CATÓLICA LISBON
BUSINESS & ECONOMICS

Impact of Disclosing Nudges in a Financial Context

Jessica Caldeirão Rodrigues

Dissertation written under the supervision of Daniel Fernandes

Dissertation submitted in partial fulfilment of requirements for the MSc in Management with specialization in Strategy and Entrepreneurship, at the Universidade Católica Portuguesa, 6th of January 2021.

Abstract

Title: Impact of Disclosing Nudges in a Financial Context

Author: Jessica Caldeirão Rodrigues

Nudges are subject to substantial literature debate due to their subtle nature, as they manipulate individuals' decisions in a non-transparent way. Therefore, making a nudge transparent might alter its effectiveness.

This study was designed to ascertain what is the impact of disclosing nudges in a financial context, particularly in a saving scenario, and how it affected saving contributions, trust towards the bank, and customer/bank relationship for both type 1 and type 2 nudges. A survey was conducted among 613 participants. Overall, respondents did not change their saving contribution, and trust and relationship were not significantly damaged, suggesting that financial nudges can be transparent and effective, similarly to what was found in other fields. The type of nudge used does not significantly influence the saving contribution, nor trust. Nonetheless, the relationship with the bank presented more sensitive results upon nudge disclosure. The factors that influence the saving contribution, trust, and relationship were investigated and the bank's perceived intention with the nudge strategy was the most relevant aspect.

Keywords: Nudge, Nudge Disclosure, Transparency, Type 1 Nudge, Type 2 Nudge, Saving Contribution, Trust, Relationship, Financial

Sumário Executivo

Título: Impacto da Divulgação de *Nudges*[1] num Contexto Financeiro

Autor: Jessica Caldeirão Rodrigues

Os *nudges* estão sujeitos a debates substanciais na literatura devido à sua natureza subtil, pois manipulam as decisões dos indivíduos de uma forma não transparente. Portanto, tornar um *nudge* transparente pode alterar a sua eficácia.

Este estudo foi elaborado para averiguar qual é o impacto da divulgação dos *nudges* num contexto financeiro, particularmente num cenário de poupança e como é que tal afetou as contribuições de poupança, a confiança no banco e a relação cliente/banco para ambos os *nudges* de tipo 1 e tipo 2. Foi realizado um questionário com 613 participantes. No geral, os entrevistados não mudaram a sua contribuição de poupança e a confiança e o relacionamento não foram significativamente prejudicados, sugerindo que os *nudges* financeiros podem ser transparentes e eficazes, similarmente ao que foi descoberto noutras áreas. O tipo de *nudge* utilizado não influencia significativamente a contribuição de poupança, nem a confiança, porém o relacionamento com o banco apresentou resultados mais sensíveis à divulgação do *nudge*. Os fatores que influenciam a contribuição de poupança, confiança e relacionamento foram investigados e a intenção percecionada do banco com a estratégia do *nudge* foi o aspeto mais relevante.

Palavras-Chave: *Nudge*, Divulgação de *Nudge*, Transparência, *Nudge* Tipo 1, *Nudge* Tipo 2, Contribuição de Poupança, Confiança, Relacionamento, Financeiro

[1] Embora "*Nudge*" não tenha uma tradução direta em Português, palavras como "empurrão" e "incentivo" podem estar associadas ao termo "*Nudge*".

Acknowledgments

This dissertation is the culmination of a journey full of adventure and challenges. It is the result of a path with ups and downs, effort, but most of all happiness for accomplishing a dream. Therefore, I would like to thank all the people that contributed to my academic and personal development, and the concretization of this thesis.

Firstly, I would like to thank Professor Daniel Fernandes, for his guidance and support throughout the development of this dissertation.

I would also like to express my gratitude to Professor Anna Bernard for all the feedback and valuable insights provided during the execution of this thesis.

I am also thankful to everyone that took some of their time to answer my research survey and to share it, without whom this research could have not been conducted.

My family and friends for always being there for me, for the support, motivation, and continuous inspiration.

Last, but not least, I want to express my deepest gratitude to my mom, my dad, and my brother, who have always stood by my side, in the good, the bad, the inspiring and not-so-glamorous moments, nothing of this would be possible without you. Thank you for all the opportunities that you gave me and for always pushing me to follow my dreams and accomplish them. All that I am today, I owe it to you. I am forever deeply grateful for everything.

Thank you all.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

FW – Free Will

PR – Psychological Reactance

RQ – Research Question

1. Introduction

1.1 Topic Presentation and Problem Statement

As rational beings, we expect to make rational choices, at least according to classical economic theory. However, studies done in the area of behavioral economics, a relatively recent field, have been consistently proving that we make irrational and biased decisions. In our daily life, we are overloaded with information, and it would be nearly impossible to process all of it, as we do not always have the time, willingness, or capacity to do so. Hence, individuals present bounded rationality (Bolton & Ockenfels, 2012; Simon, 1972), often relying on heuristics and automatic mechanisms (Kahneman, 2012), which sometimes might result in suboptimal decisions. For instance, humans tend to stick with the default option to avoid the burden of making a decision, even if the default option is donating an organ (E. J. Johnson & Goldstein, 2003). Thus, if individuals do not always maximize their expected utility, how can we help people make better choices?

Some authors claim that it is possible to improve individuals' decisions, through nudges, which can be defined as *"any aspect of choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives"* (Thaler & Sunstein, 2008, p. 6). Essentially, nudges are a behavioral change tool, as they influence individuals' decisions, by taking advantage of cognitive flaws (Bovens, 2009; Hansen & Jespersen, 2013). The problem associated with this is that given its subliminal and covert nature, they are often claimed to be non-ethical, as people are not aware of the manipulation taking place, even if it is for their best interest. As a result, there is substantial literature debate regarding nudge transparency and effectiveness.

There is little empirical evidence regarding nudge transparency, and the studies done are related to a health or environmental setting (Bruns et al., 2018; Loewenstein et al., 2015; Steffel et al., 2016), and focus primarily on type 1 nudges, which is the case of default options, finding that nudges can be transparent and effective. However, there is still a gap to study the impact of nudge transparency in a financial context, a more complex and sensitive domain, which may lead to different results. Therefore, I will investigate if such findings still hold in a financial context, for both type 1 (fast and automatic thinking) and type 2 nudges (slow, deliberate thinking) (Kahneman, 2012; Sunstein, 2016).

Furthermore, it should be highlighted that uncovering a nudge, might have repercussions not only on the financial decision itself but also on trust and relationship with financial institutions,

which are often perceived as non-ethical and manipulative, due to the frequent financial scandals. In this manner, one's belief in free will shall be accounted for, as well as psychological reactance traits. Indeed, people might perceive the covert nature of the nudge as a restriction to their freedom, feeling manipulated, and leading them to react adversely (J. W. Brehm, 1966; S. S. Brehm & Brehm, 1981; Bruns et al., 2018).

In summary, the problem statement I am investigating can be defined as "What is the impact of disclosing nudges in a financial context?". In order to target the presented problem statement, the following research questions will be answered:

RQ1: Is nudge disclosure perceived differently for type 1 and type 2 nudges, in terms of change in the saving contribution, trust towards the bank, and customer/bank relationship?

RQ2: Do the bank intentions, saving importance, and psychological traits, such as belief in free will and psychological reactance, affect the change in the saving contribution, upon the nudge disclosure?

RQ3: Do the bank intentions, saving importance, and psychological traits, such as belief in free will and psychological reactance, affect the trust towards the bank, upon the nudge disclosure?

RQ4: Do the bank intentions, saving importance, and psychological traits, such as belief in free will and psychological reactance, affect the customer/bank relationship, upon the nudge disclosure?

1.2 Academic and Managerial Relevance

Nudge effectiveness and transparency is still an area that requires deep investigation, since by being a relatively recent topic, few studies were done about it, and, thus, there are a lot of aspects that are still unknown and require further scientific validation. In this sense, this dissertation contributes to the existing literature by investigating the impact of nudge disclosure in a financial context. Past research is primarily related to a health and environmental setting, therefore, transposing this question to a different field, which is by nature more complex, might lead to different results. Additionally, the majority of studies are focused on type 1 nudges, specifically defaults, but I will examine both type 1 and type 2, which will contribute to understanding whether the type of nudge used can affect consumers' financial decision upon the reveal. Moreover, I will not only examine if financial nudges can be transparent and

effective, but I will also analyze the impact of nudge disclosure in terms of trust towards the financial institution and their customer/bank relationship, core values in the financial sector, being this study enriched with a measure for belief in free will and psychological reactance.

