Saving Behavior; insights into the effect of Peer Pressure relative to Risk Aversion and Time Preference

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ABSTRACT

In light of the societal changes that magnify the effect of peer pressure, its relation to saving behavior is gaining momentum. Previous research finds a clear relationship; however, it cannot conclude on whether this results from peer saving pressure or peer consumption pressure, nor on the direction of their effects. Also, it remains unclear how the saliency of both variables comes into play. Finally, whereas the effect seems substantial in itself, the question is how the effect size compares to established influencers of saving behavior, such as risk aversion and time preference. Six hypotheses were raised to answer these questions. Data from 178 respondents was analyzed through an Ordinal Logistic Regression. Results show that, in contrast to much previous literature, peer saving pressure negatively affected saving behavior. Yet, when the saliency of peer saving increased, this relation reversed for respondents who experience high peer saving pressure. In addition, the effect size was found to exceed risk aversion and impatience. The effect of peer consumption pressure, however, was not found to be significant, nor to outraise risk aversion and impatience. Though when moderated by the saliency of peer consumption, a positive significant relation with saving behavior occurred. Social upward comparison, peer learning and peer motivation seem to drive the effects that were found. Practical implications lie in increasing the saliency of peer saving behavior, which facilitate learning effects, to improve saving behavior. Yet, further research is required to discover the underlying causes of the findings.

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1. INTRODUCTION

Recently, troubling insights have been exposed with regard to the saving behavior of U.S. citizens. It was found that, in 2022, 42% of Americans had less than $1,000 in their savings account. Even more worrisome, 10% of Americans did not dispose of savings at all, which accounted for at least 25 million people (Flynn, 2022). Unfortunately, although said to be magnified by the consequences of COVID-19, these underperforming saving rates have not been temporary. America and many other countries show a consistent pattern of structural personal saving deficiencies (Jamal et al., 2015). For instance, already back in 2014, it was found that 41% of U.S. households did not dispose of adequate savings to cover a $2,000 expense (Pew Charitable Trusts, 2015). Additionally, in 2017, it came to light that 41% of U.S. households could not afford an unforeseen cost of $400 without borrowing. This pattern of 'undersaving' does not only pertain to short-term saving goals, as many people are also found to be lacking in terms of retirement savings (Munnell et al., 2007).

In an attempt to reverse this pattern, many researchers have examined explanations for why people lack the ability to save sufficiently. This however seems to be an incredibly complex puzzle, in which many variables play a role, such as poor income rates, insufficient financial literacy (Babiarz & Robb, 2014), missing support from financial institutions (Mullainathan & Shafir, 2009), and many more (Middlewood et al., 2018).

Within this puzzle, the role of peer pressure is gaining more and more momentum. Peer pressure is explained by the influence of members of one's peer group, in which peers are regarded as people of approximately the same age, status, and interests. The role that peer pressure plays within saving behavior is attracting growing interest. Reason for this is shifts in technology that work as a catalyst for peer pressure. Peer pressure is strongly amplified by social media, which is why its societal impact increases (Han et al., 2019). Bosworth (1993) claims that traditional economic models fall short of adequately explaining the notable differences in saving rates that are observed globally. Han et al. (2019) say these models can be improved by including the role that peer pressure plays.

As presented in Chapter 2, many researchers found a significant relationship between peer pressure and saving behavior. It should however be noted that peer pressure can come in two forms: saving pressure and consumption pressure. Peer saving pressure pertains to the influence of peer saving habits on someone's personal finances (Karunaanithy et al., 2017). To illustrate, an individual could feel pressured to keep up with the saving behavior of his or her peers, who may be achieving certain financial milestones or save aggressively. Peer consumption pressure, however, describes the influence of peer consumption habits on an individual's financial decisions (Maurer & Meier, 2008). This can for

instance occur when an individual is pressured to keep up with peer expenditures who may be living a more lavish lifestyle. Whereas peer saving pressure directly influences saving behavior, peer consumption pressure is expected to influence saving behavior more indirectly (Beshears et al., 2015). Yet, it remains unclear whether this indirect relationship with saving behavior measures up to the direct effect of peer saving pressure on saving behavior since these two variables have (to the best of my knowledge) only been studied independently.

With regards to peer saving pressure, many researchers found a positive relationship between peer saving pressure and saving behavior (see Chapter 2, Table 1) in the sense that it increased motivation to improve personal finances or facilitates peer learning. However, Beshears et al. (2015) suggest that peer saving pressure in the form of upward social comparison can have a backfiring effect. Upward social comparison is described as a behavioral strategy in which agents compare themselves with others to draw inferences about their own position (Festinger, 1954). When compared with an agent that is perceived as better-performing, this can result in discouragement, which can negatively impact saving behavior (Beshears et al., 2015). With regards to peer consumption pressure, the majority of research shows that this increased consumption behavior. Rather intuitively, De Giorgi et al. (2020) say that its relation to saving behavior is negative, as they found that agents who take peer consumption into consideration deviated from suggested financial decisions.

This above-illustrated puzzle is nicely summarized by Han et al. (2019), who mention that: "There is evidence of contagion of both consumption and investment behaviors, but contagion can potentially spread either a decision to consume more or to consume less." (p. 1). In other words, it remains unclear whether peer pressure is mainly driven by saving pressure or by consumption pressure, and whether this results in an improved or reduced level of saving behavior. The first pillar of this study is, therefore, to gain more insights into the role that both peer saving pressure and peer consumption pressure play and the direction of their relationship to saving behavior.

Additionally, previous research primarily examined peer pressure either based on the comparison of saving or consumption levels between an agent and that of his or her peers, or based on the saliency (i.e., degree of peer communication on the topic) of saving or consumption. Yet, it is arguable that these are not mutually exclusive, but rather that peer communication moderates the relationship between peer comparison and saving behavior. The second pillar of this research is hence to quantify this expected moderating effect.

Finally, although often found to be significant in itself (see Chapter 2, Table 1), the effect size of peer pressure within the puzzle of personal saving deficiencies has often been assessed in isolation. However, this does not allow for a relative understanding of the intensity of the effect. Hence, the

question arises whether its effect is comparable to the effects of established variables that have been known to influence saving behavior. Especially because of the complexity of the puzzle of variables that influence saving behavior, it is critical to not only determine the significance of certain variables but also to detect their relative effect size compared to other variables. Without the availability of established benchmarks, this effect size cannot be put into context. To illustrate, a newly introduced variable might provide tremendous significant results, but once added to a model with established benchmarks, its effect size turns out to be neglectable. Or, on the contrary, once compared to established benchmarks, the newly introduced variables could show to be even more influential than their predecessors. With regards to the current study, the latter is certainly plausible since the role of peer pressure is highly subject to the current societal changes (e.g., increased social networks due to globalization, the presence of social media) whereas other variables might not be influenced by this. Such findings would provide great opportunities for policy development, as it provides guidance within the complicated puzzle of low savings.

Two common explanations for insufficient saving rates that could potentially act as benchmarks tie back to well-known concepts within several academic fields; risk aversion and time preference. Already in 1738, risk aversion was introduced by Bernoulli. He suggested that, with gambles, agents not exclusively consider gains and losses but also their personal utility that is derived from the risky action itself (Bernoulli, 2011). Arrow (1971) and Pratt (1964) eventually quantified this within the expected utility framework by showing that a risk-averse agent has a concave utility function rather than a straight one. More specifically, the greater the concavity of the agent's utility function, the stronger the sense of risk aversion. The second concept, time preference (or impatience), captures the value that an agent places on an asset at an earlier moment in time compared to its corresponding value at a later moment in time. In 1930, Fisher was the first to capture this effect by developing his two-period consumption-saving model. Within this model, the trade-off between consuming now or consuming in the future is explored (Fisher, 1930). This subsequently resulted in the development of several discounting models, which devalue future assets to account for time preference.

Both topics naturally tie back to saving behavior. It is relatively intuitive that agents with higher levels of risk aversion mitigate the risk of future financial insecurity by increasing personal savings. Likewise, time preference in the form of high levels of impatience intuitively results in low levels of savings since the urge to consume now wins from the aspiration to save. It is therefore that an abundance of empirical research found a significant relationship between either risk aversion or time preference and saving behavior (see Chapter 2). As elaborated upon in the next chapter, the current study therefore treats risk aversion and time preference as established influencers of saving behavior. This paves the way for exploiting these variables as benchmarks for the effect size of peer pressure. Interestingly enough, Karunaanithy et al. (2017) set the first steps in doing so by computing a model that, among

others, captured both peer pressure and time preference in form of self-control. Their findings suggest that the effect of peer pressure outraises the effect of time preference. The third and final pillar of this research is therefore to benchmark the effect of peer pressure on saving behavior against the effects of risk aversion and time preference.

To answer the three pillars that are described above, six hypotheses have been developed which are presented in Chapter 3. By means of these hypotheses, this study aims to answer the overarching question: ***'What is the effect of peer pressure on saving behavior, and how does it relate to the established effects of risk aversion and time preference?'*** This study is distinctive in the sense that it not only provides more insights into the relationship between peer pressure and saving behavior and the moderating role of peer communication, but it also is the first study, to my knowledge, that benchmarks its effect to two established variables.

The research question was answered through an Ordinal Logistic Regression conducted on a sample of 178 respondents. Results showed that peer saving pressure negatively impacted saving behavior, whereas this effect was mirrored once the relation was moderated by peer communication about saving. In addition, the original effect size was found to outraise that of risk aversion and impatience. Pertaining to peer consumption pressure, no significant relationship was found. Yet, once the relation was moderated by peer communication about consumption, a positive effect on saving behavior was found.

The remainder of this research is structured in the following manner: Chapter 2 covers an extensive review of existing literature on peer pressure, risk aversion, and time preference in relation to saving behavior. Chapter 3 discusses the conceptual framework based on the research hypotheses. In Chapter 4, the data collection method is explained, followed by an extensive elaboration of the research methodology in Chapter 5. The study results are presented in Chapter 6, which are further discussed in Chapter 7. This is followed by the study's implications in Chapter 8 and its limitations and opportunities for future research in Chapter 9. Finally, the findings are summarized in the conclusion in Chapter 10.

2. LITERATURE REVIEW

This chapter provides an extensive review of the concepts and theories relevant to this study. Firstly, the effect of peer pressure on saving behavior is reviewed. Within this section, peer pressure through peer saving behavior is examined first, followed by an elaboration on peer pressure through peer consumption. Thereafter, the first established variable within saving behavior, namely risk aversion, is introduced. Finally, literature on the second established variable, time preference, is covered.

2.1 Peer Pressure

The importance of social networks and relationships first gained attention within the field of economics when Bourdieu (1986) developed his Social Capital Theory in 1986. This theory is defined as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition" (p. 248). In other words, it signals that social relationships are valuable resources that, if used correctly, can yield reproductive human capital (skills, knowledge, and experiences possessed by an individual or population).

A derivative of this theory is the concept of peer pressure. Peer pressure is a process in which members of a social group intendedly or unintendedly influence other members of the group in terms of thoughts, feelings, actions, etcetera. It links back to Social Capital Theory in the sense that peer pressure has the potential to positively influence the thought patterns of group members, hence resulting in improved human capital. An example of this is social relationships that lead to improved financial behavior.

White et al. (2016) examined this effect by looking at the relationship between social relationships and financial planning behavior. Financial planning was measured in form of 1) current money management, 2) investment planning, and 3) emergency planning. Based on cross-sectional data, the authors found that when the degree of social relationships increased, current money management and investment planning improved. This study therefore shows that there indeed is a connection between social relationships and financial behavior. However, this does not yet specifically address financial peer pressure since the study examined the effect of social relationships in general instead of specifically the financial behavior of these relationships.

A study that fills this gap was carried out by Miller & Soo (2020). The authors aimed to isolate the causal effect of neighborhood environment, which can be regarded as similar to peer effects (Bayer et al., 2004) on credit scores. They did so by means of the 'Moving to Opportunity' (MTO) experiment. A highly unique, large-scale experiment in which low-income families were provided with vouchers

that enabled them to move to a better neighborhood through a randomized lottery. Results showed that for participants that moved to the lowest poverty areas while in their younger years, credit scores improved after the move. As for the participants that moved to better neighborhoods as adults, the move implied a reduction of overdue debts, hence improved financial behavior. This shows that once participants were continuously exposed to peers with low poverty scores, their own financial behavior improved. This directly signals that financial peer pressure can indeed result in improved financial behavior.

Similar inferences were drawn by Mohamed (2017), who examined the effect of financial socialization on financial knowledge, financial behavior, and financial well-being in Malaysia. Interestingly enough, they found no correlation between financial peer interactions and improved financial knowledge. However, the authors did find that both peer observation and peer interaction improved financial behavior, resulting in participants that acted more towards the recommended financial behavior. This suggests that economic agents do not particularly develop financial skills through peer interaction, however, they do show improved financial behavior simply by copying peer behavior.

In a study that was conducted by Dangol & Maharjan (2018), corresponding results were found. The researchers examined the effect of parental influence and peer effects on the saving behavior of the Nepalese youth. With regards to peer effects, participants were asked for 1) the extent to which their friends save 2) the extent to which saving (issues) are discussed with friends 3) the extent to which they involve in financial activities with peers, and 4) the extent to which they compare both saving and spending with peers. Regression results showed that all items had a significant positive relationship with saving behavior. Important to mention, however, is that this study failed to take the differences in saving levels between respondents and their peers into account. It merely looked at the extent to which peers save in isolation, but not in comparison to the saving behavior of the subject. Hence, it remains unclear whether the positive relationship that was found was a result of upward comparison (respondents having more savings than their peers) or from downward comparison (respondents having fewer savings than their peers).

A study that highlighted the importance of controlling for the differences in saving levels between respondents and peers was conducted by Beshears et al. (2015). The authors carried out a field experiment that measured the effect of providing information about peer saving behavior on enrollment in 401(k) programs (a U.S. retirement savings plan). The first treatment group was exposed to the number of peers (in the form of age-matched colleagues) that participate in the 401(k) plan. The second treatment group was exposed to the number of peers that were contributing at least 6% of their paycheck to the 401(k). Interestingly, a negative effect of both treatments was found, as the disclosure of peer

information generated decreased savings of the unenrolled employees in both cases. According to the authors, 'Discouragement from upward social comparisons seems to drive this reaction.' (Beshears et al., 2015, p1). Therefore, whereas earlier mentioned research signals a positive relationship between peer pressure and saving behavior, this study shows that financial peer pressure potentially also has negative effects on saving behavior.

Further, yet more general research on peer pressure was conducted by Jamal & Azan (2015). The authors investigated the effect of peer pressure and financial literacy on saving behavior among Malaysian college and university students. Although specifics on the type of peer pressure were not disclosed, regression results showed a positive and significant effect on saving behavior.

In a similar study that was also conducted among Malaysian university students, Mohd Abdul Kadir & Jamaluddin (2020) investigated the effect of financial knowledge, parent's socialization, peers influence, self-control, and financial stress on students' saving behavior. Despite lacking details on the type of peer pressure, the results showed that peer influence had a positive and significant effect on saving behavior.

