepared to pay more for the extension of payment, please type 0 (zero).
AT MOST an additional charge of (in €):

_____

Q05 Imagine you receive notice from the National Lottery that you have won a prize worth € 1,000. The money will be paid out after a year. The money can be paid out today, but in that case you receive less than € 1,000. How much less money would you be prepared to receive at most if you would get the money at once instead of after a year? If you are not interested in receiving the money earlier or if you are not prepared to receive less for getting the money earlier, please type 0 (zero).
AT MOST a reduction of (in €):

_____

Q06 Imagine again you receive notice from the National Lottery that you have won a prize worth € 100,000. The money will be paid out after a year. The money can be paid out today, but in that case you receive less than € 100,000. How much less money would you be prepared to receive at most if you would get the money at once instead of after a year? If you are not interested in receiving the money earlier or if you are not prepared to receive less for getting the money earlier, please type 0 (zero).
AT MOST a reduction of (in €):

_____

Q07 Imagine that you receive a tax assessment of € 1,000. The assessment has to be settled within a year. It is, however, possible to settle the assessment now, and in that case you will get a reduction. How much reduction would you like to get at least for settling the assessment now

instead of after a year? If you are not interested in getting a reduction for paying early or if you think there is no need to get a reduction for paying early, please type 0 (zero).
AT LEAST a reduction of (in €):

_____

*

Q08 Imagine you receive a tax assessment of € 100,000. The assessment has to be settled within a year. It is, however, possible to settle the assessment now, and in that case you will get a reduction. How much reduction would you like to get at least for settling the assessment now instead of after a year? If you are not interested in getting a reduction for paying early or if you think there is no need to get a reduction for paying early, please type 0 (zero).
AT LEAST a reduction of (in €):

_____

C Myopia

Q29 To what extent do you agree or disagree with the following statements. There are no right or wrong answers.

	totally disagree (1)	disagree (2)	somewhat disagree (3)	neither agree nor disagree (4)	somewhat agree (5)	agree (6)	totally agree (7)
I think about how things can change in the future, and try to influence those things in my everyday life. (1)	○	○	○	○	○	○	○
I often work on things that will only pay off in a couple of years. (2)	○	○	○	○	○	○	○
I am only concerned about the present, because I trust that things will work themselves out in the future. (3)	○	○	○	○	○	○	○
With everything I do, I am only concerned about the immediate consequences (say a period of a couple of days or weeks). (4)	○	○	○	○	○	○	○
Whether something is convenient for me or not, to a large extent determines the decisions that I	○	○	○	○	○	○	○

take or the actions that I undertake. (5)							
I am willing to sacrifice my well-being in the present to achieve certain goals in the future. (6)	○	○	○	○	○	○	○
I think it is important to take warnings about negative consequences of my acts seriously, even if these negative consequences would only occur in the distant future. (7)	○	○	○	○	○	○	○
I think it is more important to work on things that have important consequences in the future, than to work on things that have immediate but less important consequences. (8)	○	○	○	○	○	○	○
In general, I ignore warnings about future problems because I think these problems will be solved before they get critical. (9)	○	○	○	○	○	○	○

I think there is no need to sacrifice something now for problems that lie in the future, because it will always be possible to solve these future problems later. (10)	○	○	○	○	○	○	○
I only respond to urgent problems, trusting that problems that come up later can be solved in a later stage. (11)	○	○	○	○	○	○	○
I find it more important to do work that gives short-term results, than work where the consequences are not apparent until later. (12)	○	○	○	○	○	○	○

D Financial Self-Efficacy

Q30 Select which of the different answers applies most to you. There are no right or wrong answers.

	completely disagree (1)	partially disagree (2)	neither agree nor disagree (3)	partially agree (4)	completely agree (5)
1. I only have little influence on the financial things that happen to me. (1)	○	○	○	○	○
2. I often feel powerless in dealing with money issues. (2)	○	○	○	○	○
3. There are only a few things I can do to change my financial affairs. (3)	○	○	○	○	○
4. I am convinced that how I deal with money influences my future. (4)	○	○	○	○	○
5. I often feel confident when making financial decisions. (5)	○	○	○	○	○

6. I am convinced I can save regularly. (6)	○	○	○	○	○
7. I find regularly saving money difficult. (7)	○	○	○	○	○
8. With money matters, I find it difficult to execute my plan or keep my good intentions. (8)	○	○	○	○	○

E Control Questions

Q35 Do you have a stock portfolio that you personally manage?

- ○ Yes (1)
- ○ No (2)
- ○ I don't want to say (3)

Q36 Do you have any experience with cryptocurrencies that you personally manage?

- ○ Yes (1)
- ○ No (2)
- ○ I don't want to say (3)

F Demographics

Q31 1. What is your age? (in years)

_____

Q32 2. What is your gender?

- Male (1)
- Female (2)
- Other (3)

Q33 3. What is your highest completed education?

- Highschool (no preparation for University), Realschule, Hauptschule, VMBO (1)
- Highschool (preparation for University), Abitur, HAVO/VWO (2)
- MBO (3)
- Applied Science University, Fachhochschule, HBO (4)
- University level (eg. Bachelor or Master), Wetenschappelijk onderwijs (WO) (5)
- Did not (yet) complete any education (6)
- Other (7)

Q34 4. What is your most important daily activity?

- ○ I am a salaried employee (1)
- ○ I am a freelancer (2)
- ○ I am looking for a job (3)
- ○ I study or go to school (4)
- ○ I am tasked with housekeeping (5)
- ○ I am retired (6)
- ○ I am (partially) unfit for work (7)
- ○ Other (8)

Q37 5. What is your monthly net income? (meant are all positive incomes, including wage, student fund, child benefit, allocation from family, etc.)

- ○ No income (1)
- ○ Less than € 500 (2)
- ○ € 500 - € 1,000 (3)
- ○ € 1,000 - € 1,500 (4)
- ○ € 1,500 - € 2,000 (5)
- ○ € 2,000 - € 2,500 (6)
- ○ € 2,500 - € 3,000 (7)
- ○ More than € 3,000 (8)
- ○ I do not want to say (9)

G Debriefing

Q38 Thank you very much for participating in this study.

In case you have any further questions concerning the study, don't hesitate to contact the researcher via Email: n.nettersheim@student.utwente.nl

End of Block: Block 8