This last point leads to managerial relevance, as it is of high importance for a manager to comprehend the impact of nudge transparency. Firms, specifically banks or other financial institutions, might have nudge strategies implemented that are not "actively" transparent. In case transparency increases effectiveness and does not damage trust or the relationship, banks might opt to reveal that information. Nevertheless, if it has a negative effect, they should be prepared, as a customer might discover, due to external reasons, and react adversely, affecting, in practical terms, their financial transactions with the bank, such as the amount saved or deposited, and even their trust and relationship, which assume a preponderant role in the financial sector. As a consequence, by knowing about the potential impact of nudge disclosure, managers of banks can adjust their strategies in advance.

Taking a broader vision, this thesis can have relevance for society in general, because it will highlight a strategy that is commonly used in a variety of fields, possibly raising its awareness to individuals, especially for cases in which the nudge might be designed for the interest of companies and not the interest of consumers.

1.3 Research Methods

In order to answer the problem statement, primary data will be gathered and critically analyzed, and compared with the existing literature. The main source of primary data will be collected through an online survey, in which participants are subject to three different conditions (type 1 nudge, type 2 nudge, and control group), to understand the impact of nudge disclosing. As a result, the research questions will be answered through the appropriate statistical analysis of the data gathered, such as t-tests and multiple linear regression models.

1.4 Dissertation Outline

This dissertation is divided into five chapters. After this brief introduction, will follow a chapter with a literature review on nudges, and nudge transparency, specifically in the financial setting, which is vital for the hypothesis formulation. Then, a methodology chapter is presented, including research design and procedure, pilot, and participants information. Next, the results

of the study conducted will be presented. Finally, findings will be carefully analyzed and discussed in light of the literature review, and the main conclusions will be presented, as well as managerial implications, limitations, and future research ideas.

2. Literature Review

The literature review aims to provide an empirical and academic background regarding the topics relevant to answer the research questions. The existing knowledge about nudges will be summarized, linked, and carefully analyzed, to proceed to hypothesis formulation.

The literature review proceeds as follows. It will start by providing an outline of the evolution of behavioral economics and how the traditional belief that consumers make rational choices is contradicted by bounded rationality, as well as biased judgments and decisions. Secondly, it will explore the nudge concept and how nudges take advantage of such cognitive flaws. Thirdly, further explanation will be provided on the literature debate regarding nudge ethical questionability, namely regarding transparency and effectiveness. After that, the division between type 1 and type 2 nudges will be presented. Then, a section is included about the financial setting, starting with the importance of financial decisions and how nudges can help to improve them. The transparency debate will be brought to this domain, including bank intentions. Furthermore, it will be discussed how individuals' goal alignment can impact nudging. Finally, the idea of belief in free will, related to libertarian paternalism, will be examined, as well as psychological reactance, that might arise from nudge disclosing.

2.1 Evolution of Behavioral Economics

From the moment we are born, we make decisions every single day, and for a long time these were believed to be rational, i.e., economists claimed that consumers make the best choices for them, given a specific set of circumstances and the information they possess. However, what Tversky and Kahneman (1974) demonstrated is that people make biased judgments, often relying on heuristics, as they present bounded rationality (Bolton & Ockenfels, 2012; Simon, 1972). The problem associated with this is that if irrational choices do not translate into a random error, that would simply be canceled out on average, then errors should be predictable, and so should be the consumers' "irrational" choices (Thaler, 2018). In this manner, some studies have been done in the area of behavioral economics. One of the most important contributions to this field concerns the prospect theory developed by Kahneman and Tversky (1979), which elaborates on decisions under uncertainty, according to which individuals do not make choices that maximize expected utility, as previously believed by economists. Hence, prospect theory works best to predict choices than the classical economical approach (Barberis, 2013; Camerer, 1998; Thaler, 2018). These findings were extremely relevant for the evolution

of behavioral economics, as they added a more human dimension, by including psychological realism to consumer behavior. Many other theories have been developed over the past decades that corroborate these biases and limitations, including the endowment effect, loss aversion, and status quo bias (Kahneman et al., 1991), the theory of self-control (Shefrin & Thaler, 1978), among others.

2.2 Nudging

This bounded rationality and irrational choices often lead to poor and suboptimal decisions, as we frequently rely on heuristic cues. Therefore, the following question arose: *"is it possible to help people make better choices, even if they are already fully informed?"* (Thaler, 2018, p. 1281). According to some authors, the answer is yes, through nudges, which can be defined as *"any aspect of choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives"* (Thaler & Sunstein, 2008, p. 6). Essentially the concept developed by the authors is rooted in two principles: firstly, choice of architecture, which consists of the physical, social, psychological aspects that influence the environment in which individuals make decisions. Secondly, libertarian paternalism, which is the idea that through nudging, individuals can make better choices for themselves, as if they were fully informed and in a "cold state", without limiting their freedom of choice.

Other aspects are relevant to add to this definition, specifically the fact that nudging should not make any option costlier in terms of money, time, social sanctions, or trouble (Hausman & Welch, 2010) and the fact that nudges are an attempt to deliberately influence individuals' decision-making process by exploiting non-rational factors (Hansen & Jespersen, 2013). As a result, nudging is considered by many as a behavioral change strategy with huge potential, the reason why it has been increasingly gaining importance in different fields such as law, health, environmental issues, financial set and even in public policies (Hacker, 2017; E. J. Johnson & Goldstein, 2003; Kroese et al., 2016; Madrian & Shea, 2001; Reisch et al., 2017; Sunstein & Reisch, 2014; Thaler & Sunstein, 2008).

Indeed, plenty of studies show that nudges are effective, being some of the most pointed reasons the fact that people do not pay full attention to all the available options. Additionally, individuals like to take the path that involves less effort, being choices influenced by defaults, frames, and anchors, as well as the lack of clear and defined preferences that may lead people

to be more easily influenced (Sunstein & Thaler, 2003; Thaler & Sunstein, 2008). In this sense, one of the most common nudges are default options, which have been widely used as opt-out (vs. opt-in) systems in organ donation (E. J. Johnson & Goldstein, 2003), retirement plans (Madrian & Shea, 2001) and to promote a healthy habit formation.

2.3 Nudge Transparency and Effectiveness

The subtle and covert nature of nudges is subject to prominent literature debate, due to its ethical concerns, as they might manipulate people in a way that is not transparent to them, by taking advantage of human flaws in judgment and decision-making (Bovens, 2009; Hansen & Jespersen, 2013; Hausman & Welch, 2010). One way to mitigate this issue would be to make nudges more transparent. However, there is little empirical evidence regarding nudge transparency and effectiveness.

On one hand, one might believe that having transparency, by providing more information on nudges, is a good indicator. Firstly, because having more information might lead people to not choose blindly and take a more thoughtful decision. Secondly, it might mean that nudges become less ethically questionable. Indeed, according to the House of Lords (2011), a nudge can be considered ethically acceptable if choice architects inform people that they are being nudged, or people can clearly understand that an intervention is being applied. Thirdly, psychological research might anticipate that linking the nudge with their desired intentions would make nudges more effective. This argument can be supported by the salience theory (Bordalo et al., 2012), according to which people tend to over-weight the more salient characteristics in the decision process, thus, we would expect that providing information about the intention of nudges would increase their effectiveness (Bruns et al., 2018).

On the other hand, having full transparency about nudges might not only decrease, but also lead to the opposite desired effect, as people might react adversely knowing that they are being nudged (Arad & Rubinstein, 2018; J. W. Brehm, 1966), especially if we consider sensitive settings. Other authors have less extreme suggestions, claiming that the level of transparency should be such that, if individuals want, they should be able to uncover the manipulation behind nudges, at least to protect minorities and verify the government's policies (Bovens, 2009). However, the underlying question remains "What information should exactly be revealed, and what is its impact on consumer behavior?".

The few empirical studies that were done were primarily focused on default options, in a health and environmental setting, reaching the conclusion that disclosing the nudge did not influence default options effectiveness (Bruns et al., 2018; Loewenstein et al., 2015; Steffel et al., 2016), regardless if people were pre- or post-informed, and regardless of the potential influence of the default, its purpose or both. Similarly, a field experiment reached the same conclusion about nudge disclosing. In this case, instead of a default option, the underlying nudge was the environment itself, particularly an explanatory sign about the healthier product placement saying "we are helping you to make healthy choices" (Kroese et al., 2016). These results may be due to the setting in which the experiment was held, i.e., due to a common belief that having a healthy lifestyle is important. Additionally, it is not clear that customers noticed the sign, and if they did, there is no evidence that they changed their behavior when they realized they were being nudged. Thereupon, further research should be done to ensure that disclosing nudges does not impact its effectiveness.