Corresponding results were found in a study that was carried out by Karunaanithy et al. (2017). The authors investigated the psychological factors that affect the saving behavior of the youth in war-torn areas. Data from undergraduates in Sri Lanka was analyzed to test for the effect of financial literacy, parental socialization, peer influence, and self-control on saving behavior. The authors found a significant positive effect of peer pressure on saving behavior. Especially interesting is that this model also included a measure of self-control, which can be regarded as the opposite end of impatience on the spectrum of time preference. Whereas the model did find a significant effect of peer pressure, no significant effect of self-control was found. This suggests that the effect of peer pressure outraises the effect of time preference.

A serious drawback of the three latter studies, however, is the lack of elaboration on peer pressure. All studies leave the concept open for interpretation. As such, the studies could be referring to general peer pressure (the degree to which one is sensitive to the opinion of his or her social network) or to financial peer pressure (sensitivity to the financial decisions of peers). Financial peer pressure can, in turn, stem from peer saving pressure or peer consumption pressure. Recall that peer saving pressure reflects sensitivity to peer saving, whereas peer consumption pressure reflects sensitivity to peer consumption. Both are of interest to the current study as they can be seen as two sides of the same coin; the amount one spends cannot be saved, and the amount one saves cannot be spent. Hence, once peer consumption pressure causes one to overconsume, this potentially affects one's ability to save.

Peer consumption pressure was, among others, studied by Bursztyn et al. (2014). The authors explored the effect of peer consumption based on two concepts, namely 'social learning' and 'social utility'. The former explains that an agent learns from his or her peers once he or she buys something, whereas the latter explains that the utility that is retrieved from consumption is directly affected by the number of peers that own the asset. Both concepts were explored through an experiment with peer groups of two people. Within each pair, one participant that opted to buy a certain asset was randomly granted the possibility to do so or not. Subsequently, randomization decided whether the second member of the pair was either informed about the buying intention of the peer, and whether the peer was granted the buying right or was not informed of any information about the peer. Eventually, this participant was granted the possibility to purchase the asset. This setup allowed to examine both the social learning effect (in case the peer only disclosed an interest in the asset but did not buy) and the social utility effect (in case the peer was also granted the right to actually buy the asset). The results showed that both effects resulted in increased consumption behavior.

Much additional prior research exists on the relationship between peer consumption pressure and personal consumption decisions. (Ravina, 2007; Maurer & Meier, 2008; Kooreman et al., 2011). Ravina (2007) found that for a representative sample of U.S. credit card account holders, habit persistence positively influenced household consumption choices, in which habits were buildup of internal and external habits. The latter referred to the consumption of the reference group, otherwise known as peer pressure. Maurer & Meier (2008) studied peer effects by extending the standard life-cycle model (which expects that agents smooth consumption over their entire life cycle) by allowing for peer effects. Based on a U.S. sample, they found statistically significant evidence for the moderating role that peer effects play on consumption choices across multiple types of peer groups. Finally, Kooreman et al. (2011) further explored the Easterlin hypothesis, which says that positive shocks to an agent's neighbor's income level reduce the level of happiness of that specific agent. The authors looked at a Dutch lottery that allocated prizes to postal codes and granted one household with an additional BMW car. Their results showed that direct neighbors of winners significantly increased car consumption, hereby showing a positive relationship between peer consumption and personal consumption behavior.

Although the above-mentioned research shows a strong relationship between peer consumption pressure and consumption behavior, its relation to saving behavior has often been neglected. This gap was filled by De Giorgi et al. (2020), who related the effect of peer consumption pressure to observed patterns of under-saving and over-borrowing. By means of data on the entire population of Denmark, the authors demonstrated that peer consumption increased household consumption. Additionally, from their second model, the 'keeping up with the Joneses' model, in which individual utility was affected

by the average consumption of peers, they learned that saving profiles deviated from the priorly determined optimal if respondents took peer consumption into account.

A theoretical concept called the 'visibility bias' captures overconsumption that is caused by peer pressure. The visibility bias explains overconsumption by addressing the information asymmetry that results from peer consumption. It states that consumption is more salient than non-consumption (i.e., saving behavior) and agents are influenced by the financial decisions of peers. Due to this information asymmetry, agents assume that peers consume more than they save, and eventually start copying this behavior. According to the authors, this leads to overconsumption and insufficient savings. (Han et al., 2019). In a sense, the visibility bias can be regarded as an extension of Kahneman's and Tversky's (1973) availability heuristic. This cognitive bias is a mental shortcut used by people to estimate the likelihood or frequency of an event based on how easily they recall or imagine examples of the event. Since consumption is more salient than non-consumption, the availability heuristic causes people to overestimate the consumption frequency of peers compared to their saving behavior.

All in all, this section shows that previous literature found a clear relationship between peer pressure and saving behavior. However, to date, researchers cannot come to terms on whether this relationship is positive or negative. It also remains unclear whether the main source of influence is peer saving or peer consumption.

Table 1. Summary of previous literate on peer pressure in relation to financial decisions

Authors	Study design	Country	Target group	Research topic	Summarized findings related to peer pressure	Effect
				1) Peer saving pressure		
White (2016)	Non-experimental	U.S.	Youth	Social relationships and financial planning behavior	The degree of social relationships is positively related to the quality of current money management and investment planning	+
Miller & Soo (2020)	Experimental	U.S.	Families	Neighborhood effects on debt levels	Moving to low-poverty areas at a young age improves credit scores. Moving to low-poverty areas as an adult reduces overdue debts	+
Mohamed (2017)	Non-experimental	Malaysia	Young employees	The effect of financial socialization, financial knowledge, and financial behaviour on financial well-being	Peer observation and peer interaction are positively related to the quality of financial behavior. Yet, a relation with financial knowledge is not found	+
Karunaanithy et al. (2017)	Non-experimental	Sri Lanka	Undergraduate students	The effect of financial literacy, parental socialization, peer influence, and	There is a significant positive relationship between peer pressure and saving behavior	+

				self-control on saving behavior		
Dangol & Maharjan (2018)	Non-experimental	Nepal	Youth	Parental and peer influence on saving behavior	The extent to which friends save, to which saving is discussed with friends, the level of involvement in financial activities with peers, and the extent to which saving and consumption are compared with peers are all positively related to saving behavior	+
Jamal et al. (2015)	Non-experimental	Ma-laysia	Students	The motives of saving behavior and the mediating effect of financial literacy	Peer influence is positively related to saving behavior	+
Mohd Abdul Kadir, Jamaluddin (2020)	Non-experimental	Ma-laysia	Students	The role of financial knowledge, parental socialization, and peer influence on saving behavior in emerging countries	Peer influence is positively related to saving behavior	+
Beshears et al. (2015)	Experimental	U.S.	Working individu-als	The effect of disclosing information about peer saving on saving behavior	Information on peer saving behavior and high levels of peer saving are negatively related to saving behavior	-
2) Peer consumption pressure						
Bursztyn et al. (2014)	Experimental	U.S.	Financial brokers	The effect of peer consumption on financial decisions	Both the social learning effect (knowledge about consumption decisions of peers) and the social utility effect (utility derived from the number of peers that own the asset) positively affect consumption	+
Ravina (2007)	Non-experimental	U.S.	Credit card holders	How habit persistence influences household consumption choices	Consumption habits of the reference group positively influence household consumption	+
Maurer & Meier (2008)	Non-experimental	U.S.	House-holds	The extension of the standard life-cycle model by controlling for peer effects	Peer pressure increases consumption across multiple types of peer groups	+
Kooreman et al. (2011)	Experimental	The Nether lands	Dutch citizens	The effects of lottery winners on neighbor's consumption decisions	Direct neighbors of lottery winners significantly increase (car) consumption	+
De Giorgi et al. (2016)	Experimental	Den-mark	Working individu-als	The effect of peer consumption on household consumption	Respondents that take peer consumption into account deviate from the optimal saving behavior	-[1]
Han et al. (2021)	Theoretical	N/a	N/a	The effect of the disbalance between	The disbalance in the saliency of peer consumption causes a loop	+

| | | the saliency of consumption and non-consumption on saving behavior | of overconsumption based on false inferences. Peer pressure therefore increases consumption compared to savings |

[1]On the relationship between peer consumption pressure and saving behavior

2.2 Risk Aversion

Already in 1738, the concept of risk aversion was introduced by Bernoulli (Bernoulli, 1954). He developed a hypothesis that states that a person accepts risk not only based on possible gains and losses, but also based on the utility that is derived from the risky action itself. He introduced this hypothesis in an attempt to explain the St. Petersburg Paradox, which questions why certain agents are hesitant to participate in a gamble with an equal chance of winning and losing.

Risk aversion reflects an agent's tendency to prefer outcomes with low levels of uncertainty compared to outcomes with high levels of uncertainty, although the latter might yield higher returns. Arrow (1971), and Pratt (1964) quantified this through their Arrow-Pratt measure of risk aversion. It implies that, within the Expected Utility (EU) framework, a risk-averse agent shows a concave utility function rather than a straight one. More specifically, the greater the concavity of the agent's utility function, the stronger his or her sense of risk aversion.

The subsequent link between risk aversion and saving behavior is rather intuitive. Since future income streams are almost always uncertain, agents that show high levels of risk aversion will be inclined to create a buffer for periods that impose little income. Bleichrodt & Eeckhoudt (2005) showed that under EU, the presence of future income risk reduces current consumption and stimulates saving for an individual that is risk-averse and prudent. Whereas the role of prudence is outside of the scope of this article, (empirical) evidence on the relationship between risk aversion and saving behavior will be covered below.

Among the various researchers that explored this relationship were Bommier & Grand (2019). In their research, they studied infinitely long-living agents who were forced to make saving decisions based on uncertain future income streams. They found that, in the presence of income uncertainty, agents that show high levels of risk aversion prefer larger amounts of precautionary savings (saving that results from uncertainty regarding future income streams). The authors state that this connection can be regarded as intuitive, since "A more risk-averse individual cares more about risk reduction, by definition, and therefore chooses higher amounts of savings." (Bommier & Grand, 2019, p. 1387).

Additionally, in empirical research carried out by Muhamad et al. (2021), a group of Malaysian respondents was studied to examine the relationship between self-efficacy, risk preference, demographics and saving behavior. With regard to the effect of risk attitudes, the authors examined three types of risk: daily risk, idiosyncratic risk, and covariant risk. Daily risk reflects everyday needs, such as the sudden need for money to buy food. Idiosyncratic risk are risks that relate to tangible assets that households hold. Covariant risk captures large impact risks, such as unemployment. Regression results showed that risk preferences over all combined categories had a significant effect on savings, in which risk-seeking behavior caused lower levels of short- and long-term savings. Yet, they only found this relationship to be significant for women, implying that men did not consider risk with regard to saving decisions.

In a similar study that was carried out in the Netherlands, the effect of risk preference, regulatory focus, and perceived saving barriers on saving intention was investigated. Risk preference was measured through ten adapted statements from Grable and Lytton's (1999) Financial Risk Tolerance Scale. Data derived from an online survey showed that higher levels of risk aversion increased one's intention to build precautionary savings. Additionally, their results showed that risk preference was a better predictor of saving behavior compared to their 13-item construct on general saving intention (Magendans et al., 2017).

Furthermore, in a study conducted by Brown et al. (2008) the effect of risk aversion on debt levels (which can be regarded as a direct representation of saving behavior) was measured. Data from two studies conducted among U.S. households was used. The former study included five hypothetical gambles related to potential income streams, whereas the latter study contained one question on financial risk-taking. Both were eventually translated to a risk aversion index. When modeling these index scores against debt levels, the authors found that risk aversion had a negative effect on household debt, which ultimately suggests higher levels of savings. This finding is again rather intuitive since high levels of household debt impose household risk. A risk-averse agent will therefore, by definition, aim to minimize this risk by decreasing debt levels.

In an additional study that was conducted by Amari et al. (2020), the researchers examined the effect of financial literacy and risk aversion on saving behavior. Data was collected among French households and was used to test three hypotheses. One of these hypotheses focused on the mediating effect of risk aversion within the relationship between income and saving behavior. Results showed that lower levels of risk tolerance (i.e., high levels of risk aversion) had a significant positive effect on saving behavior. In other words, the more risk-averse an agent is, the higher his or her saving levels.

Finally, Oduncu (2012) investigated the effect of, among others, risk aversion on precautionary savings. The authors found a significant positive relationship between risk aversion and precautionary savings. This again shows that agents with higher levels of risk aversion show higher levels of savings.

Yet, despite the above-mentioned literature that shows a clear link between risk aversion and saving behavior, Bommier et al. (2012) mention that in the case of intertemporal choice models, this effect strongly depends on the utility function that is used. They found that studies that adopt the Kihlstrom and Mirman utility function (that allows for an agent's level of risk aversion) or the Quiggin utility function (which allows for different levels of risk aversion across different outcomes and probability distributions) manage to find a relationship between risk aversion and precautionary savings. Nonetheless, the effect seems debatable when Epstein and Zin's utility function (that allows for time-varying risk aversion) is used. However, to overcome the constraint that such model selection imposes, the authors developed a model-free approach that managed to prove the link between risk aversion and precautionary savings.

In conclusion, the above-presented literature clearly shows the existence of a positive relationship between risk aversion and saving behavior, hereby empirically proving the conceptual relationship between the two variables. As such, the current study will continue by regarding the variable risk aversion as an established factor within saving behavior. Important to mention is that since the current study does not require the selection of a specific utility function nor does it examine risk aversion in intertemporal choice models, the effect of model selection that was explained by Bommier et al. (2012) can be disregarded.

2.3 Time Preference

Within economics, the concept of time preference refers to the value that is placed on a certain asset at an earlier moment in time, compared to the value of that specific asset considering that it is received at a later moment in time (Frederick et al., 2002). The role that time preference plays within saving behavior, was discovered early on by Fisher (1930). He was the first to capture this effect by developing his two-period consumption-saving model. Within this model, an agent only lives for two periods, for which the trade-off between consuming now or consuming in the future is explored. This theory was later expanded further by Samuelson (1937), who developed the exponential discounting model. Exponential discounting entails that additional weights are introduced to future assets so that they are devaluated to account for the role that time preference plays. Phrased in a simpler way, it says that a dollar is worth less in the future than it is today, since evidence shows that assets decrease in value once they are received at a very distant point in time (Frederick et al., 2002)

The discount factor that results from the discounting model therefore directly signals the agent's capacity to delay gratification by being patient. Naturally, this ability affects an agent's ability to save money, since a larger discount factor will impose less capacity to save money. Therefore, such agents are at times referred to as 'inappropriately impulsive' or even 'irrational' by various authors such as Becker & Mulligan (1997).

After the development of the exponential discounting model, many additional models that capture discounting behavior within intertemporal choices were developed. By means of these models, much empirical research was done to prove the theoretical relationship between time preference and saving behavior. For instance, already in 1983 (and later supported by Bailey (1992)), Greenberger & Steinberg (1983) found that especially young people show high levels of impatience, which caused them to spend income immediately and ignore long-term financial goals.

Krusell et al. (2002) examined the relationship between time preference and saving behavior through the hyperbolic discounting model. Opposed to exponential discounting, hyperbolic discounting accounts for differences in time preferences by including both short- and long-term discounting factors. The authors found that when the former is smaller than unity, agents increased consumption by postponing savings, whereas when it is larger than unity, agents reduced consumption and increased savings.

Later, Choi & Han (2018) modeled the relationship between discounting factors and saving behavior through the hyperbolic Euler equation, which is another form of time discounting that also allows for short-term discounting factors. The authors estimated short-term discounting factors of Korean citizens against saving behavior. They found that when Koreans showed short-run patience, this led to decreased consumption, hence increased savings between. In contrast to this when Koreans exhibited short-run impatience, this led to an increase in consumption and a decrease in savings.

A similar study was carried out by Huffman et al. (2016), who empirically studied discounting behavior of elderly Americans. In their study, the target group was exposed to straightforward intertemporal choices, which gave respondents a choice between certain payments today and different payments in the future. Such intertemporal choices have the benefit that they generate indicators of impatience, which can be analyzed without the application of a specific discounting model. Once these indicators were modeled against overall wealth, results showed that impatience had a significant negative effect on savings.

Corresponding results were found by Goda et al. (2015), who examined the retirement savings of a broad sample of U.S. citizens. Discount rates were extracted from a quasi-hyperbolic discounting

model which, in contrast with exponential discounting, accounts for time-inconsistent discount rates (Laibson, 1997). Their results showed that the degree of impatience observed in the population had a highly significant negative effect on retirement savings.

In a study that adopted a slightly different approach, Middlewood et al. (2018) investigated whether time preference influenced respondents' decision to automate saving deposits. Their main findings demonstrated that respondents with high levels of impatience, compared to respondents with lower levels of impatience, had significantly lower savings, a poorer overall financial performance, were less confident in their personal capability to save $2,000, and found it more challenging to pay bills. This study is especially interesting due to its abundance of independent variables on which impatience has a significant effect.

Additionally, Hastings & Mitchell (2020) have investigated the effect of impatience on wealth and investment decisions based on nationally representative data from Chile. Results showed that impatience levels were strongly correlated with retirement savings, in which the former had a negative significant effect on the latter.

Whereas the previously mentioned research focuses on saving rates, the study conducted by Kuchler & Pagel (2021) was tailored to personal debt repayment plans. The authors examined the degree of consumption spending in proportion to paycheck receipt, which directly reflects one's level of impatience. Their results showed that the more impatient agents were, the less they were capable of reducing their debt levels. In a similar manner, MIT economist Parker (2017) investigated the effect of governmental refunds to U.S. households. He found that although consumption was partly smoothed as the earlier mentioned Consumer Lifecycle Theory would predict, impatient respondents spent newly gained money quicker. He even noted that self-assessment on this matter did a good job of isolating 'spenders' from 'savers'. "It's a question about impatience. Are you someone who is impatient? If you get 'yes' for that answer, those are the spenders", he said in an interview (Science Blog, 2017).

To sum up, the above-presented literature shows a clear relationship between time preference in the form of impatience and saving behavior. The covered literature also shows that this relationship remains present under various models of time discounting as well as under a model-free approach. Because of the abundance of empirical research, it can be said that time preference is an established variable that affects saving behavior.

2.4 Summary and Synthesis

Overall, it is fair to say that previous literature suggests a relationship between peer saving pressure and saving behavior. Regarding the other side of the coin, the relationship between peer consumption

pressure and consumption behavior seems to be present as well. Yet, its indirect effect on saving behavior remains unquantified. Additionally, for both types of peer pressure (i.e., peer saving pressure and peer consumption pressure), multiple measures for peer pressure have been exploited. Previously used measures for peer pressure are, however, inconsistent, in that multiple indicators for peer pressure are used (e.g., peer observation, peer communication, peer comparison). Furthermore, the relationship between risk aversion and saving behavior, and time preference (in the form of impatience) and saving behavior has been empirically substantiated by many researchers. Previous literature finds a clear positive relationship with regard to the former and an evidently negative relationship between the latter. Based on the abundance of empirical proof, the current study therefore regards their relationship to saving behavior as established benchmarks for newly introduced variables such as peer pressure.

3. THEORETICAL FRAMEWORK AND HYPOTHESES

Based on the literature that is presented in the previous section, several conclusions can be drawn. First of all, it is shown that the effect of peer pressure on saving behavior seems substantial. However, no definite conclusions on the direction of the effect (positive or negative) nor the source of the effect (peer saving or peer consumption) can be drawn yet. Second, from the presented academic literature, we can infer that risk aversion and time preference can be regarded as established variables since their significance has been proven many times. This sets the stage for a deductive study approach based on several research hypotheses, which will be elaborated upon in the upcoming chapter.

3.1 Pillar I: Peer Pressure within Saving Behavior

As explained in Chapter 2.1 peer pressure can come in two forms; pressure imposed by peer saving behavior, and pressure that results from peer consumption behavior. These two forms will henceforth be referred to as 'peer saving pressure' and 'peer consumption pressure'. Logical reasoning follows that they can be considered as two sides of the same coin; when peer pressure results in higher savings, it will leave less room for consumption, and vice versa. However, the type of peer pressure an agent experiences does not have to be mutually exclusive. More often than not, economic agents will be exposed to both; they will both have peers that save more as well as peers that consume more. Hence the question is, do both types of peer pressure have a significant effect on saving behavior? And is one type more important than the other? This ties into the following hypotheses:

H1: peer saving pressure positively influences personal saving behavior
H2: peer consumption pressure negatively influences personal saving behavior

The direction of H1 is positive since the vast majority of previous literature (see table 1) found a positive relationship between the two variables. The direction of H2 is negative because previous literature (see table 1) says that peer consumption causes agents to increase consumption, which is expected to result in decreased savings (De Giorgi et al., 2016).

3.2 Pillar II: The Moderating Role of Peer Communication

Only briefly touched upon in prior research is the moderating role that peer communication plays within peer pressure. Han et al. (2019) recently studied this, which led them to develop the visibility bias. This bias captures the disbalance that results from the saliency of consumption and non-consumption (i.e., saving behavior). This feeds into Kahneman and Tversky's (2019) availability heuristic in the sense that it generates easy accessibly thoughts on peer consumption. Overestimation of peer consumption is the result, which in turn, increases peer consumption pressure. In contrast, the taboo that exists around

discussing saving efforts withholds this moderating effect from occurring with peer saving pressure. Yet, once the saliency of saving behavior were to be increased, the moderating effect likely causes improved saving behavior. Peer communication about saving could possibly balance out the effect of the availability heuristic and impose learning effects. Hence, it is important to gain insights into the enhancing role that peer communication plays within both types of peer pressure. Thus, the following hypotheses have been formulated:

H3: peer saving communication moderates the relationship between peer saving pressure and saving behavior
H4: peer consumption communication moderates the relationship between peer consumption pressure on saving behavior

3.3 Pillar III: Peer pressure Benchmarked against Established Variables

To date, peer pressure has not yet been studied in combination with risk aversion and time preference. As a result, previous research lacks the possibility to make inferences about its relative effect size compared to such established variables. A lost opportunity, from my point of view, since especially the variable of peer pressure has to potential to overshadow traditional variables, which would be a beneficial insight for policymaking. As mentioned in previous sections, the changing societal dynamics give stage to peer pressure while risk aversion and time preference remain untouched by such changing dynamics. To detect the relative effect size of peer pressure, hypotheses that include the benchmark variables have been raised:

H5: Compared to risk aversion and time preference, peer saving pressure has a stronger effect on saving behavior.
H6: Compared to risk aversion and time preference, peer consumption pressure has a stronger effect on saving behavior.

3.4 Conceptual Model

Figure 1. Conceptual model
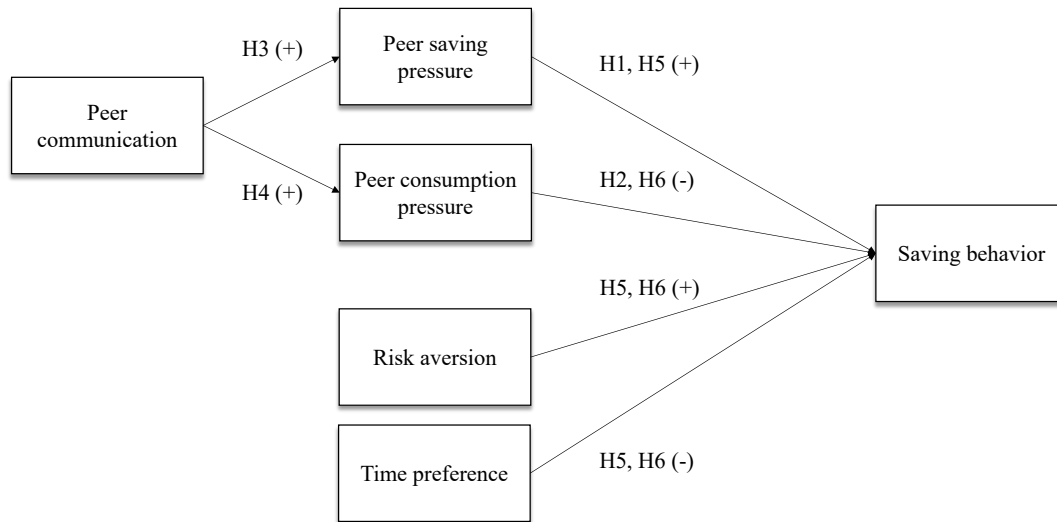
4. DATA COLLECTION

The following chapter covers the data collection method, the survey, and relating construct. Additionally, it provides general insights into the final sample that was generated through the survey. For reproductive purposes, specifically the survey items are explained extensively.

4.1 Data Collection Method

Data was collected through a web-based survey method, which was spread out online in December 2022. The survey generated a total of 307 respondents, of which the characteristics will be elaborated upon at the end of this chapter. For the sake of response maximization, this study used a convenience sampling technique, in which respondents are selected for inclusion in the sample because they are easiest to access. Although convenience sampling lacks randomization, it does generate relatively large sample sizes in case of limited available resources (Kumar, 2018). As part of this method, there were no inclusion criteria identified prior to the sample selection. Additionally, to increase the response rate and to prevent self-selection bias, one randomized price in form of a €20 Amazon voucher was attached to survey participation. Such an incentive has proven to generate more responses and decreases self-selection bias as people that would normally not participate in surveys are now more inclined to do so (Dillman et al., 2014; Roberts et al., 2003). Finally, prior to distributing the survey, a pilot test was conducted with eight individuals to assess the survey based on comprehensibility, after which the survey was modified to its final version. Pretesting is an important part of survey development, as it helps to identify and address potential sources of measurement error, such as response biases or comprehension issues before distributing the survey to the full sample (Tourangeau & Rasinski, 1988).

4.2 Survey

Participating agents were first explained that they were participating in a study that researches the effect of 1) peer pressure 2) risk aversion, and 3) time preference on saving behavior. Further elaboration on the topics was kept to a minimum to prevent the experimenter demand effect in which participants unintentionally change their responses based on what they think the experimenter is looking for, hereby generating biased data (Rosenthal & Rosnow, 2009). The subsequent survey (Appendix A) existed of five different blocks, which will be discussed below.

Block I: Saving Behavior

In block one, participants were asked about their saving behavior, which is the dependent variable of this study. Since solely looking at a snapshot of participants saving accounts would be highly subjective to external factors and situational conditions, resulting inferences would be unreliable. This study therefore takes general 'Saving Ability' as a representation of saving behavior.

The construct Saving Ability contains seven self-assessed statements, with which respondents had to agree or disagree on a seven-point Likert scale. Within this construct, 1 demonstrates strong disagreement; 7 demonstrates strong agreement. The seven-point Likert scale is preferred by many researchers as it has proven to provide the most optimal results due to scale reliability and the presence of a natural midpoint (Churchill & Peter, 1984). The statements on Saving Ability were duplicated from Dangol & Maharjan (2018), however slightly altered to adequately address the current study. The motivation for using such statements stems from the latent nature of the variable Saving Ability. Saving Ability is a latent variable, or unobserved construct, because its value is not directly tied to one specific variable. According to Fornell & Bookstein (1982), "such unobserved constructs can be viewed either as underlying factors or as indices produced by the observable variables" (p. 441). Several observable variables were therefore combined to create a reflective measure of Saving Ability. To ensure construct validity of these variables, internal consistency measures are carried out in the next subchapter.

Block II: Peer Pressure
Survey block two pertains to peer pressure. Since, according to the previous literature covered above, peer pressure can stem from peer saving behavior and peer consumption behavior, this block consists of two parts.

In the first part, Peer Saving Pressure was measured. Respondents were exposed to the following statement: 'I think my peers save more money than I do' and had to comment on this statement based on a seven-point Likert scale. It was made clear that this time, a score of 1; indicates that the respondent saves a lot more than its peers, 4 (the midpoint); shows that the respondent has equal savings as its peers, and 7; reflects that a respondent's peers save a lot more than the respondent does. This measure hence refers to the difference in saving efforts between a participant and his or her peers. Important to mention is that it does not matter whether the respondent thinks this answer represents the actual difference in saving efforts compared to its peers. Reason for this is that, in practice, it is expected that agents are unable to precisely estimate the amount their peers save (Han et al., 2019). As such, the degree of Peer Saving Pressure will more often than not be in the form of perception, rather than actual amounts.

Followed by the question on Peer Saving Pressure, a second question was asked that focused on Peer Saving Communication. This variable captures the degree of communication between peers about saving efforts (i.e., the saliency), as opposed to the difference in saving efforts that was measured in the previous question. In this question, respondents had to comment on the following statement: 'I often talk about saving efforts (the amount we save or plan to save) with my peers'. Respondents could show their degree of agreement based on a seven-point Likert scale, with 1; reflecting strong disagreement, and 7; strong agreement.

In the second part of this block, Peer Consumption Pressure was measured, again in terms of perception. The exact amount of peer consumption is, again, information that an agent normally would not have to his or her disposal. Hence, measuring this variable in terms of perception should be sufficient. Respondents had to judge this following statement: 'I think my peers consume (e.g., buy clothes/vacations, etc.) more than I do'. It was again made clear that the seven-point Likert scale this time indicates that 1; the respondent consumes a lot more than its peers, 4 (the midpoint); they consume equally, 7; the respondent consumes a lot less than its peers.

Finally, respondents were asked about their level of Peer Consumption Communication. Respondents had to assess the following statement: 'I often talk about consumption behavior (things we bought or plan to buy) with my peers'. For this statement, 1; reflects strong disagreement, and 7; reflects strong agreement. Note that this question again refers to the level of communication about consumption behavior (i.e., saliency), whereas the previous question reflects the difference in consumption behavior between a respondent and its peers.