2.4 Type 1 and Type 2 Nudges

One aspect that should be taken into consideration is the type of nudge used in these strategies. The nudge used will represent the choice of architecture, one of the primary pillars of nudges, as it will affect the environment in which individuals make their decisions, including the psychological environment. Nudges can be divided between type 1 and type 2 nudges, as used by Sunstein (2016), as they tackle different cognitive mechanisms. Indeed, studies on behavioral decision-making portray the thinking process as divided into two systems: system 1, corresponding to a fast, unconscious, automatic, effortless, affective thought; and system 2, which corresponds to a slow, conscious, deliberate, effortful, rule-based thought (Hofmann et al., 2009; Kahneman, 2012; Marchiori et al., 2017; Marteau et al., 2012; Osman, 2004; Sloman, 1996).

Most of the times, we as humans make many decisions not based on deliberate thinking, but instead on automatic and heuristic procedures (Kahneman, 2012), using much more frequently system 1, as we do not always have the cognitive capacity, time, motivation or willingness to carefully think about the numerous decisions we make in a day (Hofmann et al., 2009; Kahneman, 2012; Smith & DeCoster, 2000). Therefore, type 1 interventions, which work without the awareness of the agent, being less transparent, are usually more effective (Dhingra et al., 2012; Jung & Mellers, 2016). These types of nudges include changing cafeteria designs,

changing default options, and automatic enrollment in saving plans. Their effectiveness has been demonstrated by some authors, as mentioned in section "2.3 Nudge Transparency and Effectiveness". On the contrary, type 2 nudges tend to be more transparent but less effective, as they require a more effortful decision-making process, comprising warning signs, reminders, and any type of information aiming to increase the knowledge of the individual.

There is little scientific evidence comparing both nudges and, in terms of nudge transparency, there is still a gap that needs to be filled. Therefore, I want to investigate the impact of nudge disclosing using both types of nudges. The first hypothesis that I will derive, based on literature, is:

H1: Before the nudge is revealed, type 1 nudge will be associated with a higher saving contribution, thus, being more effective.

2.5 Financial Decisions

2.5.1 Importance of Financial Decisions

Being nudges a behavioral change tool, their main purpose should be to help people make better and wiser choices, through enduring change and habit formation. For this reason, to change or eliminate a certain habit, it is important to be aware of it, to proceed to the change. Especially, if we consider sets in which the outcomes assume a preponderant relevance, such as the financial setting, this awareness, and desire for control are even more important (Chartrand, 2005).

Financial decisions are said to be of crucial significance to our lives. However, the financial field is considered by many as being complex, and also more sensitive, as it might be associated with an aversion behavior. Some theories illustrate this aversion and irrational choices, taking the example of the disposition effect, which explains why people make bad decisions in the stock market, selling stocks too early. This phenomenon is also associated with the prospect theory, as people tend to be risk-seeking toward gains, but risk-averse towards losses (Kahneman & Tversky, 1979).

Adding to this, it should be highlighted that 68% of people save less than they would like for their retirement (Thaler & Sunstein, 2008). According to the life cycle theory, households want to smooth consumption over time, deciding how much to consume and how much to save (Modigliani, 1966). Nonetheless, this tends to be difficult mainly for two reasons: firstly, people

might fail to calculate the amount they should save, probably due to a general lack of financial literacy (Lusardi & Tufano, 2015). Secondly, people are present-biased and lack the self-control to save for retirement, instead, they prefer the immediate gratification of consumption (Thaler, 2004).

2.5.2 Nudging Financial Decisions

Given the importance of financial decisions and the urgent need of improving them for the general population, nudging has been assuming a preponderant role in this field, reaching effective results, particularly concerning automatic enrollments and default options. Usually, the majority of saving plans before this type of intervention use an opt-in design model, in which individuals receive information about the available plans, and then they need to actively enroll in them. With this type of intervention, they should receive the same information, with the exception that they are automatically enrolled and, in case they do not want to join a certain plan, they need to opt-out. For example, a study conducted in a U.S. corporation about 401(k) plans, changed from an opt-in to an opt-out system, finding that the participation level increased significantly and, when employees were hired under the automatic system, they kept the default contribution rate and fund allocation (Madrian & Shea, 2001). Other programs allowed employees to commit to increasing their savings as a proportion of their future salary increase (Thaler, 2004), among many others demonstrated in the literature (Choi et al., 2002, 2003). However, these programs should not be taken lightly, as they might get individuals stuck with long term contracts (Thaler, 2018), arising, once again, the transparency issues related to nudges.

Overall, people accept or believe in the idea that they should take environmental responsibilities, have a healthier lifestyle, and might even not mind changing a cafeteria design, but if the setting complexity is increased, which is the case of financial decisions, the findings mentioned in the section “2.3 Nudge Transparency and Effectiveness”, according to which nudges can be transparent and yet effective, might not hold, as people might perceive they are being manipulated.

The financial system is often perceived as non-ethical and manipulative. Frequent financial scandals, financial crises, and frauds might deteriorate banks' reputations. Indeed, studies show that Americans’ trust in the American Banking System dropped significantly after the crisis, and has not entirely recovered yet (Zingales et al., 2015), others report fraud in mortgage

applications related to income falsification (Mian & Sufi, 2017). In addition to this, more than 50% of people do not refinance their mortgages, mainly because they are skeptical about the financial institutions' motives, showing that people have difficulty trusting lenders (E. Johnson et al., 2015). In this manner, financial advisers are often perceived as dishonest. Indeed, a study validated this belief by showing that between 7% to 15% of financial advisers have been disciplined for misconduct or fraud, and still more than 50% of them get to keep their jobs (Aulianida et al., 2019), justifying people being suspicious about the financial sector.

Therefore, I expect that the findings related to the possibility of nudges being transparent and effective will not hold in a financial context. To enrich my analysis, three output variables will be considered, specifically change in the saving contribution, trust towards the bank, and customer/bank relationship. Thus, I hypothesize that:

H2a: After the nudge reveal, participants will negatively change their saving contribution, being this effect stronger for type 1 nudge.

H2b: After the nudge reveal, participants will feel their trust in the bank is weaker, being this effect stronger for type 1 nudge.

H2c: After the nudge reveal, participants will think the nudge strategy will affect their customer/bank relationship negatively, being this effect stronger for type 1 nudge.

The effects are expected to be stronger for type 1 nudge, as defaults are considered less transparent, thus, revealing its covered nature might lead people to react more adversely upon the reveal.

2.5.3 Choice Architect Intentions

Findings reveal that a large proportion of people are unfamiliar with the concept of nudges and, in general, if the nudge aims to improve individuals' lives and society, people tend to accept them with few limitations regarding manipulation. However, their approval seems to be intrinsically related to the intentions of the choice architect (Junghans et al., 2015), indicating that the need for further research is required in more complex settings, such as financial decisions. Based on this, one should expect different results depending on how people perceive the intention of the choice architect, in this case, the bank. Thus, the following hypotheses arise:

H3a: Those perceiving the bank as acting in their own interest, instead of the interest of depositors, will change more negatively their saving contribution.

H3b: Those perceiving the bank as acting in their own interest, instead of the interest of depositors, will feel their trust in the bank is weaker.

H3c: Those perceiving the bank as acting in their own interest, instead of the interest of depositors, will think their customer/bank relationship is more negatively affected.

2.6 Nudging and Goal Alignment

Another aspect that might influence nudge disclosing is related to how the nudge is aligned with one's goals (Marchiori et al., 2017). Nudging strategies aim to help individuals make decisions that are in their best interest, as a result, they should be aligned with their goals. For instance, someone aiming to save more might appreciate nudge strategies that are aligned with this objective. In this case, interventions might be perceived as more freedom preserving and be more easily accepted, compared to interventions that go against one's goals. In this manner, if individuals value saving, we might expect that their change in the saving contribution will not be significantly negatively affected, since they would save anyway, regardless of the bank nudges strategies. However, for those that value saving, their trust and relationship can be even more negatively affected. In this manner, I hypothesize that:

H4a: Those who value saving will change their saving contribution less negatively.

H4b: Those who value saving will feel their trust in the bank is weaker.

H4c: Those who value saving will think their customer/bank relationship is more negatively affected.

2.7 Belief in Free Will

The second pillar of nudges is libertarian paternalism, according to which Sunstein and Thaler (2003) defend that private and public institutions should be able to influence behaviors to maximize individuals' expected utility while keeping their freedom of choice. However, nudges are often argued to influence people's behaviors without being noticed, which might lead to the belief that one's autonomy is being violated and, consequently, limit an individual's freedom (Bovens, 2009). Even though there is no scientific consensus regarding its actual existence, free will beliefs impact individual behaviors, especially in alignment with their cultural values (Baumeister et al., 2009; Vohs & Schooler, 2008). The concept of libertarian paternalism

depends a lot on the resilience of this core belief, and given that is a relevant concept to individuals, I hypothesize that:

H5a: Those who present stronger beliefs in free will, will change more negatively their saving contribution.