Block III: Risk Aversion

In the third block, respondents were assessed on their degree of Risk Aversion by means of a Multiple Price List (hereinafter: MPL) containing seven different statements with two lotteries. For each statement, participants had to choose which lottery they preferred to take. Letting participants compare and choose lotteries is a popular method of quantifying levels of risk aversion since it directly elicits respondents' degree of risk aversion (Andreoni & Sprenger, 2012; Bommier et al., 2012). All lotteries were presented in the form of an MPL. The MPL is a commonly used method for eliciting risk preferences. It is characterized by its ease of use as respondents simply have to choose between two lotteries for several series of statements. Its key feature is that, over the series of statements, option B (A) is riskier than option A (B) and that the expected value of lottery B (A) increases steeper than that of lottery A (B). In other words, although lottery B is riskier, it eventually yields higher returns (Holt & Laury, 2002). Hence, the moment the respondent switches from choosing one lottery to choosing the other lottery directly shows their level of risk aversion, as it shows by how much money a respondent wants to be compensated for taking more risk. Whereas many types of MPLs exist, the one by Holt & Laury is commonly used. Yet, this MPL gained critics from several researchers who pointed out multiple flaws (Drichoutis & Lusk, 2014; Csermely & Rabas, 2016; Abdellaoui et al., 2011). To correct for these flaws, the current study used an adapted version of the Holt & Laury MPL, in which pay-offs were varied instead of probabilities, that always included one riskless option, and in which pay-offs were increased in magnitude.

Block IV: Time Preference

The final block focused on time preference, which was measured in terms of Impatience (thus, time preference will henceforth be denoted as impatience). To elicit respondents' degree of Impatience, respondents were asked to choose between several intertemporal choice statements. All choices reflected a possibility of A) receiving 500eu right now or B) receiving amount X three months from now. Statements were presented in a similar manner as the Risk Aversion statements, namely by means of an MPL. In the current MPL, amount X increased in each statement, making it more attractive to opt for the later pay-out. The moment a respondent switches from opting for the smaller instant amount to waiting for the larger delayed amount thus reflects his or her degree of (im)patience. This measure is widely used to elicit time preferences (Huffman et al., 2016; Falk et al., 2015; Bradford et al., 2017; Sutter et al., 2013) since it has the advantage that it directly reveals levels of impatience without the necessity of choosing one specific discounting method and estimating the related discount factors.

Block V: Demographic Questions

In the final part of the survey, respondents were asked about several control variables, namely: Age, Gender, Education, Ethnicity, Employment Status, Marital Status, and Income. This block was deliberately positioned at the end of the survey as multiple researchers state that this preserves the feeling of anonymity in a survey. In the current study, respondents' feeling of anonymity is held in high regard since the research topic is likely perceived as private and confidential (Dillman et al., 2014; Groves et al., 2011).

4.3 Construct Validity

As explained above, the construct Saving Ability uses a multi-item scale to measure the corresponding latent variable. This multi-item scale exists of seven observable variables that are expected to be reflective of the underlying concept. Provided that the seven variables are indeed reflective, causality flows from the observable variables to the unobservable variable (Coltman et al., 2008). Hence, causality can only be guaranteed if internal consistency is assured, meaning that the observed variables should measure the same underlying concept. Internal consistency was examined based on the construct's Cronbach's Alpha (CA) and composite reliability score.

CA is considered to be the most frequently used measure to estimate internal consistency. CA is calculated by comparing the correlation between separate scale item scores and total scale item scores with the variance of the separate scale item scores. The resulting Alpha signals the degree to which certain items are related as a group. The higher the Alpha, the more likely the survey items are to generate equal responses, thus reflecting construct reliability (Cronbach, 1951). The commonly accepted threshold for CA is 0.7 (George & Mallery, 2021).

Yet, several researchers claim that drawing inferences merely based on the CA is insufficient. Gagnon et al. (2017) argue that CA only generates partial evidence of internal consistency due of several shortcomings. They therefore suggest substantiating this measure by means of an additional measure, such as the composite reliability score. This score generates an indicator of the shared variance among the observed variables as an indicator of a latent construct (Fornell & Larcker, 1981). The lower bound for this measure is 0.7 (Hair, 2011). However, although preferred by Peterson & Kim (2013), Werts et al. (2017) say its reliability is debatable. Therefore, the current study hence treats this measure as a complementary measure instead of a substation for the CA.

As presented in table 2, the output for both measures exceeds their recommended benchmark. Additionally, with regard to the CA, an in-depth analysis of the Alphas showed that dropping one or more statements from the multi-item scale did not improve the CA. The internal consistency of the construct is thus validated.

Table 2. Construct Reliability

	Cronbach's Alpha (CA)	**Composite Reliability Score**
Saving Ability construct	0.87	0.87

4.4 Final Sample

Eventually, data from 307 respondents was collected. Out of this sample, however, 124 respondents had to be disregarded due to missing values (n = 88) or irrational switching behavior (n = 41) at the MPL lists, which is explained in Chapter 5.1. The resulting sample therefore contains 178 respondents (n = 178), of which the sample characteristics are presented in table 3. The majority of the sample is female (n = 107), with the remaining sample being male (n = 71). This signals a fairly equally distributed sample with regard to gender (60% female, 40% male), which enhances the external representability of this research. Regarding age distribution, however, the sample is strongly skewed to the right, with the vast majority belonging to age category 18-30 (n = 110). Similar distribution inequalities are found in education levels since 84% of the sample is highly educated, which are respondents that have at least completed Higher Vocational Education (n = 149). Yet, income levels are skewed to the right, with the lion's share earning less than €24.999 yearly (n = 81). This can be explained by the employment status of the sample, which shows that about one-third of the sample is student (n = 60). Additionally, an unquestionably large share of respondents has a European ethnicity (n = 141), while other ethnicities are weakly represented. This uneven distribution is likely caused by the convenience sampling technique, which was the preferred sampling technique because of its large reach. Yet, the resulting distribution inequalities potentially affect the generalizability of this study, which impacts the external validity of the results.

Table 3. Sample characteristics

Variable	Frequency	Percentage
Gender		
Female	107	60.1
Male	71	39.9
Total	178	100.0
Age		
18 – 30 years old	110	61.8
31 – 40 years old	19	10.7
41 – 50 years old	6	3.4
51 – 60 years old	36	20.2
61+ years old	7	3.9
Total	178	100.0
Education		
Low education (Secondary Vocational Education or below)	29	16.3
High education (Higher Vocational Education or above)	149	83.7
Total	178	100.0
Ethnicity		
European	141	79.2
Non-European	37	20.8
Total	178	100.0
Employment status		
Employed	106	59.6
Student	60	33.7
Unemployed	12	6.7
Total	178	100.0
Marital status		
Married	57	32.0
Unmarried	121	68.0
Total	178	100.0
Income level		
< €24.999	81	45.5
€25.000 - €74.999	60	33.7
> €75.000	37	20.8
Total	178	100.0

5. RESEARCH METHODOLOGY

The following chapter first explains how several of the above-mentioned variables were transformed to fit into the research model. Subsequently, this research model and its corresponding statistical tests are presented.

5.1 Data Transformation

Within the original dataset, several variables required transformation prior to conducting the analysis. The first set of variables that was transformed, are the seven items that measure the latent variable Saving Ability. The seven items were combined into one construct by means of a composite score. In its most common form, composite scores are mean variables that are derived from multi-item scales. Such composite scores are not only said to generate greater evaluability but also enable the measurement of a latent variable, provided that the construct is valid (Cerully et al., 2017). The current study followed the standard practice of transformation into mean scores, which resulted in a final Saving Ability index ranging from 1 to 7. As discussed in the subsequent subchapter, these mean scores can either be regarded as continuous values or as ordinal values in form of rounded integers.

Secondly, the values that resulted from the MPLs that measure Risk Aversion and Impatience have been transformed into indexes. As explained in Chapter 4.2, the MPLs contain seven statements with either gambles or intertemporal choices. The point at which a participant switches between the two provided choices indicates his or her degree of Risk Aversion or Impatience, depending on the MPL. The indicators that result from these switching points eventually generate a model-free approach as they allow inferences based on indicator comparison. Important to take into account, however, are participants who yielded multiple switching points. Such answering behavior shows either a lack of understanding or focus from the participant since switching more than once is irrational (Holt & Laury, 2002). To illustrate, once a subject switched from the immediate to the delayed payment as he or she reached a point at which they are compensated enough to wait, it does not make sense for this respondent to switch back to the immediate payment in later statements that contain larger delayed payments. Therefore, participants who showed such multiple switching behavior have been disregarded from the analysis, which resulted in a reduced sample of n=178. The remaining switching points were transformed into indicators that signal a participant's degree of Risk Aversion and Impatience.

Finally, the variables Peer Saving Pressure and Peer Consumption Pressure have been transformed to improve their fit to the research question. As originally measured, low scores (i.e., 1, 2, or 3) indicate that a respondent either saves or consumes more compared to its peers, depending on the question. A mid-point score (i.e., 4) reflects equal savings or consumption. High scores (i.e., 5, 6, or 7)

signal that his or her peers save or consume more. Thus, scores from one to four indicate that a respondent experiences no peer pressure, whereas scores from five to seven do indicate peer pressure. Respondents that answered with one, two, three, or four have therefore been pooled together in which their degree of peer pressure was labeled as 'none'. Respondents that answered with a score of five have been labeled as experiencing 'little' peer pressure. Finally, respondents with a peer pressure score of six and seven were labeled as experiencing 'moderate' and 'high' peer pressure respectively. This transformation was applied since downward social comparison (i.e., comparison with peers that are inferior) was eventually determined to be out of the scope of this research.

5.2 Research Model

To answer the research question of this study the formulated hypotheses were tested by means of four different research models. The models and their corresponding variables are summarized in table 4 on the next page. The first column represents the four different topics that comprise this research. The second column shows the related variables which are further explained in column three, with their labels presented in column four. It should again be noted that peer pressure is measured in terms of Peer Saving Pressure and Peer Consumption Pressure separately. Also, recall that both contain a variable on peer pressure (difference in saving or consumption between respondent and its peers) and saliency (degree of communication about saving or consumption efforts), which are two essentially different properties. Column five displays the specific model(s) in which all variables are present, which is further discussed in the next paragraph. The final column shows which hypothesis was answered via the corresponding model.

Table 4. Model variables

Topic	Variables	Measure	Label	Models	Corresponding hypotheses
Saving behavior	Saving Ability	Saving ability construct	n/a	1 – 4	H1 – H6
Peer pressure	Peer Saving Pressure	Difference between respondent and peers	PP	1, 2	H1, H3, H5
	Peer Saving Communication	Degree of communication	PC	2	H3
	Peer Consumption pressure	Difference between respondent and peers	PP	3, 4	H2, H4, H6
	Peer Consumption Communication	Degree of communication	PC	4	H4
Risk aversion	Risk Aversion	MPL	RA	1 – 4	H5, H6
Time preference	Impatience	MPL	IMP	1 – 4	H5, H6
Control variables	Age	Age category	n/a	1 – 4	

As mentioned, column three shows in which model each variable is present. Model 1 and Model 2 are focused on peer saving pressure. Model 1 answers whether Peer Saving Pressure results in increased or decreased Saving Ability, yet the relationship is expected to be positive. This model simultaneously benchmarks the effect of Peer Saving Pressure against Risk Aversion and Impatience. Model 2 researches whether this effect is moderated by saliency in terms of Peer Saving Communication. In Model 3 and Model 4, the focus shifts toward peer consumption pressure. Model 3 explores whether Peer Consumption Pressure decreases Saving Ability and if this effect is stronger than the effect of Risk Aversion and Impatience. Model 4 provides insights into whether the effect of Peer Consumption Pressure is enhanced by the degree of Peer Consumption Communication.

Although, in theory, the four research models could have been combined into one research model, it was deliberately chosen not to do so. First of all, the variables Peer Saving Pressure and Peer Consumption Pressure are expected to be highly related. Chances are high that when a respondent's peers consume a lot, they save little (and vice versa). This would cause multi-collinearity among the variables, a statistical phenomenon that occurs when two or more independent variables in a regression model are highly correlated with each other. This results in less reliable regression results, which are more complex to interpret (Sutter et al., 2013). Additionally, a combined model would require

additional observations due to an increased number of parameters and is less comprehendible for the reader. It was therefore decided to create two separate models for the two types of peer pressure.

To improve the accuracy of the four models and to mitigate confounding effects, the original models controlled for Age, Gender, Education, and Income, as previous research showed that these variables are strongly related to saving behavior (Lopez, 1998; Dangol & Maharjan, 2018; Solmon, 1975; Aidoo-Mensah, 2018). Yet, whereas control variables improve the accuracy of the model, including too many variables in the models risks overfitting (Zhang, 2014). Therefore, after the most accurate statistical test was determined for the four models (as presented in the next subchapter), corresponding Goodness-of-Fit measures were conducted. Based on the output of these measures (Appendix B), it was decided to only control for Age.

5.3 Data Analysis Method

Given the research question and the available data, several potential statistical models were tested to determine the most adequate model. Based on the dependent variable at hand, two possible statistical analyses are Multiple Linear Regression (MLR) and Ordinal Logistic Regression (OLR).

MLR is a statistical technique that is an extension of the Ordinary Least-Squares (OLS) regression in that it allows for involving more than one independent variable. MLR predicts the outcome of the dependent variables through multiple independent variables, based on the linear relationship between the variables (Cohen et al., 2013).

The model requires a continuous dependent variable, which is in essence available in the current dataset. Since the dependent variable Saving Ability is a composite score of seven Likert scale statements, this variable can either be regarded as continuous (since the mean score of all items generates a continuous variable) or as ordinal (Song et al., 2013).

Yet, as the original nature of all seven statements is ordinal, the composite score for Saving Ability can equally remain in its ordinal form. That is, the variable can be classified into a limited number of categories, where the categories have a meaningful order (Agresti, 2010). Pertaining to Saving Ability, its output can be regarded as categories, in which category one indicates a very low saving ability and category seven indicates a very high saving ability.

In the case of such an ordinal dependent variable, the statistical analysis calls for an Ordinal Logistic Regression (henceforth OLR). An OLR is a statistical method that takes the meaningful order of the dependent variable into account. It belongs to the family of logistic regressions, which are used

to analyze binary dependent variables. OLR is commonly used in various fields, such as psychology, education, sociology, health sciences, and economics, as it has the advantage of maintaining the ordinal nature of the data (Calvin, 1998).

In general, OLR estimates the relationship between the ordinal dependent variable and one or more independent variables via a cumulative logit model. It is estimated through maximum likelihood estimation, which provides estimated coefficients that describe the relationship between the independent variable(s) and the ordinal dependent variable. Additionally, the cumulative logit model assumes that the probability of a higher category of the ordinal dependent variable is greater than the probability of a lower category. In other words, the cumulative logit model assumes a meaningful order between the categories of the dependent variable, hence maintaining the ordinal nature of the variable (Calvin, 1998).

To determine the most adequate statistical model, the Goodness-of-fit of all models was examined. A Goodness-of-fit test is a mathematical estimation that models the difference between the observed and predicted data, which generates insights into how well the model fits the data (Lewis-Beck & Skalaban, 1990). Several Goodness-of-fit tests exist, depending on the statistical model that is used. With regards to the MLR models, the R^2 and R^2 adjusted scores are often reviewed to assess the Goodness-of-fit of a certain model. Yet, since only the latter takes the number of added independent variables into account, R^2 adjusted score measure is most adequate to examine the fit of the current models. The threshold of this measure typically lies between 0.7 and 0.9 (Karch, 2020).