H5b: Those who present stronger beliefs in free will, will feel their trust in the bank is weaker.

H5c: Those who present stronger beliefs in free will, will think their customer/bank relationship is more negatively affected.

2.8 Psychological Reactance

Since people intrinsically value decision rights and autonomy (Bartling et al., 2014; Fehr et al., 2013; Owens et al., 2014), nudges by not being transparent about their covert nature, might lead people to have reservations and react adversely (Bruns et al., 2018; Felsen et al., 2013). Psychological reactance can be described as *"the motivational state that is hypothesized to occur when a freedom is eliminated or threatened with elimination"* (S. S. Brehm & Brehm, 1981, p. 37). When this happens, it creates a motivation to restore it, a psychological reactance, which may lead to hostile and aggressive behaviors (J. W. Brehm, 1966; Dillard & Shen, 2005), resulting in the reduced effectiveness of the nudge or even in the opposite effect of the desired behavior. Consequently, to restore the "lost freedom", people might engage in the restricted behavior (J. W. Brehm, 1966; Bruns et al., 2018), which in this case corresponds to a decrease in the saving contribution. Indeed, even the trust in the bank can be shaken, as well as the customer/bank relationship.

Given the transparency concern, we could expect that providing more information would reduce this possible reactance, as it can be seen as a sign of trust. However, one study concerning environmental issues suggests that there is no evidence that neither information nor the purpose of the nudge triggers a psychological reactance (Bruns et al., 2018). Of course, the conclusion might not be necessarily extrapolated to other fields. Therefore, I suggest measuring participants' trait reactance, to understand how this psychological trait affects the change in the saving contribution, perceived trust, and relationship. Thus, I hypothesize that:

H6a: Those who are more prone to reactance will change more negatively their saving contribution.

H6b: Those who are more prone to reactance will feel their trust in the bank is weaker.

H6c: Those who are more prone to reactance will think their customer/bank relationship is more negatively affected.

3. Methodology

The present chapter aims to describe the methodology adopted. Firstly, the research strategy and design will be presented, then a section is included explaining in a detailed manner the procedure, including how each variable was measured, followed by a section about the pilot and data collection. Finally, the sample is described.

3.1 Research Strategy and Design

In order to test if nudges in a financial context work when they are disclosed, specifically their effects in terms of the saving contribution, trust, and relationship, for both type 1 and type 2 nudges, I designed an experimental study, which is the most common way to examine cause-effect relationships (Saunders et al., 2008). For this purpose, an online survey was conducted with Qualtrics, through which the data was collected. The study followed a between-subjects design, as different participants were randomly assigned, through block randomization function, to three different conditions: type 1 nudge, type 2 nudge, and control group. This design enabled the creation of a shorter survey, easier to be filled and completed by participants while minimizing knowledge transfer across conditions, and maintaining the accuracy of the results through the randomization.

In this study, the dependent variables were the change in the saving contribution, which was coded as the difference between the new saving contribution (after the nudge reveal) and the saving contribution (before the nudge reveal), both of them directly asked in the survey. Additionally, trust and relationship were also dependent variables, representing the change in trust towards the bank (from much weaker to much stronger) and the change in the customer/bank relationship (from very negatively to very positively affected), upon the disclosure. On the other hand, independent variables were the type of nudge (coded as 1 = type 1 nudge, 0 = type 2 nudge), bank intention, saving importance, average belief in free will, and average psychological reactance. The survey was divided into 6 blocks: Saving Importance, Nudge Manipulation (type 1 nudge vs. type 2 nudge vs. control), Nudge Reveal (type 1 nudge vs. type 2 nudge), Free Will, Psychological Reactance, and Demographics, being available in Portuguese and English.

3.2 Procedure

3.2.1 Underlying financial decision

The first step I took in the elaboration of the experimental design consisted of formulating a hypothetical scenario in which participants would need to make a real-life financial decision. Nudges are widely used for retirement and saving plans. Retirement plans tend to be more specific, goal, and target-oriented, which would require participants to be closer to retirement, or at least, employed to think more seriously about these matters. Therefore, given my resources and capabilities, I decided to focus on saving plans, as they have a broader usage, including not only retirement but also savings to buy a house, a car, do a trip, extra expenses, among many others. As a result, a higher population could be targeted, students, employers, and retired people, since my primary goal was to reach findings that apply to humans in general, and not a specific target.

3.2.2 Saving Importance

After the introduction to the survey, participants were immediately asked about the importance of saving to them, in which they answered on a 5-point Likert scale (ranging from 1 – "Not important at all" to 5 – "Extremely important"). This question was the first one presented, as it intended to evaluate how individuals value saving and how their saving goals could be aligned with the nudge, without any influence related to the nudge experiment.

3.2.3 Nudge Manipulation

In the next block, Nudge Manipulation, participants were presented to a hypothetical scenario, which was built in such a way that would make it as similar and comparable as possible for the three different conditions (type 1 nudge vs. type 2 nudge vs. control) so that the only difference between them would lie solely on the nudge itself (or in its absence, in the case of the control group). The wording of the experiment common to all conditions was as follows: "Suppose you have a net income of 1000€. Your bank proposes a saving plan, which consists of allocating a percentage of your net income to a savings account, every month, which can be mobilized in advance with an interest penalty.". Firstly, it should be mentioned that a supposed amount of 1000€ was chosen, to create an equal situation for all participants, eliminating potential complications related to different income levels and interpretations. Secondly, the monthly

periodicity was selected, since the majority of people receive their wages monthly. Thirdly, the account was mobilized in advance with an interest penalty, because this is one of the most common saving products that banks offer, and if a non-mobilized account was used, the scenario would become very similar to a retirement plan, leading to the situation mentioned above. Fourthly, inflation rates were not included, because the goal of the experiment was not that people would calculate the optimal amount to save. Also, given the generalized high financial illiteracy levels, that would make the question harder to solve, deviating it from its primary purpose: evaluate the change in the saving contribution after the nudge reveal. Then, the question varied depending on the condition under which participants were. All of the three scenarios included the following sentence: "Feel free to choose the percentage that you would like to allocate to your savings account.". The word "free" was chosen on purpose, to underline the fact that participants were not forced, by any means, to choose the desired value, fulfilling the libertarian paternalism pillar of nudges.

For type 1 nudge, participants were presented with a default option of 6% that they could simply select. Despite this, it was given to them the possibility of indicating another percentage from 0 to 100 in an open box, as nudges should not forbid or limit any other alternatives. Usually, these types of financial products range percentages from 2% to 6%, being 6% already a relatively high amount. Thus, given that this nudge aimed at facilitating the decision for the depositors, maximizing their expected utility (in this case, the saved amount), the default option was defined at 6%.

For type 2 nudge, before the last sentence, was presented a reminder in bold, which aimed at advocating the importance of saving, to induce an allocation of a higher percentage. The reminder was "Please remember that saving is important, as it helps you to be more protected against eventual financial shocks.". This was an open-ended question that allowed participants to indicate their saving contribution.

For the control group, an open-ended question was presented as well, in which they needed to indicate the percentage, but without any default option, or reminder. This question allowed me to understand the percentage level that individuals would choose if a nudge was not presented to them. In other words, enabled me to understand the effectiveness of type 1 and type 2 nudges.

3.2.4 Nudge Reveal

This block was only presented to participants that were in type 1 or type 2 nudges. It started with a transparency check question, asking if respondents noticed that there was a default option of 6% (for type 1 nudge), or a reminder about saving benefits (for type 2 nudge). One of the limitations of previous studies was that, in some cases, it was not possible to know if the nudge was transparent enough or at least if individuals noticed it. This question enabled me to account for that situation, through the creation of a dummy for transparency check (coded as 1 = noticed, 0 = not noticed). After this, a message appeared saying "This strategy was used so that people would choose a higher percentage.", explicitly indicating the goal of the nudge. The term "nudge" was not used, since that would require a theoretical explanation of the term, and it does not have a direct translation to Portuguese, creating eventual problems for people not so fluent in English.

Moreover, a question was presented to examine what people perceived to be the intention of the bank with this strategy, either for the bank's interest, corresponding to the sentence "To increase the available amount in the bank" or for the depositor's interest, as "To increase my personal savings". This variable was coded as a dummy as well (coded as 1 = bank's interest, 0 = depositor's interest). Next, respondents were asked, through an open-ended question, to indicate a new saving contribution, representing the percentage that they would like to save after knowing about the strategy. With the saving contribution after and before the nudge reveal, it was possible to analyze how the saving contribution changed, with a new variable called "change in the saving contribution", corresponding to the difference between the new saving contribution and the old one. To enrich the analysis, participants were inquired about how they felt their trust in the bank changed on a 5-point Likert scale (ranging from 1 – "Much weaker" to 5 – "Much stronger"), as well as a question about how they perceived this strategy would affect their customer/bank relationship (ranging from 1 – "Very negatively" to 5 – "Very positively"). Overall, after this block, I had all dependent variables: change in the saving contribution, trust, and relationship.