To examine the Goodness-of-fit of the OLR models, several measures exist. A commonly used measure is the Hosmer-Lemeshow test, which can be applied to binary, multinomial, or ordinal logistic regression models (Ugba, 2022). The test compares the observed frequencies with the expected frequencies of the dependent variables, followed by a computation of the test statistic that is distributed along the Chi-squared distribution. This test statistic is used to review the null hypothesis that the observed and expected values are the same across all categories, indicating that the model fits the data. Hence, insignificance of the test is aimed for (Hosmer Jr et al., 2013).

Table 5 shows both the R^2 adjusted scores and the Hosmer-Lemeshow p-values for all models of interest. With regards to the R^2 adjusted scores, none of the MLR models satisfy the suggested requirements (i.e., < 0.7). This is possibly caused by the lacking linear relationship between the independent variables and the dependent variable (Neter et al., 1996), which was discovered to be missing after analyzing their relationship graphically. However, based on a 5% significance level, none of the Hosmer-Lemeshow p-values appear to be significant, which signals a proper Goodness-of-fit of the OLR models. Hence, although several researchers claim that it is a misconception that low R^2

adjusted scores by definition imply poor Goodness-of-fit (Karch, 2020), the below-presented output clearly shows a superior fit for the OLR models.

Table 5. Goodness-of-fit output per model

	Model 1	Model 2	Model 3	Model 4
Adjusted R^2	0.277	0.278	0.184	0.187
Hosmer-Lemeshow p-values[1]	0.309	0.128	0.0759	0.962

[1]Hosmer-Lemeshow test H0: No lack of fit dictated

Note: * p < 0.05, ** p < 0.01, *** p < 0.001

6. DATA ANALYSIS

Following the conclusion of the previous chapter, the data was analyzed by means of an Ordinal Logistic Regression (OLR) model. Yet, to guarantee reliable inferences, this model requires several assumptions to be met. Hence, this chapter first covers all assumption checks relating to the OLR model, after which the results of each model are presented and discussed.

6.1 Model Assumptions

6.1.1 Proportional Odds Assumption

One of the key assumptions of OLR models is the proportional odds assumption, also known as the parallel regression assumption. This assumption states that the relationship between the independent variables and the dependent variable is equal across all levels of the dependent variable (Hosmer Jr et al., 2013). In other words, the coefficients of the independent variables that describe the relationship between the lowest category of Saving Ability versus all higher categories of Saving Ability are the same as the coefficients that describe the second lowest category of Saving Ability versus all higher categories of Saving Ability.

Violation of the proportional odds assumption can lead to biased estimates and incorrect predictions. Hence, it is important to check for this assumption by examining the degree of constant relation between the independent variables and the dependent variable across all levels of Saving Ability. Such examination can be carried out via a Brant test. The Brant test evaluates the significance of the difference between the observed cumulative odds ratios and the expected cumulative odds ratios. The cumulative odds ratios represent the odds of being in or below a particular category of Saving Ability, relative to being in a higher category of Saving Ability, for a one-unit increase in the independent variable. The test assumes that the proportional odds assumption holds; thus significance reflects a violation of the assumption (Brant, 1990).

The Brant test generates an Omnibus score that provides an overall assessment of the proportional odds assumption for the model at hand. If the Omnibus score is statistically significant, then the proportional odds assumption is violated. If the Omnibus score is insignificant, then there is no evidence to suggest that the proportional odds assumption has been violated (Brant, 1990). In that case, the OLR model can be considered valid, given that the other assumptions hold as well. Table 6 presents the Omnibus scores that correspond to the null hypothesis of proportional odds. For all models presented, no model shows significant Omnibus scores at all commonly used significance levels (i.e., 0.1%, 1%, 5%). It can hence be concluded that the proportional odds assumption is satisfied.

Table 6. Omnibus output per model

	Model 1	Model 2	Model 3	Model 4
Omnibus	0.32	0.46	0.19	0.61

Note: * p < 0.05, ** p < 0.01, *** p < 0.001

6.1.2 Linearity Assumption

As with any logistic regression model, an important assumption of the OLR model is the assumption of linearity (Bender & Grouven, 1997). Yet, this assumption differs from the linearity assumption that holds for MLR models in that it requires the independent variables to be linearly related to the log odds of the dependent variable instead of with the dependent variable in its original nature. The log odds of the dependent variable represent the natural logarithm of the odds that an event will occur, which can take any value from negative infinity to positive infinity (Hosmer Jr et al., 2013).

If the linearity assumption is violated, the estimated coefficients may not accurately represent the true relationship between the independent variables and the dependent variable. One way to assess this assumption is by separately plotting the independent variables against the log odds of Saving Ability. The resulting plots (Appendix C) all show a linear relationship, from which can be concluded that the linearity assumption holds.

6.1.3 Absence of Multi-Collinearity

The third assumption is the absence of multi-collinearity (Hosmer Jr et al., 2013). Multi-collinearity is a statistical phenomenon that occurs when two or more independent variables in a regression model are highly correlated with each other. This can cause problems in the estimation of the regression coefficients, making them less reliable and harder to interpret. As was found by Sutter et al., multi-collinearity can for instance be expected between the Risk Aversion and Impatience (Sutter et al., 2013). Hence, checking for multi-collinearity is an important step in the analysis of the current models to ensure that the results are reliable and can be interpreted correctly.

To test for the absence of multi-collinearity across the independent variables, a Variance Inflation Factor (VIF) test is commonly used. The VIF test measures the degree to which the variance of the estimated regression coefficient is inflated due to multi-collinearity. A VIF output score of 1 indicates no multi-collinearity, while a VIF output score greater than 1 indicates the presence of some degree of multi-collinearity. Generally, a VIF value between 5 and 10 is considered to be an indication of significant multi-collinearity (Cohen et al., 2013).

Table 7 below shows the VIF output scores for all four models. Considering the above-mentioned thresholds, the independent variables show some degree of multi-collinearity. Yet, since the values remain below 5, the degree of multi-collinearity is not enough to be alarming. Therefore, it is not necessary to remove one or more of the variables from the model.

Table 7. VIF value per model

	VIF values model 1	VIF values model 2	VIF values model 3	VIF values model 4
Peer Saving Pressure	1.422180	1.451969		
Peer Saving Communication		1.404436		
Peer Consumption Pressure			1.281914	1.315522
Peer Consumption Communication				1.190201
Risk Aversion	1.065063	1.133884	1.031073	1.039904
Impatience	1.066265	1.067218	1.061984	1.063080
Age	1.378115	1.693555	1.315462	1.496563

Note: VAF = Variance Inflation Factor

6.1.4 Nature of the Data

Finally, the OLR model requires the dependent variable to be of ordinal nature. Additionally, at least one or more of the independent variables should be either continuous, categorical, or ordinal (Adejumo & Adetunji, 2013). Both assumptions can easily be evaluated with the bare eye since the dependent variable at hand is clearly ordinal, and the independent variables are of categorical and ordinal nature.

6.2 Regression Results

Table 8 shows the output of all OLR models. Recall that model 1 and model 2 explore the relationship between Peer Saving Pressure and Saving Ability, whereas models 3 and 4 model Peer Consumption Behavior against Saving Ability.

Table 8. Ordinal Logistic Regression results per model

Para-meter	Model 1 (saving)			Model 2 (saving)			Model 3 (consumption)			Model 4 (consumption)		
	Beta (ß)	OR	P-value	Beta (ß)	OR	P-value	Beta (ß)	OR	P-value	Beta (ß)	OR	P-value
PP (little)	-0.770	0.462	0.035 *	-1.295	0.273	0.137	0.025	1.025	0.946	-0.866	0.420	0.435
PP (mode-rate)	-1.907	0.148	0.000 ***	-3.361	0.034	0.002 **	0.342	1.408	0.332	0.518	1.679	0.668
PP (strong)	-1.910	0.147	0.000 ***	-3.654	0.025	0.000 ***	0.400	1.492	0.492	-2.038	0.130	0.172
PC				-0.099	0.905	0.384				-0.200	0.817	0.100
RA	-0.024	0.976	0.715	-0.012	0.987	0.853	0.007	1.007	0.908	-0.000	0.999	0.993
IMP	-0.220	0.802	0.001 **	-0.213	0.808	0.002 **	-0.245	0.782	0.000 ***	-0.229	0.795	0.001 **
Age 31-40	1.647	5.192	0.002 **	1.414	4.116	0.012 *	0.673	1.960	0.194	0.589	1.803	0.285
Age 41-50	0.797	2.220	0.294	0.931	2.538	0.232	0.778	2.177	0.321	0.897	2.453	0.262
Age 51-60	1.434	4.196	0.000 ***	1.460	4.309	0.000 ***	1.486	4.421	0.000 ***	1.438	4.214	0.000 ***
Age 61+	1.877	6.535	0.008 **	1.793	6.012	0.013 *	2.272	9.703	0.001 **	2.309	10.073	0.002 **
PP (little) * PC				0.159	1.172	0.477				0.187	1.206	0.433
PP (mode-rate) * PC				0.401	1.493	0.141				-0.033	0.967	0.889
PP (strong) * PC				0.454	1.575	0.043 *				0.494	1.639	0.045*

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ Note: PP = Peer Pressure; PC = Peer Communication; RA = Risk Aversion; IMP = Impatience, OR = Odds Ratio

6.3 Interpretation of the Results

The output, as presented in table 8, shows the regression coefficients, their p-values, and the odds ratios. The regression coefficients, accompanied by their p-values, reflect the change in log odds of moving up one category of Saving Ability for a one-unit increase in the independent variable at hand, holding all other variables constant. A positive significant coefficient indicates that an increase in the independent variable is associated with a higher likelihood of moving up one category of Saving Ability, while a negative coefficient indicates the opposite. Yet, since the regression coefficients that result from an OLR model are scaled in terms of logs, these values are relatively complex to interpret. As such, the regression coefficients have additionally been transformed to odds ratios, which in essence, are the exponentiated regression coefficients. The exponentiated coefficients provide an estimate of the change in odds (instead of the log odds) of moving up one category of Saving Ability for a one-unit increase in the independent variable at hand, holding all other variables constant. An odds ratio greater than 1 implies that an increase in the independent variable is associated with higher odds of moving up in Saving Ability, whereas an odds ratio less than one signals the opposite (Gelman & Hill, 2006). Besides improved comprehensibility, Rosnow & Rosenthal (1996) mention the odds ratio provides a way of measuring the magnitude of the effect (commonly referred to as the effect size), which ultimately increases the practical significance of a research. They argue that by providing such an effect size along with statistical significance, researchers can provide readers with a more complete picture of the results and the corresponding implications.

6.3.1 Model 1

The first model estimates the relationship between Peer Saving Pressure, Risk Aversion, Impatience, and Saving Ability. Based on the output presented in table 8, only Peer Saving Pressure (PP little; p = 0.035, PP moderate; p = 0.000, PP strong; p = 0.000) and Impatience (p = 0.001) show a significant effect on Saving Ability on a 5% significance level, whereas Risk Aversion (p = 0.715) does not seem to have a significant relationship with the dependent variable.

Based on the odds ratios, it can be concluded that for respondents that experience little Peer Saving Pressure, the odds of being in a higher category of Saving Ability is 53.8% [i.e., (1 - 0.462)*100%] lower compared to respondents that do not experience Peer Saving Pressure, holding all other variables constant. For respondents that experience moderate Peer Saving Pressure, the odds of being in a higher category of Saving Ability is 85.2% [i.e., (1 - 0.148)*100%] lower compared to respondents that do not experience Peer Saving Pressure, holding all other variables constant. For respondents that experience high Peer Saving Pressure, the odds of being in a higher category of Saving Ability is 85.3% [i.e., (1 - 0.147)*100%] lower compared to respondents that do not experience Peer Saving Pressure, holding all other variables constant. This shows that Peer Saving Pressure has a

statistically significant negative effect on Saving Ability, in that increased Peer Saving Pressure causes the probability to be in a high level of Saving Ability to decrease. This is illustrated by figure 2 presented below, which shows that for low categories of Saving Ability (i.e., scores below 4), the probability of being in one of these categories increases if the level of Peer Saving Pressure increases (from 'none' to 'strong' on the x-axis). In contrast, for high categories of Saving Ability (i.e., scores above 4), the probability of being in one of these categories decreases if the level of Peer Saving Pressure increases.

Figure 2. Predicted probabilities of Saving Ability per level of Peer Pressure
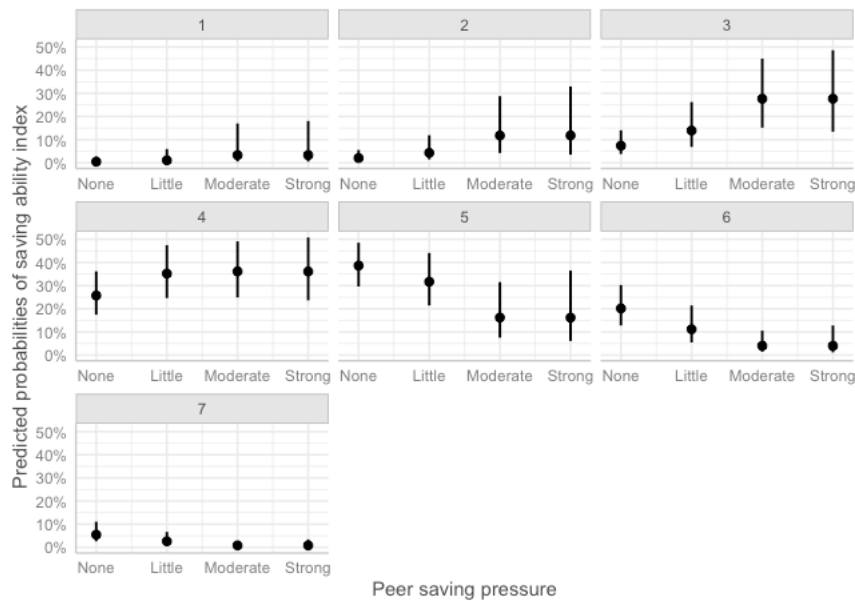
Interestingly enough, this opposes hypothesis 1 which was raised in Chapter 3, which hypothesized a positive relationship between Peer Saving Pressure and Saving Ability. However, since the output shows a negative relationship, this hypothesis can be rejected. The original hypothesis was based on previous literature that found a positive relationship (see table 1), yet, in the experiment conducted by Beshears et al. (2015), the researchers found a negative relationship between peer saving pressure and saving behavior. In their research, they suggest that this is a result of so-called 'up-ward comparison', which is a situation in which agents get demotivated to improve their personal finances because of the feeling of insecurity and failure that the up-ward comparison entails. This will be further elaborated upon in the following chapter.

Additionally, for every unit increase in Impatience, the odds of being in a higher category of Saving Ability decreases by 19.8% [i.e., (1 - 0.802)*100%], holding all other variables constant. In other words, Impatience has a statistically significant negative effect on Saving Ability. Yet, to make inferences about the strength of the effect compared to the strength of the effect of Peer Saving Pressure, it should be tested whether the coefficients are statistically different from each other. Reason for this is

that the magnitude of the coefficients depends on the underlying scale of the independent variables, which in this case, differ from each other. Hence, larger coefficients do not necessarily mean that the effect size is larger. As such, a Wald-test has been conducted. A Wald-test is a statistical test that can be used to determine whether the coefficients in a regression model are statistically different from each other. It does so based on the difference between two coefficients divided by the standard error of the difference. The null hypothesis of the Wald test states that there is no difference between two coefficients (Greene, 2003). Yet the coefficients from model 1 resulted in a significant Wald-test ($p = 0.01$). Hence, this null hypothesis can be rejected at a 1% significance level. The coefficients can therefore be regarded as statistically different from each other. This implies that Peer Saving Pressure has a larger effect on Saving Ability compared to Impatience, which is in line with the earlier presented findings by Karunaanithy et al. (2017). Based on this finding, combined with the insignificant effect of Risk Aversion, hypothesis 5 can be accepted.

6.3.2 Model 2

The second model aims to determine whether saliency in terms of Peer Saving Communication moderates the relationship between Peer Saving Pressure and Saving Ability, by including an interaction term of both variables. Due to this interaction term, the individual coefficients for these variables in model 2 become meaningless, while the coefficient of the interaction term reflects the relationship between Peer Saving Communication and Saving Ability for each level of Peer Saving Pressure. In other words, the coefficients for the interaction term represent the change in Saving Ability associated with a one-unit increase in Peer Saving Communication when Peer Saving Pressure is held constant at a particular level (Aiken et al., 1991).

Based on the regression results as presented in table 8, only the interaction between Peer Saving Pressure category 'strong' and Peer Saving Communication is statistically significant at a 5% significance level ($p = 0.043$). Hence, for all respondents that experience strong Peer Saving Pressure compared to respondents who experience no Peer Saving Pressure, the degree of communication about saving efforts moderates this effect. More specifically, for this group, a one-unit increase in Peer Saving Communication increases the odds of being in a higher category of Saving Ability by 57.6%, holding all other variables constant. This effect is visualized in figure 3 below. The graph represents the effect of Peer Saving Communication per type of Peer Saving Pressure. The right column displays this effect for the respondents that experience high Peer Saving Pressure. On the horizontal axis, the level of Peer Saving Communication is shown. The vertical axis represents the probability of being in that specific category of Saving Ability. Note that for respondents that experience high Peer Saving Pressure, an increase in Peer Saving Communication increases the probability of being in Saving Ability category four or above (i.e., high saving ability). In other words, for people that experience high Peer Saving Pressure, the slope of the relationship between Peer Saving Communication and the probability of being

in a certain category of Saving Ability is positive for high levels of Saving Ability. Since this effect is, however, only found to be significant for the group of respondents that experiences high Peer Saving Pressure, hypothesis 3 is only partly supported.

Figure 3. The effect of Peer Saving Communication for each level of Peer Saving Pressure
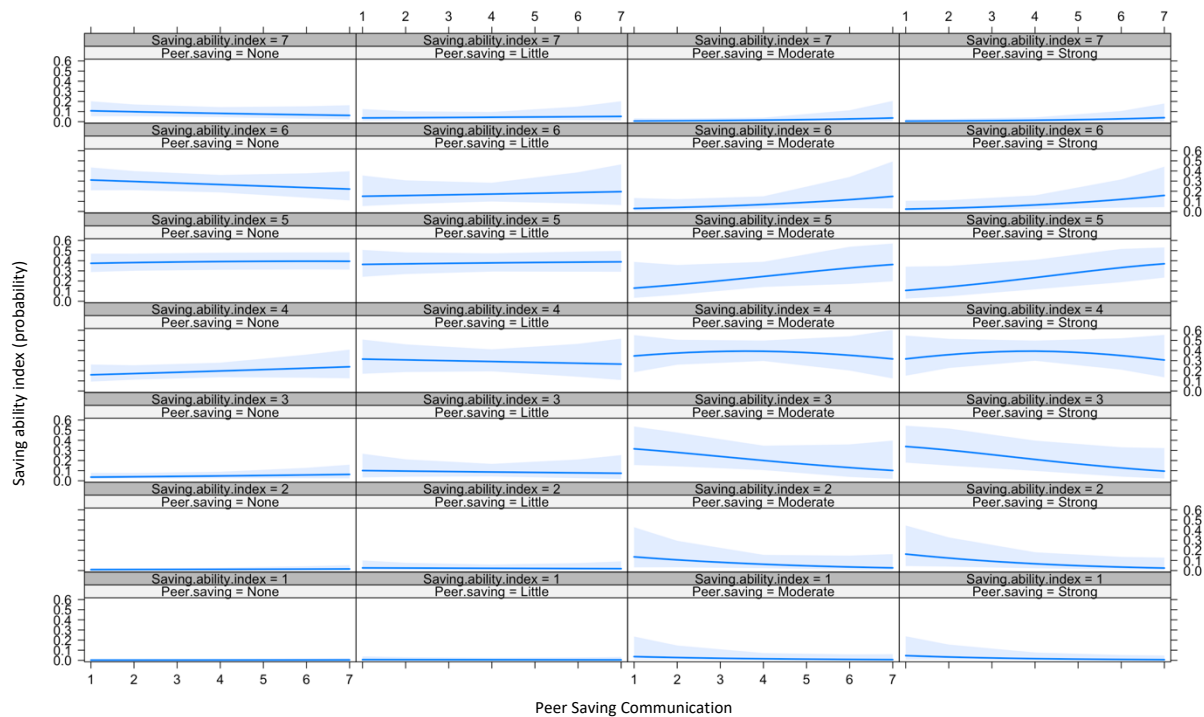
The effect of the interaction term is particularly interesting because it mirrors the direction of the previously found negative effect between Peer Saving Pressure and Saving Ability in that the direction switches from negative to positive. This could potentially be explained by the reasoning that without actual communication about Peer Saving Pressure, assumptions about others create the negative upward comparison effects that seemed to drive model 1. However, once agents actually talk about saving efforts with peers, instead of merely making assumptions, agents might learn from peers and hereby improve their saving ability. This would explain why the coefficient is negative when agents make assumptions about peer saving, whereas it is positive once peer saving is actually discussed. Further elaboration on this is provided in the next chapter.

6.3.3 Model 3

The third model includes peer pressure in terms of peer consumption behavior, in that it includes the variables Peer Consumption Pressure, Risk Aversion and Impatience. Although a negative relationship between Peer Consumption Pressure and Saving Ability was hypothesized in hypothesis 2, a statistically significant relationship was not found (PP little; $p = 0.946$, PP moderate; $p = 0.332$, PP strong; $p =$

0.492). Since none of the coefficients for Peer Consumption Pressure are significant at any of the commonly used significance levels (i.e., 0.1%, 1%, 5%), hypothesis 2 is rejected.

With regards to hypothesis 6, which expects Peer Consumption Pressure to have a stronger effect on Saving Ability compared to Risk Aversion and Impatience, this hypothesis can likewise be rejected. Interesting to mention, however, is that this model again finds a statistically significant relationship between Impatience and Saving Ability ($p = 0.000$) at a 1% significance level but does not find a statistically significant relationship between Risk Aversion ($p = 0.908$) and Saving Ability.

6.3.4 Model 4

The final model again measures whether saliency moderates the relationship between peer pressure and Saving Ability, yet this time tailored to Peer Consumption Pressure and Peer Consumption Communication.

Based on the output in table 8, the interaction term is statistically significant at a 5% significance level for respondents that experience strong Peer Consumption Pressure ($p = 0.045$). Based on the odds ratio, it can be stated that for all respondents who experience strong Peer Consumption Pressure compared to respondents that experience no Peer Consumption Pressure, a one-unit increase in the degree of Peer Consumption Communication increases the odds of being in a higher category of Saving Ability by 63.9%, holding all other variables constant. This effect is illustrated in figure 4 on the next page, which shows the effect of Peer Consumption Communication per type of Peer Consumption Pressure. In the column on the right, this effect is displayed for the group of respondents that experience a high Peer Consumption Pressure. On the horizontal axis, the level of Peer Consumption Communication is shown. The vertical axis represents the probability of being in that specific category of Saving Ability. The graph shows that for respondents that experience high Peer Consumption Pressure, an increase in Peer Consumption Communication increases the probability of being in Saving Ability category 4 or above (i.e., high saving ability). In other words, for people that experience high Peer Consumption Pressure, the slope of the relationship between Peer Consumption Communication and the probability of being in a certain category of Saving Ability is positive for the high-scoring categories of Saving Ability. Yet, since the effect of the interaction term is only significant for the highest category of Peer Consumption Pressure, hypothesis 4 is only partly supported.

Figure 4. The effect of peer consumption communication for each level of peer consumption pressure
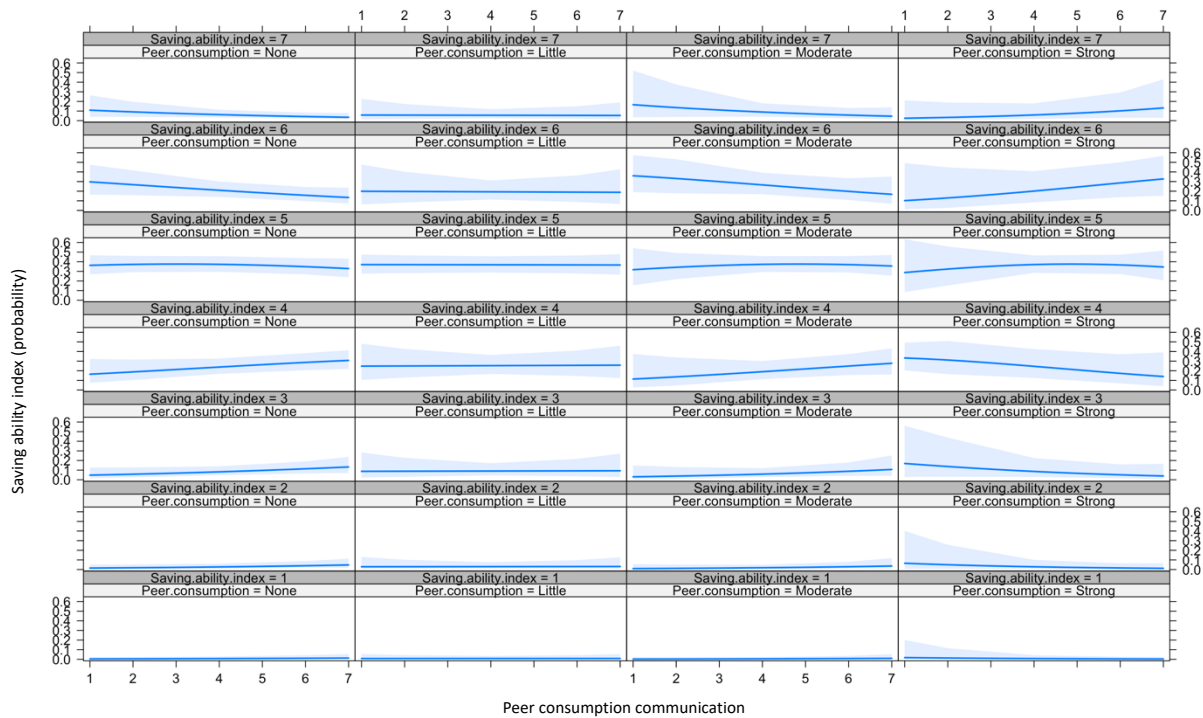
Since hypothesis 2 expected the original relationship between Peer Consumption Pressure and Saving Ability (without an interaction term) to be negative, the positive coefficient of the interaction term is again rather surprising. Whereas it was expected that agents consume more (hence save less) because of the urge to comply with the consumption behavior of peers, the positive relationship between the interaction term and Saving Ability suggests the opposite. This could be caused by the potentially motivating effect that discussing consumption with peers has on the ability to save so that peer consumption patterns can be met in the future.

6.4 Summary of the Results

In conclusion, this chapter has provided an analysis of the data that resulted from the survey. Table 9 on the next page shows a summary of the hypotheses that have been tested and their corresponding findings. All in all, hypothesis 5 is supported fully, hypotheses 3 and 4 are supported partly, and hypotheses 1, 2, and 6 are rejected. However, important to mention is that hypothesis 1 is only rejected because the direction of the relationship was found to be the opposite of the expected direction, whereas the relationship itself was found to be significant. This rather surprising finding, along with the other findings of this study, will be elaborated upon and synthesized with previous research in the next chapter.

Table 9. Summary of the results

Hypothesis	Relationship	Coefficients (ß)	Odds Ratios (OR)	Decision
H1	Peer Saving Pressure -> Saving Ability (+)	-0.770* -1.907*** -1.910***	0.462 0.148 0.147	Rejected
H2	Peer Consumption Pressure -> Saving Ability (-)	0.025 0.342 0.400	1.025 1.408 1.492	Rejected
H3	Peer Communication -> Peer Saving Pressure -> Saving Ability (+)	0.159 0.401 0.454*	1.172 1.493 1.575	Partly accepted
H4	Peer Communication -> Peer Consumption Pressure -> Saving Ability (-)	0.187 -0.033 0.494*	1.206 0.967 1.639	Partly accepted
H5	Peer Saving Pressure > Risk Aversion / Impatience	-0.770* -1.907*** -1.910***	0.462 0.148 0.147	Accepted
H6	Peer Consumption Pressure > Risk Aversion / Impatience	0.025 0.342 0.400	1.025 1.408 1.492	Rejected

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: OR = Odds ratio

7. DISCUSSION

In light of the increasingly important role that peer pressure plays within today's society (Han et al., 2019), this study aimed to reveal its effect on saving behavior whilst benchmarking this effect against established variables in the framework of saving efforts. Building on previous research that was conducted on the role of peer pressure, this study developed a research model which enabled the discovery of the direction (i.e. positive or negative) and source (i.e. peer saving pressure or peer consumption pressure) of the effect of peer pressure. The model additionally included the effect of risk aversion and impatience, two variables that were considered as established variables that affect saving behavior. As presented in the previous chapter, table 9 shows that hypothesis 5 is supported fully, hypotheses 3 and 4 are supported partly, and hypotheses 1, 2, and 6 are rejected. Since these findings are rather inconsistent with the hypotheses that were based on previous literature presented in Chapter 2, their meaning will be further elaborated upon in this chapter.