3.2.5 Free Will

To measure participants' beliefs in free will, the FAD-Plus instrument was used, which includes four subscales: free will, scientific determinism, fatalistic determinism, and unpredictability (Paulhus & Carey, 2011). In the present experiment, only the free will 7-item subscale was

presented, as I was solely interested in this indicator. Moreover, including too many items in the survey might lead to respondents getting fatigued, leading to less accurate answers. Each item corresponded to a Likert scale question (ranging from 1 – "Strongly disagree" to 5 – "Strongly agree"). This independent variable was manipulated to a new variable average free will, corresponding to the average score obtained in the 7 questions.

3.2.6 Psychological Reactance

The following block was focused on Psychological Reactance, which was measured using the updated Hong Psychological Reactance Scale, an 11-item scale cored in four factors: emotional response towards restricted choice, reactance to compliance, resisting influence from others, and reactance to advice and recommendations (Hong, 1992; Hong & Faedda, 1996; Rosenberg & Siegel, 2018). Similar to what I did in free will, each item corresponded to a Likert scale question (ranging from 1 – "Strongly disagree" to 5 – "Strongly agree"). This independent variable was also manipulated to a new variable average psychological reactance, corresponding to the average score obtained in the 11 questions.

3.2.7 Demographics

Finally, the survey ended with a demographics block, in which respondents were asked about gender, age, where they live, education level, professional situation, and household income after deducting taxes. Note that instead of nationality, was used the place where respondents live, since I expect to obtain findings that might be used by financial institutions, and usually they operate based on the subsidiaries they have located in different countries, and not based on the nationality of their customers. For more detailed information about the survey, please see Appendix 1.

3.3 Pilot and Data Collection

Before launching the final survey, I conducted a pilot among 10 people to understand how the survey was being perceived by respondents, if it was well structured, and clear, in order to improve eventual aspects. From the feedback I got, the reminder of type 2 nudge was not salient enough, therefore, in the final version, this reminder was presented in bold. Furthermore, the transparency check question was introduced to account for the cases in which people did not

perceive the nudge as transparent or evident enough. Everything else, kept the same as illustrated in section "3.2 Procedure".

The data was collected as part of an online survey, through Qualtrics, and was distributed through an anonymous link on social media platforms, and through word of mouth, to maximize the number of valid answers. The survey was available from the 11th of November until the 26th of November of 2020. Participation was entirely voluntary and did not involve any payment. The data were further analyzed with Excel and R Script.

3.4 Participants

From a sample of 628 complete answers, 15 were excluded has these answers were not credible. Observations that presented an age lower than 16 were removed, as they might not be mature enough to take saving contributions seriously, corresponding to six observations. Moreover, two participants claimed to have ages higher than 129, from Afghanistan (the first country in the list of countries), which were also excluded, leading to an age range from 16 to 81 years old. The duration was also a criterion considered relevant. For this reason, seven individuals were excluded as they took more than one day to answer, leading to a valid sample of 613 observations (198 in type 1 nudge, 201 in type 2 nudge, and 214 in the control group). The recommended sample size for an experimental study is at least 30 participants per cell (Wilson Van Voorhis & Morgan, 2007). Given the fact that I have three conditions, the minimum amount would be 90, hence the sample size can be considered relevant.

In demographical terms, the sample was composed of more females (52%) than males (48%), with an average age of 39.05 years. Although individuals from 22 different countries answered, the vast majority lived in Portugal (93%). Most respondents held a Bachelor's degree (50%), followed by having a High School level (30%), and a Master's degree (19%). Professionally, more than half of participants were employed (54%), followed by students (24%), retired (7%), and the rest of the sample fell either in the category unemployed (2%), student-worker (4%) or other (9%). In terms of income, individuals laid mainly in the first three classes: 1001€-2000€ (38%), less than 1000€ (23%) and between 2001€-3000€ (21%). There were no significant differences in the sample across the three different conditions. For more detailed information about demographics, please see Appendix 2.

4. Results

This chapter aims to present the main results of the study conducted to answer the problem statement about the impact of disclosing nudges in a financial context. It starts with a manipulation check, specifically provides an assumption check, to select the most appropriate statistical tests to perform, and a group manipulation check is also done. Then, a preliminary analysis of the three dependent variables (change in saving contribution, trust, and relationship) is performed. Moreover, nudge effectiveness is verified. Taking into consideration that I wanted to test similar hypotheses for the three output variables, the present chapter is organized based on the dependent variables for simplicity, being each hypothesis tested and the respective results presented, thus, answering each proposed research question.

4.1 Manipulation Check

4.1.1 Assumption Check

Before I proceeded to any further analysis and decided which tests would be more appropriate to apply, a preliminary assumption check was made across all variables. Firstly, independence is verified across the entire study, as the survey was designed to guarantee that respondents were randomly allocated to one and only one group, thus, observations are independent of each other. Secondly, the variables should follow approximately a normal distribution. To test for normality, the Shapiro-Wilk test was performed, as it provides better power than the Kolmogorov-Smirnov normality test, from which I concluded that none of the variables was normally distributed (Table 2, Appendix 3). Nevertheless, according to the Central Limit Theorem, regardless of the population distribution, as long as the sample size is large enough, which is the case, the distribution of the random sample follows approximately a normal distribution, thus, solving the normality question. Thirdly, Levene's test for homogeneity of variances was run, as it is less sensitive to departures from normality, compared to Barlett's test, to analyze if the variance of the data in the different groups was the same (Table 3, Appendix 3). In the cases in which the variance is homogeneous, tests were performed as usual. However, for the cases in which this assumption was violated, instead of using a regular Two-Sample T-Test, Welch Two-Sample T-Test was used, since it is less restrictive compared to the original Student's test, as it assumes that variance is not the same across groups.

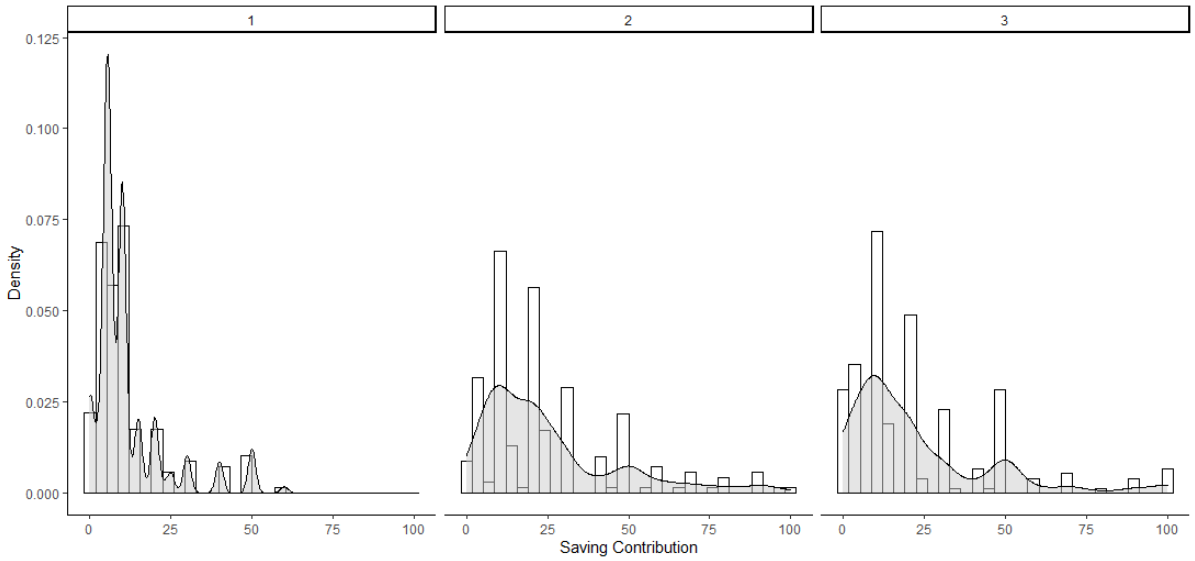
4.1.2 Group Manipulation Check

After the main assumptions were checked, it was also necessary to verify if the three conditions were not significantly different from each other in demographical terms, such that it would be indifferent to select one member of group one, two, or three. By doing this, it was possible to account for the fact that the only element varying between samples was the nudge itself. Therefore, the three groups were compared using a One-Way ANOVA, as all demographical variables had homogeneous variances across groups, from which I concluded that there were no statistically significant differences between the groups. [$F(2,610)_{Male} = 1.487$, $p = .227$; $F(2,610)_{Age} = 0.151$, $p = .860$; $F(2,610)_{Portugal} = 1.177$, $p = .309$; $F(2,610)_{Education} = 1.367$, $p = .256$; $F(2,610)_{Profession} = 0.102$, $p = .903$; $F(2,610)_{Income} = 2.206$, $p = .111$]. For more detailed information, please see Appendix 4.