Firstly, model 1 found a significant relationship between peer saving pressure and saving behavior. However, the direction of this observed effect is opposed to the expected direction of the relationship. As can be seen in Chapter 2 table 1, the bulk of previously conducted studies found a positive relationship between peer saving pressure and saving behavior, in that the saving efforts of peers motivated agents to improve the quality of their personal findings. Yet, the current study finds a negative relationship between peer saving pressure and saving behavior (PP little; $\beta = -0.770$, $p = 0.035$, PP moderate; $\beta = -1.907$, $p = 0.000$, PP strong; $\beta = -1.910$, $p = 0.000$). As presented in table 8, the observed direction is negative, which implies that agents with peers that have a large amount of savings are more likely to have poor saving behavior. Whereas it was expected that peer pressure plays a motivating role in the framework of saving behavior, these results suggest that agents are demotivated by peers with large amount of savings. This finding is, however, not completely surprising, as Beshears et al. (2015) presented the same findings; based on an experiment with 401(k) retirement programs for which peer participation was exposed to respondents, the authors found a similar negative relationship. They suggested that discouragement from upward social comparisons drives this reaction. Upward social comparison is a behavior strategy that stems from the field of psychology. This concept was termed and developed by Festinger (1954), who contemplated that people are unable to self-judge themselves and therefore rely on comparison to others as a form of evaluation. He states that social comparison both serves to validate personal opinions and abilities and provides a benchmark of what is possible to achieve. Such social comparison can be both upward and downward. As for upward social comparison, people compare themselves with someone who is perceived to perform better, for instance, in terms of savings. This behavior strategy can result in both positive and negative feelings. According to Marsh and Parker (1984), upward social comparison can result in feelings of inferiority (being of

lower status or quality compared to someone else), leading to negative emotions. Examples of this are increased depression (Feinstein et al., 2013) and lower self-esteem and body image (De Vries & Kühne, 2015) due to upward social comparison resulting from the use of social media. Yet, Collins (1996) mentions that upward social comparison can be beneficial since it has the potential to motivate individuals to improve their performance. This motivating effect was also found within saving behavior by Raue et al. (2020). Their experiment showed that participants that were told that their saving efforts were average or below average increased their savings by a larger amount compared to participants that were told to be overperformers or that received no comparison information. The findings of Beshears et al. (2015) and Raue et al. (2020) are therefore diametrically opposed, which shows the need for nuance regarding the direction of this effect. The line of reasoning that the current findings could be a result of upward social comparison therefore remains mere speculation.

The second, less surprising inference that can be drawn from model 1 is that peer saving pressure plays a more prominent role within saving behavior compared to risk aversion and impatience. As presented in Chapter 2, years and years of research point to the importance of the latter two variables within the framework of saving behavior. Yet, once added to a model that includes peer saving pressure, impatience (ß = -0.220, p = 0.001) was found to be less powerful than peer saving pressure (PP little; ß = -0.770, p = 0.035, PP moderate; ß = -1.907, p = 0.000, PP strong; ß = -1.910, p = 0.000), as confirmed by a significant Wald-test (p = 0.01). Additionally, risk aversion even lacked a significant effect (p = 0.715). This could be explained by today's societal changes that strongly enhance the role of peer pressure, whereas they do not directly affect risk aversion and impatience. Increased globalization and social media, for instance, cause larger and more interactive peer networks, which potentially explains the strength of the effect relative to risk aversion and impatience. This finding especially has major implications for policymaking, which will be reviewed in Chapter 8.2.

Based on the negative relationship that was found between peer saving pressure and saving behavior in model 1, the findings of model 2 are notable. This model showed that for respondents who experience high levels of peer saving pressure, peer communication about saving efforts (i.e., increased saliency) had a significant positive (ß = 0.454, p = 0.043) effect on saving ability. This finding is remarkable since the moderating effect of peer communication caused the direction of the relationship between peer saving pressure and saving behavior to flip from negative to positive. A possible explanation for this finding is supported by figure 5 (Appendix D), which shows that peer communication about saving efforts is highly skewed to the right. This signals that saving efforts are rarely discussed within peer groups, which is supported by the research by Han et al. (2019), who address that saving is not salient. Building on this insight, the mirrored direction that was found could reflect a shift from upward social comparison to peer learning. In other words, while agents might experience the negative effects from upward social comparison simply based on inferences they make about their peers, actually discussing

saving efforts with their peers could cause encouragement to improve saving behavior which would explain the positive relationship that was found. A study that investigated the effect of discussions about saving efforts with peers was conducted at Harvard. By means of an experiment, the authors studied the effect of a peer group savings program on precautionary savings, which focused on discussing saving goals. They found that for the treatment group that participated in the savings program, deposits to the savings account grew 3.7-fold, and the average saving balance nearly doubled (Kast et al., 2018). This shows how group discussion can benefit saving behavior, which is in line with the current finding.

Model 3 examined whether peer consumption pressure negatively influences saving behavior. The results of this model showed that peer consumption pressure did not have a significant effect on saving behavior (PP little; $p = 0.946$, PP moderate; $p = 0.332$, PP strong; $p = 0.492$). This finding is less unexpected than the previous findings since only little prior research exists on the relationship between peer consumption pressure and saving behavior specifically. As presented in Chapter 2, many authors showed a clear relationship between peer consumption pressure and consumption behavior. Although this demonstrates that peer consumption pressure affects consumption behavior, it does not yet prove a link with saving behavior. To the best of my knowledge, only the study by De Giorgi et al. (2016) to some extent focused on the relationship with saving behavior and found that respondents who took peer consumption into account deviated from the optimal saving behavior. Additionally, Han et al. (2019) argued that the saliency of consumption causes agents to make false inferences about saving efforts of peers, hereby negatively affecting saving behavior. Yet, the latter study is rather theoretical in nature, which shows that previous insights into the relationship between peer consumption pressure and saving behavior are narrow. It is therefore less surprising that a significant relationship was not found. An interesting insight, however, results from the insignificance that was found for peer consumption pressure in that it suggests that peer pressure stems more from peer saving pressure compared to peer consumption pressure.

Model 4 again showed a rather surprising result. The model included an interaction term between peer consumption pressure and peer consumption communication which is significant at a 5% significance level for respondents that experience a high level of peer consumption pressure (ß = 0.494, $p = 0.045$). Results showed that for respondents that experience high levels of peer consumption pressure, communicating about consumption behavior and initiatives caused improved saving behavior. This is surprising in the sense that the direction of the original relationship was hypothesized to be negative since Han et al. (2019) argue that high levels of peer consumption cause agents to increase consumption and decrease savings. A potential explanation for the opposing relationship that was found could be that agents are motivated to improve their saving behavior once they communicate about consumption behavior with their peers so that they can keep up with their peers' consumption levels. This line of reasoning has previously been explored by Duesenberry (1948) who hypothesized that "the

strength of any individual's desire to increase his consumption expenditure is a function of the ratio of his expenditure to some weighted average of the expenditures of others with whom he comes into contact". This reasoning could be extended by arguing that this desire ultimately causes saving behavior to improve. To illustrate, if agents were not influenced by peers to increase consumption, there would be less need to save up for certain expenditures, whereas a desire for increased consumption calls for either improved saving behavior or increased income streams. This potentially justifies the rather counter-intuitive positive relationship that was found between peer consumption communication and saving behavior. Yet, further research will be needed to validate this reasoning.

All in all, at least half of the predefined hypotheses have been accepted. Peer saving pressure has been shown to play an important role within saving behavior, thereby outplaying the effect of risk aversion and impatience. Yet, the direction of certain effects that were found was considered unexpected, especially once moderated by peer communication. In addition, the results suggest that the source of peer pressure stemmed mostly from peer saving pressure. In Chapter 9, suggestions are provided for further research that should discover the root causes of the current findings.

8. IMPLICATIONS

8.1 Theoretical Implications

In terms of value added to the field, this study contributes in multiple ways. First, the regression results provide new insights into the direction of the relationship between peer saving pressure and saving behavior. The results namely show that the inferences made by several previous studies that find a positive relationship between the two variables can be questioned. More specifically, the current study complements the, to my knowledge, only study that found a negative relationship between peer saving pressure and saving behavior (Beshears et al., 2015). This implies that a positive relationship between the two variables should not be regarded as obvious and that role of upward social comparison within saving behavior should not be neglected. These findings were eventually extended by showing that increased saliency of peer saving efforts can reverse the negative relationship (likely because of peer learning) for agents that experience high levels of peer saving pressure. The current study therefore adds dimension to the existing literature in the sense that it not only contradicts much previous literature but also provides insights into how to address the negative effect, which is beneficial for policy making. Finally, to the best of my knowledge, this is the first study that benchmarks the effect of peer pressure against both risk aversion and impatience. The resulting conclusion that peer pressure plays a more prominent role within saving behavior compared to impatience and risk aversion can therefore be regarded as a major contribution to the field since it provides direction within the puzzle of low savings.

With regard to peer consumption pressure, the contributions to the field are less prevalent. The lacking significant relationship between peer consumption pressure and saving behavior retains us from supporting the previous study by De Giorgi et al. (2016), who showed that participants that took peer consumption into account deviated from the optimal saving behavior. Yet, the interaction effect (that accounts for the degree of peer communication about consumption behavior) that was found to be significant does provide new insights as it contradicts the conclusion of the study by Han et al. (2019). The authors argue that increased saliency of consumption behavior causes an agent to infer that peers save little, which eventually causes that agent to similarly save little. This is refuted by the results of the current study which showed that increased saliency through communication about consumption improved saving behavior, potentially because it motivates agents to save up for expenditure goals that were inspired by peers. The current study hence provides new insights into the potential positive effect of peer communication about consumption behavior. Additionally, to the best of my knowledge this is the first study to simultaneously assess both peer saving pressure and peer consumption pressure in relation to saving behavior. This study therefore sheds new light on the source of peer pressure, which is, based on the current findings, expected to mostly originate from peer saving pressure.

8.1 Practical Implications

The findings of this study generate several practical implications, which mainly pertain to peer saving pressure. The results provide interesting new insights in terms of financial policymaking, specially tailored to peer communication about saving efforts, since this has shown to significantly improve saving behavior. In Chapter 6, model 2 showed that for respondents who experience high levels of peer saving pressure, communication about saving efforts among peers shifts the negative effect on saving behavior to a positive effect. In practice, this implies that increasing the saliency of saving efforts, such as talking about how much you and your peers aim to save within one year, could improve someone's saving behavior. Yet, as shown in the bar chart in Appendix D, peer saving communication is highly skewed to the right with most of the respondents disagreeing with the statement 'I often talk about saving efforts (the amount we save or plan to save with my peers'. This is in line with the study by Han et al. (2019), who claim that non-consumption is not salient. Keeping the current findings in mind, this signals that financial policies should be focused on increasing and facilitating conversations about saving. The effect of corresponding policies was verified in the earlier mentioned experiment conducted at Harvard (Kast et al., 2018), in which a strong effect of saving groups (that collectively discuss saving goals) on saving behavior was found. Recall that participation in the saving group resulted in a 3.7-fold increase in saving deposits and almost a 200% increase in average saving balance. This hence is an example of how peer effects can be practically exploited to improve saving behavior.

The Harvard case study simultaneously bridges to the second practical implication that flows from our findings, namely that policies on peer saving effects should be prioritized over policies pertaining to risk aversion and impatience. Their experiment namely contained a second treatment group, who were offered a 5% interest rate (compared to an initial 0.3%) on their savings account. Yet, their results showed that for the majority of participants, this treatment did not have any effect. In a sense, increased interest rates can be considered as a policy against the negative effect of impatience on saving behavior, in that increased interest rates are a compensation for retaining the money in a bank account by delaying consumption desires. By means of the increased interest rates, agents are encouraged to refrain from immediate consumption. Yet, the Harvard study showed that such increased interest rates had no effect, whereas the peer groups did show a positive effect on saving behavior. This therefore suggests that peer effects play a larger role than impatience, hereby substantiating the current findings. Such an insight provides financial institutions and policymakers with more direction as it shows that the focus should be shifted from traditional policies to more contemporary policies that account for peer effects.

9. LIMITATIONS AND FUTURE RESEARCH

Although this study brings forth several theoretical and practical contributions, as with any academic research, the study nevertheless poses multiple limitations. The first and foremost limitation is the sample size of the study. As explained in Chapter 4, the final sample size was reduced to 178 respondents due to survey dropouts and irrational switching behavior in the Multiple Price Lists. This low sample size is especially worrying when analyzed by an Ordinal Logistic Regression (OLR) model, which is the statistical model that was used to generate the study results. Since this model is a complex model with many parameters (depending on the number of categories of the independent variable and the number of independent variables), much data is needed to accurately estimate the parameters and avoid overfitting (Hosmer Jr et al., 2013). Although there is no absolute lower limit for the required sample size of an OLR model, various researchers suggest that there should be at least 100-200 respondents per category of the dependent variable as a rule of thumb (Agresti, 2010; Harrell, 2001; Hosmer Jr et al., 2013). For the current study, in which the dependent variable contains seven categories, that would imply a minimum sample size of 700 respondents. The current sample size clearly does not meet that requirement. This, combined with the lacking randomization as a result of the convenience sampling method, jeopardizes the reliability of the inferences that were drawn based on the study results.

In addition to this, the accuracy of the measures for saving ability, peer pressure, and peer communication can be questioned. Recall that the latter two variables were assessed by means of a self-reported measure. Although this measure was chosen due to limited resources, self-reported surveys may be subject to biases and inaccuracies such as the social desirability bias or memory errors. The social desirability bias would cause respondents to answer questions such that they believe their answers will be positively perceived by others instead of providing their true opinions or beliefs (Arnold & Feldman, 1981). Especially with financial or social concepts, such as saving behavior or social positions, this bias might be lurking. Memory errors, however, are specifically present when respondents are asked to describe the frequency of events (Tourangeau & Yan, 2007). The latter applies to the degree of peer communication, in which respondents were asked to estimate how often they talk about a certain matter. It might have been difficult for respondents to accurately recall and report the frequency of the events questioned. Therefore, both self-reported measures potentially harm the representativeness of the data that was generated. It would hence be suggested to conduct a (field) experiment in which these variables can be observed directly instead of relying on self-reported measures.

Furthermore, the reliability of the results on risk aversion can be queried. Firstly, this variable is known to be influenced by wealth effects, which have not been accounted for in the current study.

According to Arrow (1984), wealth effects are characterized by an increased willingness to take risks as wealth increases. This applies to the current study in the sense that respondents with high-quality saving behavior (i.e., high scores on the dependent variable) are expected to have a large amount of savings and are therefore likely to be less risk-averse. The relationship between risk aversion and saving behavior is therefore possibly subjected to some level of reversed causality. As such, the provided coefficient and odds ratio for risk aversion may not accurately represent the relationship with saving behavior and may therefore be biased or incorrect. In addition, the low predictive power of the variable has been questioned by Sutter et al. (2013). The authors conducted an experiment among children that focused on the impact of risk aversion and impatience on health, saving decisions, and school performance. They found that whereas impatience was a strong predictor of saving decisions, risk aversion was a weak predictor, partly due to the low predictive power of experimental measures of risk aversion. They mention that choice lists that elicit risk preferences are weak predictors of field behavior due to the domain-specific components and perceptions of risk attitudes. With regards to the current study, this calls the measure for risk aversion and the validity of the variable as a benchmark into question.

The final limitation of this study readily gives stage to opportunities for future research, as it concerns the lacking understanding of the underlying causes of the study results. Although upward social comparison is expected to drive the findings of model 1, peer learning is expected to generate the findings of model 2, and peer motivation is likely to cause to findings of model 3, this is purely based on speculation. Due to the scope of this research, only the variable relationships and their corresponding directions were analyzed whereas their root causes were not analyzed on a deeper level. Hence, although the findings of the current study can be considered as a contribution, they primarily act as a starting point and call for future research. More light should be shed on the underlying cause of why certain peer effects occur, preferably via focus groups or other ways of qualitative research which are commonly used measures to uncover underlying causes (Glitz, 1997). Additional interesting research topics could concern the moderating effect of gender, education, ethnicity, living location, employment status, marital status, and income groups within the effect of peer pressure on saving behavior. Although data was collected on these variables, it was decided to exclude them from the research due to the sample size constraints and risk of overfitting.

A final interesting extension of the current research would be to examine additional measures of saving behavior. One could for instance think of a measure that combines both saving and investment initiatives or panel data on deposits and withdrawals to saving accounts (as opposed to the current cross-sectional self-assessment of saving behavior). Additionally, a more holistic measure of overall financial health should be considered. Middlewood et al. (2018) mention that whereas previous research on impatience was primarily tailored to saving behavior, overall individual financial well-being is a more

adequate measure. According to the authors, individual financial well-being does a better job at assessing overall financial goals that are not solely reflected by traditional liquid savings.

All in all, further research would benefit from a deeper understanding of the underlying causes of the relationship between peer pressure and saving behavior, in which saving behavior should be assessed more holistically, given that the minimum sample size requirements are met and experimental measures adequately predict field behavior.

10. CONCLUSION

In today's society, the presence of peer pressure cannot be ignored. Agents are continuously influenced by their social surroundings, which are constantly reinforced by social media. The visibility bias explains how the saliency of consumption (compared to non-consumption) is enhanced by social media. This causes agents to make (often false) inferences about the saving efforts of their peers. Because, if peers consume lavishly, they must not save anything, right? This is expected to feed into a positive feedback loop of overconsumption, resulting in personal saving deficiencies. On the contrary, however, much previous research acknowledges the potential benefit of peer pressure on saving behavior as high levels of peer saving could motivate agents to save. This readily demonstrates the complexity of the relationship between peer pressure and saving behavior, as it can stem from peer consumption pressure as well as peer saving pressure; two sides of the same coin. Yet, previous research does not agree on the direction of their effect on saving behavior nor how their saliency affects this relation. Additionally, it remains unclear which type of peer pressure is related strongest to saving behavior. A final pitfall is that although the effect seems substantial, the effect size has, to the best of my knowledge, not yet been compared with established influencers of saving ability.

In light of the above-raised questions, the current study has studied three pillars through a total of six hypotheses. Pillar one investigated the direction of the effect of the two types of peer pressure on saving behavior. The second pillar examined whether the saliency, in the form of peer communication, moderates this relation. The final pillar benchmarked the effect size of both types of peer pressure against established variables; risk aversion and impatience. According to previous literature risk aversion and impatience naturally tie into saving behavior, in which they positively and negatively affect savings respectively. To study all pillars, survey data on 178 subjects was analyzed through an Ordinal Logistic Regression. Results show that peer saving pressure negatively affected saving behavior. While this finding contradicts most previous research, similar results were found by Beshears et al. (2015), who suggest this is attributed to discouragement that results from social upward comparison. Interestingly, once moderated by the saliency of peer saving pressure (i.e., level of communication about peer saving efforts), the relationship mirrored. For respondents that experience high levels of peer saving pressure, increased peer saving communication caused improved saving behavior. This is in line with previous research, which found that such communication facilitates learning effects. Finally, the effect of peer saving pressure was found to outraise the effect of risk aversion and impatience. In contrast to this, no significant relationship was found between peer consumption pressure and saving behavior. Yet, once moderated by saliency (i.e., level of communication about peer consumption behavior), a significant positive relation with saving behavior was found. This is surprising, as one would expect this relationship to be negative. A possible

explanation for this finding is agents who are motivated to increase savings to keep up with peer consumption behavior.

In any case, the current findings show the complexity of the puzzle of personal saving decisions and the part that peer pressure plays. They contribute to the field in that they shed more light on the source and direction of peer effects and show that the effect size of peer saving pressure outraises that of risk aversion and impatience. Upward social comparison, peer learning, and peer motivation seem to drive the effects that were found. These insights pave the way for modernized financial policies which, in order to improve saving behavior, should mainly focus on the effect of peer learning. In addition, policies should shift from traditional policies, such as interest rates that try to combat impatience, to contemporary policies that account for peer effects. However, that having said, the results of this study should be interpreted with care, as several limitations, such as the deficient sample size and reliability of the variable measurements, harm the accuracy of the findings. Further research would therefore benefit from improvement in both matters. Additionally, as the cognitive and behavioral root causes that were suggested to cause the directions that were found (i.e., social upward comparison, peer learning, peer motivation) are based on speculation, they should be explored further. Suggestions that were given rely on qualitative measures such as focus groups, further exploration of demographics moderators, and highlighting the importance of a more holistic measure for saving behavior such as overall financial wealth.

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APPENDIX

A. Survey

BLOCK 1: SAVING BEHAVIOR

Please comment on the following statements

Strongly disagree			Neither agree nor disagree			Strongly agree
1	2	3	4	5	6	7

If I need to save money for something longer than 1 month, I always manage to do so

When I get money, I never spend it immediately

I think saving money is easy

I put money aside for the future on a regular basis

I always follow a careful budgeting plan

I always have money available in the event of an emergency

I always manage to save for certain goals

BLOCK 2: PEER PRESSURE

Please comment on the following statement (peers = your friends and/or acquaintances of equal age)

I think I save a lot more than my peers do			I think we have equal savings		I think my peers save a lot more than I do	
1	2	3	4	5	6	7

I think my peers *save* more money than I do

Please comment on the following statement (peers = your friends and/or acquaintances of equal age)

Strongly disagree			Neither agree nor disagree			Strongly agree
1	2	3	4	5	6	7

I often talk about *saving efforts* (the amount we save or plan to save) with my peers

Please comment on the following statement (peers = your friends and/or acquaintances of equal age)

I think I consume a lot more than my peers do			I think we consume equally			I think my peers consume a lot more than I do
1	2	3	4	5	6	7

I think my peers *consume* (e.g. buy clothes/vacations etc) more than I do

Please comment on the following statement (peers = your friends and/or acquaintances of equal age)

Strongly disagree			Neither agree nor disagree			Strongly agree
1	2	3	4	5	6	7

I often talk about *consumption behavior* (things we bought or plan to buy) with my peers

BLOCK 3: RISK AVERSION

Please choose A or B for each statement

	Choose between option A or B	
	A	B
A) Receive €80 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O
A) Receive €100 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O
A) Receive €120 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O
A) Receive €140 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O
A) Receive €160 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O
A) Receive €180 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O
A) Receive €200 for sure, or B) a 50% chance to win €300 and a 50% chance to win €0	O	O

Please comment on the following statement

Strongly disagree			Neither agree nor disagree			Strongly agree
1	2	3	4	5	6	7

In financial situations (e.g. stocks, loans, investments, gambles) I am a person who tries to avoid taking risks

BLOCK 4: TIME PREFERENCE

Please choose A or B for each statement

	Choose between option A or B	
	A	B
A) Receive €500 right now, or B) Receive €512,50 in 3 months from now	O	O
A) Receive €500 right now, or B) Receive €525 in 3 months from now	O	O
A) Receive €500 right now, or B) Receive €550 in 3 months from now	O	O
A) Receive €500 right now, or B) Receive €600 in 3 months from now	O	O
A) Receive €500 right now, or B) Receive €650 in 3 months from now	O	O
A) Receive €500 right now, or B) Receive €700 in 3 months from now	O	O
A) Receive €500 right now, or B) Receive €750 in 3 months from now	O	O

Please comment on the following statement

Strongly disagree			Neither agree nor disagree			Strongly agree
1	2	3	4	5	6	7

I tend to be very impatient when it comes to financial decisions (decisions about things you are considering to buy, like clothing, a vacation or a car)

BLOCK 5: DEMOGRAPHICS

What is your age?

What is your gender?

Female

Male

Other

What is the highest degree of education you have completed?

No education

Highschool

Secondary vocational education (MBO)

Higher vocational education (HBO)

Bachelor's Degree

Master's Degree

PhD or higher

What is your ethnicity? (Choose the one which is most applicable to you)

European

North American

Latino

African

Asian

Australian

What is your employment status?

Full time employed

Part time employed

Self employed

Unemployed

Retired

Student

Other

Marital status

Married

Unmarried

What is your yearly income level (before taxes)?

Below €9.999

€10.000 - €24.999

€25.000 - €49.999

€50.000 - €74.999

€75.000 - €99.999

€100.000 - €149.999

€150.000+

B. Goodness-of-Fit Check for Control Variables

Table 10. AIC output per model.

	Model 1	Model 2	Model 3	Model 4
AIC prior to dropping[1]	557.40	560.66	581.74	584.99
AIC post dropping[2]	554.16	556.54	577.84	580.41

[1]Controlling for Age, Gender, Education, Income
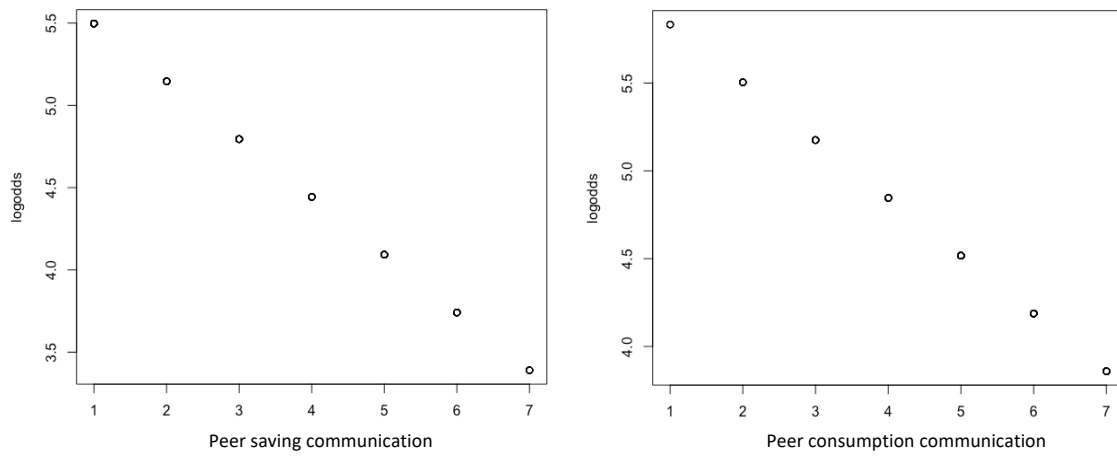[2]Only controlling for Age
Note: low AIC scores signal improved model fit compared to high AIC scores
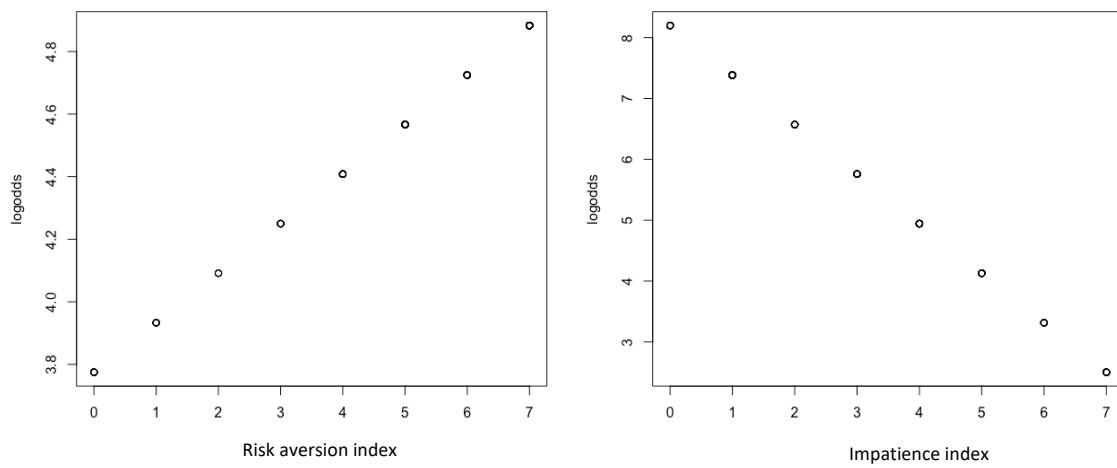
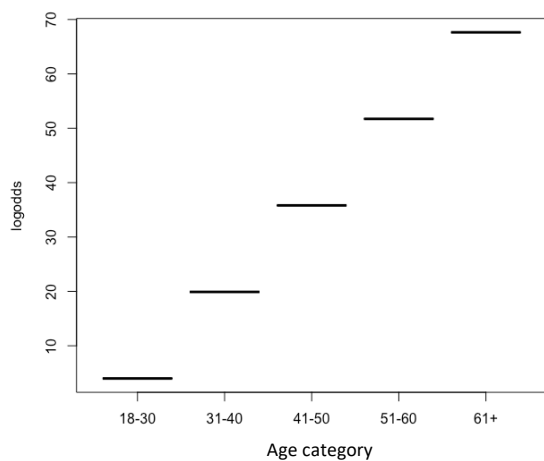## C. Linearity Plots

C.1. Peer Pressure Plots
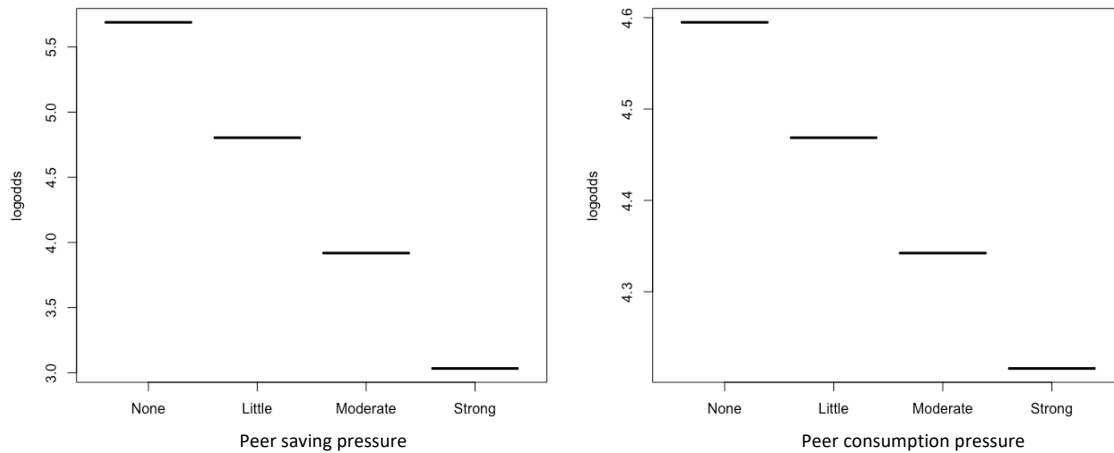
C.2 Peer Communication Plots

C.3 Risk Aversion and Impatience Plots

C.4 Age Category Plot

D. Distribution of levels of Peer Saving Communication

Figure 5. Distribution of Peer Saving Communication

Skewness = 0.18

colour
— Mean
— Median
— 25th Percentile

Frequency

Degree of peer saving communication