4.2 Output Variables

My primary goal was to understand what was the impact of disclosing a nudge in a financial context in three dependent variables: saving contribution, trust, and relationship. In what concerns saving contribution, it was verified that it followed a left-skewed distribution, as can be seen in Figure 1.

Figure 1 - Histogram and density plot of saving contribution per group



Therefore, it was beneficial for the analysis to transform it into a logarithm, as I eliminated potential problems with outliers, and the distribution fitted better into a bell-shaped curve. To properly apply the logarithmic function, the saving contribution of 0 was replaced by 1.

Moreover, it was identified that values ranged from 0 to 100, leading me to inspect which individuals would save more than 50%, a fairly high percentage. From the analysis conducted, 6.19% of the entire sample laid in this situation, with only one person from type 1 nudge, and the remaining from type 2 nudge or the control. Their demographics were also examined to comprehend the profile of these individuals (Appendix 5). Individuals willing to save more than 50% were mainly female (68%), with ages between 18 and 29 years (53%), who were either employed (45%) or studying (26%), earning mostly amounts between less than a 1000€ up to 3000€ (84%). The Shapiro-Wilk and Levene's test were computed, from which I concluded that the logarithm of saving contribution was not normally distributed, and variance was not homogeneous across groups (Appendix 6).

In what respects to change in the saving contribution, I verified that the results obtained were dispersed (SD = 10.68), varying from a decrease of 48% up to an increase of 90%. Thus, on average, participants increased by a very small amount the saving percentage (M = 0.65). Trust and relationship scored similar results (M_{trust} = 2.87, SD_{trust} = 0.55; $M_{relationship}$ = 2.97, $SD_{relationship}$ = 0.53), with an approximate answer of no change in the trust towards the bank and neither in the relationship. However, none of the respondents claimed to have a "very strong" trust and neither a "very positively" change in the relationship. For more detailed information about the summary statistics of the dependent variables, please see Appendix 7.

4.3 Hypothesis Testing

4.3.1 Nudge Effectiveness

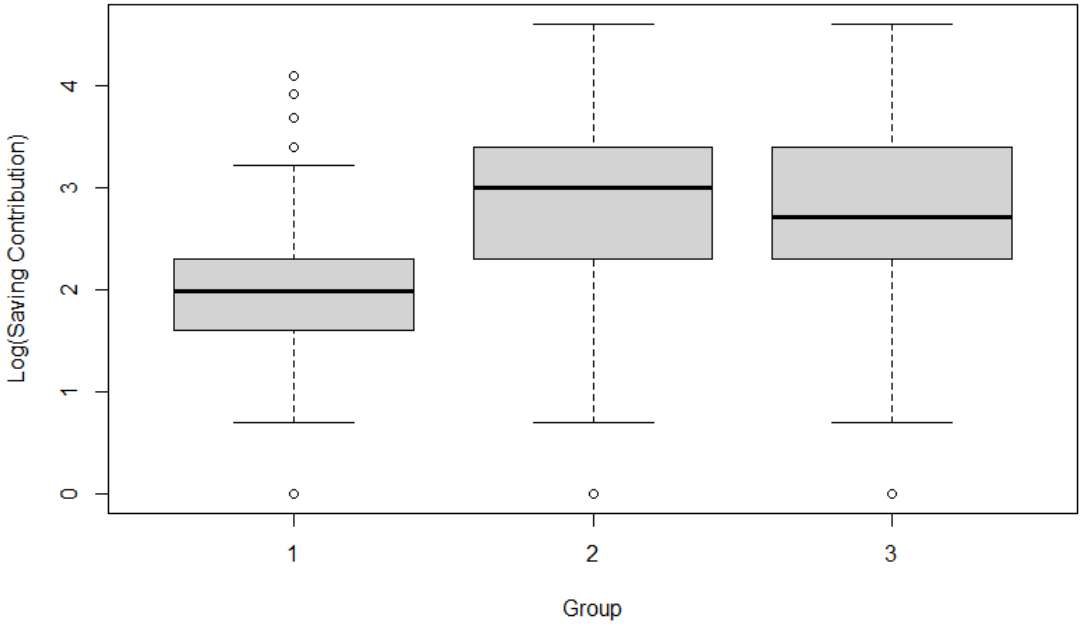
H1: Before the nudge is revealed, type 1 nudge will be associated with a higher saving contribution, thus, being more effective.

The first thing I aimed to verify was if type 1 and type 2 nudges were effective, and if type 1 was more effective relative to type 2. Hence, to test the effectiveness of both nudges relative to the control group, Welch Two-Sample T-Tests were conducted for the variable logarithm of saving contribution, as Levene's test for equality of variances was found to be violated for the present analysis, $F(2,610) = 6.70$, $p = .001$.

For type 1 nudge, this test was found to be statistically significant, $t(395.67) = -5.00$, $p < .001$. These results indicated that individuals in the type 1 nudge group (M = 2.06) saved less than did individuals in the control group (M = 2.58), suggesting that this nudge effectively changed the expected behavior but in the opposite desired direction. Indeed, from the entire sample of

198 in group 1, 163 individuals (82%) did not remain with the default option. For type 2 nudge, this test was found to be statistically significant, even though less than the previous one, $t(404.16) = 2.58$, $p = .01$. These results illustrated that individuals in the type 2 nudge group ($M = 2.85$) saved more than did individuals in the control group ($M = 2.58$), indicating type 2 nudge effectiveness in the desired direction, as presented in Figure 2. For more detailed information, please see Appendix 8.

Figure 2 – Boxplot of the logarithm of saving contribution per group



4.3.2 Nudge Disclosure for Type 1 Nudges and Type 2 Nudges

The main purpose of this dissertation was to understand how saving contribution, trust, and relationship changed upon the nudge reveal, for both nudges. Before conducting a multiple linear regression model, the following hypotheses were tested with adequate t-tests, to extract solely the difference between type 1 and type 2 nudges.

H2a: After the nudge reveal, participants will negatively change their saving contribution, being this effect stronger for type 1 nudge.

Levene's test for equality of variances was found to be violated for change in the saving contribution, $F(1,397) = 5.81$, $p = .016$, thus a Welch Two-Sample T-Test was conducted, to compare the change in the saving contribution for type 1 and type 2 nudge conditions. This test did not reach statistical significance $t(308.56) = -0.12$, $p = .908$. Hence, individuals under type 1 nudge condition ($M = 0.59$) did not significantly change their saving contribution compared

to type 2 nudges ($M = 0.71$). In fact, looking at the mean values, both conditions increased their saving contribution, leading me to reject the hypothesis that participants would negatively change their saving contribution, being the difference between conditions not significant.

The same test was run, but only considering individuals that noticed, either the default option (type 1 nudge) or the reminder (type 2 nudge), and the test also did not reach statistical significance, $t(264.6) = -0.71$, $p = .481$. For more detailed information, please see Appendix 9.

H2b: After the nudge reveal, participants will feel their trust in the bank is weaker, being this effect stronger for type 1 nudge.

Through Levene's test for equality of variances, I was not able to reject that the means were not homogeneous, $F(1,397) = 0.18$, $p = .674$, so a Two-Sample T-Test was performed, to compare trust for type 1 and type 2 nudge conditions. This test also did not reach statistical significance $t(397) = -1.40$, $p = .162$. Hence, individuals under the type 1 nudge condition ($M = 2.83$) did not present statistically significantly different levels of trust than type 2 nudges ($M = 2.91$). However, based on the mean values of both groups, it was possible to verify that trust scored a value between "Weaker" to "No change".

Like it was performed in the previous hypothesis, the same test was conducted only considering attentive individuals, but the test also did not reach statistical significance, even though it presented a lower p-value $t(345) = -1.61$, $p = .109$. For more detailed information, please see Appendix 10.

H2c: After the nudge reveal, participants will think the nudge strategy will affect their customer/bank relationship negatively, being this effect stronger for type 1 nudge.

Once again, Levene's test was not rejected, indicating homogeneous variances, $F(1,397) = 0.46$, $p = .499$, therefore, a Two-Sample T-Test was performed to compare the relationship for type 1 and type 2 nudge conditions. Contrary to the above results, this test was found to be statistically significant, $t(397) = -2.01$, $p = .045$. These results suggest that individuals in the type 1 nudge group ($M = 2.92$) felt their relationship was more negatively affected, after the nudge disclosure, than type 2 nudge ($M = 3.02$).

Finally, accounting solely for the participants that noticed the nudge, the test showed to be statistically significant at a higher confidence level, $t(345) = -2.61$, $p = .01$. In this manner, overall, I can conclude that the results did not change regardless of having noticed or not the nudge, despite the increase in the confidence level of the results attained, when participants were attentive to the nudge. For more detailed information, please see Appendix 11.

4.3.3 Factors Influencing Change in the Saving Contribution

In order to understand how the choice architect's perceived intention (H3a), saving importance (H4a), as well as the psychological traits, belief in free will (H5a) and psychological reactance (H6a) affected the change in saving contribution, a multiple linear regression model was applied. Even though the type 1 or type 2 nudge condition did not reach any statistical significance in terms of change in the saving contribution, a dummy was included for control purposes. The predictive model was:

$$\textit{Change in saving contribution} = \beta_{\text{constant}} + (\beta_{\text{type1nudge}}*\text{Type 1 Nudge}) + (\beta_{\text{bankintention}}*\text{Bank Intention}) + (\beta_{\text{savingimportance}}*\text{Saving Importance}) + (\beta_{\text{FW}}*\text{Free Will}) + (\beta_{\text{PR}}*\text{Psychological Reactance}) + \varepsilon$$

A significant regression equation was not reached ($F(5,393) = 1.824$, $p < .1$, $R^2 = .023$, $R^2_{\text{Adjusted}} = .010$). As expected from the previous hypothesis, the type 1 nudge did not significantly predict a change in the saving contribution ($\beta_{\text{type1nudge}} = -0.277$, $p > .1$). On the contrary, perceived bank intention significantly predicted change in the saving contribution ($\beta_{\text{bankintention}} = -3.290$, $p < .05$). This result supported the hypothesis that those perceiving the bank as acting in their own interest, instead of the interest of depositors, change more negatively their saving contribution (H3a). Moreover, saving importance and belief in free will revealed to be not statistically significant in predicting change in the saving contribution ($\beta_{\text{savingimportance}} = 0.441$, $p > .1$; $\beta_{\text{FW}} = 0.725$, $p > .1$), thus, I could not validate H4a and H5a. Nevertheless, psychological reactance significantly predicted the dependent variable ($\beta_{\text{PR}} = 1.896$, $p < .1$). The result obtained indicated that if individuals are, on average, one unit more prone to reactance, change in the saving contribution increased. In this manner, H6a is rejected.

4.3.4 Factors Influencing Trust Towards the Bank

In order to understand how the choice architect's perceived intention (H3b), saving importance (H4b), as well as the psychological traits, belief in free will (H5b) and psychological reactance (H6b) affected trust towards the bank, a multiple linear regression model was applied. Variables were equally coded as they were for change in saving contribution. The predictive model was:

$$\textit{Trust} = \beta_{\text{constant}} + (\beta_{\text{type1nudge}}*\text{Type 1 Nudge}) + (\beta_{\text{bankintention}}*\text{Bank Intention}) + (\beta_{\text{savingimportance}}*\text{Saving Importance}) + (\beta_{\text{FW}}*\text{Free Will}) + (\beta_{\text{PR}}*\text{Psychological Reactance}) + \varepsilon$$

A significant regression equation was found ($F(5,393) = 6.462$, $p < .01$, $R^2 = .076$, $R^2_{\text{Adjusted}} = .064$). As expected from hypothesis H2b, type 1 nudge did not significantly predict trust ($\beta_{\text{type1nudge}} = -0.079$, $p > .1$). On the contrary, bank intention significantly predicted trust ($\beta_{\text{bankintention}} = -0.318$, $p < .01$). This result supported the hypothesis that those perceiving the bank as acting in their own interest, instead of the interest of depositors, change more negatively their saving contribution (H3b). Moreover, saving importance and belief in free will revealed to be not statistically significant in predicting trust ($\beta_{\text{savingimportance}} = -0.043$, $p > .1$; $\beta_{\text{FW}} = 0.046$, $p > .1$), thus, I could not validate H4b and H5b. Nonetheless, psychological reactance significantly predicted the dependent variable ($\beta_{\text{PR}} = -0.167$, $p < .01$). The result obtained indicated that if individuals are, on average, one unit more prone to reactance, their trust towards the bank was decreased, and thus weaker. As a result, H6a is validated.

4.3.5 Factors Influencing Relationship with the Bank

Similarly, to understand how the choice architect's perceived intention (H3c), saving importance (H4c), as well as the psychological traits, belief in free will (H5c) and psychological reactance (H6c) affected customer/bank relationship, a multiple linear regression model was performed. The predictive model was:

$$\textit{Relationship} = \beta_{\text{constant}} + (\beta_{\text{type1nudge}}*\text{Type 1 Nudge}) + (\beta_{\text{bankintention}}*\text{Bank Intention}) + (\beta_{\text{savingimportance}}*\text{Saving Importance}) + (\beta_{\text{FW}}*\text{Free Will}) + (\beta_{\text{PR}}*\text{Psychological Reactance}) + \varepsilon$$

A significant regression equation was found ($F(5,393) = 7.323$, $p < .01$, $R^2 = .085$, $R^2_{\text{Adjusted}} = .074$). Based on H2c, I was expecting that type 1 nudge significantly predicted relationship, and it was the case ($\beta_{\text{type1nudge}} = -0.109$, $p < .05$), indicating that respondents who were on type 1 nudge condition verified a negative effect on relationship, compared to type 2 nudge condition. Similar to what was obtained in the previous dependent variables, bank intention significantly predicted relationship ($\beta_{\text{bankintention}} = -0.323$, $p < .01$). This result supported the hypothesis that those perceiving the bank as acting in their own interest, instead of the interest of depositors, thought their customer/bank relationship was more negatively affected (H3c). Contrary to previous results, saving importance significantly predicted relationship ($\beta_{\text{savingimportance}} = -0.063$, $p < .05$), suggesting that I can validate the hypothesis that those who value saving thought their customer/bank relationship was more negatively affected (H4c). However, belief in free will was found not to be statistically significant ($\beta_{\text{FW}} = 0.063$, $p > .1$), thus, I could not validate H5c. Finally, psychological reactance significantly predicted the dependent variable ($\beta_{\text{PR}} = -0.112$, p

< .05). The result obtained indicated that if individuals are, on average, one unit more prone to reactance, their relationship with the bank was negatively affected. As a result, H6c is validated.

All regressions were tested for heteroskedasticity, with the Breusch-Pagan test, and at a 95% confidence interval, I was not able to reject the null, i.e., homoskedasticity. Additionally, all regressions were performed including only the observations that noticed the default or the reminder. Roughly, similar results were obtained, in the sense that, overall, the same factors influenced the dependent variables, although with slightly different confidence levels. For more detailed information on the multiple regressions, please see Appendix 12.

5. Discussion

This chapter aims to discuss the main findings obtained, in the light of the literature review, following a similar structure to the previous chapter. Moreover, the main conclusions will be presented, and managerial implications are highlighted. Finally, limitations of the study are identified and further research directions are provided.

5.1 Main Findings

5.1.1 Output Variables

The initial saving contribution followed a left-skewed distribution, as expected, given that people save less than they should (Thaler & Sunstein, 2008). Despite this, a considerable number of individuals claimed to save more than 50%, having reached values of 100%. Even though this level of saving might appear theoretically difficult to achieve, as according to the life cycle theory, individuals want to smooth saving and consumption over time (Modigliani, 1966), through the examination of the demographics, those were individuals mainly between 18-29 and were students or employed. A possible explanation for this is the fact that, at this early age, individuals have fewer financial obligations, leading them to maximize saving in detriment of consumption, such as those that are still living with their parents or do not have a house/car rental, or children. Additionally, individuals might have considered the entire household income, and not solely their own, when presenting the saving contribution. It could be the case that a misinterpretation of the experiment occurred, interpreting the supposed 1000€ as an extra income, apart from their current one. Furthermore, given the current global pandemic, consumers might have shifted their consumption/saving preferences. Moreover, an interesting aspect is that a small peak in 50% was identified, indicating a middle-option bias (Simons et al., 2017).

Change in the saving contribution was, on average, very close to zero, suggesting that nudges in a financial context can be transparent and effective. However, these results were also quite dispersed, with very relevant decreases and increases, which resulted in no change in aggregate terms. Likewise, trust and relationship seemed to have no change, upon the nudge disclosure.

5.1.2 Nudge Effectiveness

Regarding nudge effectiveness, type 1 nudge was expected to be associated with a higher contribution. However, given the unexpected high saving percentages obtained, type 1 nudge was, in fact, associated with lower savings. On the contrary, type 2 nudge was associated with a higher saving contribution, which is aligned with the fact that educational approaches might be better in more complex environments, and just-in-time financial education might be better for heterogeneous financial needs (Fernandes et al., 2014; Lynch & Wood, 2006). Despite this, type 2 nudge was not extremely effective, only at a 90% confidence level, indicating that this nudge could have been stronger, either by changing the design of the question, including a more prominent reminder or simply because usually system 1 corresponds to the standard operating mode (Van Gestel et al., 2020), thus making type 2 tendentiously less effective.

Furthermore, I cannot extrapolate that type 1 nudges are not effective. First of all, because there is strong scientific evidence that they are (Choi et al., 2002, 2003; Madrian & Shea, 2001; Sunstein & Thaler, 2003; Thaler & Sunstein, 2008), and secondly the result obtained was most likely because the default option was set at a very low level (6%) compared to the range of saving contributions presented by individuals. The status quo bias and default effect were not conveniently reached, considering the number of individuals that changed the default option. Despite this, it was verified a strong anchoring effect, which can be easily identified in Figure 1, by the peak around 6% and by being the only group with solely one individual saving more than 50%. Moreover, comparatively, type 1 nudge was statically significantly more different from the control group, than it was type 2, shaping respondents' behaviors more effectively in this sense, although in the opposite desired direction.

Taking it all together, I can conclude that type 2 nudge was effective. However, it could have reached stronger results. I also suggest that, if the default option was set at a higher level, type 1 nudge would verify a higher average saving contribution, being indeed more effective than type 2.

5.1.3 Nudge Disclosure for Type 1 Nudges and Type 2 Nudges

One of the research questions I aimed to answer with this dissertation was to understand whether nudge disclosure was perceived differently from type 1 and type 2 nudges, in terms of saving contribution, trust, and relationship. I hypothesized that nudge disclosure would have a negative impact on the three output variables and that the negative effect would be stronger for

the type 1 condition. However, from the results attained, participants did not change negatively their saving contribution. Indeed, it increased by a mean value of 0.65%, suggesting that nudges in a financial context can be transparent and effective. These findings are in alignment with previous research on nudge transparency and effectiveness in different fields (Bruns et al., 2018; Loewenstein et al., 2015; Steffel et al., 2016). Considering the existing literature, one possible explanation is the salience theory, according to which individuals overweigh the more salient aspects in the decision, so linking the nudge with the desired intention, by explicitly informing participants that the goal was to increase the saving amount (Bordalo et al., 2012), could have led to this slightly positive effect. Despite this, these results should not be taken blindly, as the change in saving contribution registered a fairly high standard deviation.

In what concerns trust and relationship, similar conclusions were derived, as both of them ranked mean values closer to 3, meaning that no change was perceived. This might indicate that people like transparency and might have perceived nudges as ethical (House of Lords, 2011).

Type 1 and type 2 conditions were not statistically significantly different from each other in terms of change in the saving contribution, neither trust, indicating that despite the type of nudge used, revealing it does not significantly affect the saving contribution nor trust towards the bank. However, type 1 respondents felt their relationship with the bank was significantly negatively affected, compared to type 2, which can be due to the subliminal and covert nature of defaults (Bovens, 2009; Hansen & Jespersen, 2013; Hausman & Welch, 2010). Type 1 participants might have felt stronger the manipulation, damaging more the relationship with the bank, in comparison with type 2 nudges. It is not clear why nudge disclosure affected the relationship and not trust for type 1 condition. Nonetheless, trust tends to be associated with service usage, being intrinsically related with reliability, whereas relationship implies confidence and trust to accept uncertainty and is more related to customer retention and exclusivity, both requiring different and complementary strategies (Aurier & N'Goala, 2010). Therefore, since participants did not present a significant change in the saving contribution, i.e., in the service usage, and by providing information, reliability might have increased, leading to no significant change in trust. However, type 1 participants might have felt more manipulated, damaging their affiliation and sense of belonging towards the bank, thus, affecting the relationship. Despite this possible explanation, further research is required to investigate this finding.

Furthermore, previous studies could not conclude that their findings were due to having noticed the nudge or not (Kroese et al., 2016), and based on the transparency check question even, I can

observe that the results were verified regardless of the individual noticing or not the default or the reminder.

5.1.4 Factors Influencing Change in the Saving Contribution

Saving contribution did not change significantly, and a meaningful model was not reached to explain the results obtained. Nonetheless, the bank's perceived intention significantly predicted change in the saving contribution. Indeed, choice architect intentions are significantly linked with nudge approval (Junghans et al., 2015), and it might have assumed more relevance given the fact that people tend to be skeptical about financial institutions (Aulianida et al., 2019; E. Johnson et al., 2015). According to previous research (Bruns et al., 2018), disclosing information on nudges did not trigger any psychological reactance. In fact, those more prone to reactance increased their saving contribution, increasing nudge effectiveness upon disclosure. However, this result was obtained at a 10% significance level, and given the overall non-significance of the model, further research is required.

5.1.5 Factors Influencing Trust Towards the Bank

Similar to the findings regarding the change in saving contribution, trust is mainly influenced by the bank's intention and by psychological reactance. Once again, I reiterate the importance of the bank's perceived intention and, as conveyed in the literature, individuals might have felt manipulated, triggering a psychological reactance, that even though it did not penalize the saving contribution, it weakened the trust towards the bank (J. W. Brehm, 1966; Dillard & Shen, 2005).

5.1.6 Factors Influencing Relationship with the Bank

Relationship towards the bank was significantly explained by the type of nudge. As already discussed, type 1 condition felt the relationship was negatively affected by the nudge disclosure. Similar to what was found for trust, the bank's intention and psychological reactance conclusions are reaffirmed for the relationship with the bank as well. Moreover, saving importance also significantly predicted the relationship. Those that valued saving more, presented higher negative effects on the relationship, indicating that these respondents might have felt more the underlying manipulation. Further research is required to understand why

saving importance affected the relationship and did not influence trust. Nonetheless, psychological mechanisms associated with the endowment effect (Kahneman et al., 1991) and psychological reactance (J. W. Brehm, 1966) might provide reasoning for this finding. People tend to value more the things they own, and by valuing more saving, losing what they believed to be "theirs" and true, might have led them to react adversely to the nudge disclosure.

Belief in free will was not a significant variable in neither one of the dependent variables, indicating that the scientific debate around the concept of libertarian paternalism, might not have practical significance for individuals, as elaborated by Sunstein and Thaler (2003). Additionally, the survey was designed specifically to ensure that participants felt their freedom of choice was not restricted by any means.

5.2 Main Conclusions

Overall, I can conclude that despite the literature concern regarding the ethical questionability of nudges, and their transparency and effectiveness, nudges can be transparent and effective in a financial context, not having significant impacts in terms of saving contribution, trust, and relationship, similar to what was found in other fields. However, from the three output variables, the relationship tended to be more sensitive towards nudge disclosure. Therefore, nudge strategies and their disclosure should be carefully done.

Type 1 and type 2 nudges are not perceived significantly different from each other regarding saving contribution and trust. However, default options made individuals feel that their relationship with the bank was negatively affected. The perceived intention of the bank played a major role in all dependent variables, and proneness to reactance intensified the negative effects in both trust and relationship. Individuals' beliefs in free will did not significantly influence the results obtained and the importance of saving was solely relevant for how the relationship with the bank was perceived.

5.3 Academic and Managerial Implications

The findings and conclusions of this dissertation offer both academic and managerial valuable implications. Firstly, nudges are a relatively recent topic, which requires further research, specifically on nudge disclosure and effectiveness, given that very little is known about this topic. Most studies that conveyed this issue were held in an environmental or health setting.

This thesis studied the impact of nudge disclosure in a financial context, adding to the existing literature that financial nudges can be transparent and effective. Moreover, it contemplated an enriched view on trust and relationship with financial institutions, suggesting that no significant negative effects were found, and indicated potential factors influencing the underlying financial decision, trust, and relationship.

Moreover, this study has managerial implications for financial institutions that use or want to use nudges as a strategy to improve their customers' financial decisions. Firstly, it should be considered that even if these organizations decide not to reveal the underlying nudge, there is always the risk of customers finding out, and present negative behavior. This study suggested that disclosing a nudge does not change its effectiveness, therefore, it is a good indicator that revealing them would be a good strategy. However, the disclosure should be done with some reservations. Firstly, it is important to consider that the financial sector is mainly built upon the trust of individuals, and any risky decision can jeopardize the confidence built up so far, damaging customer loyalty. Even though trust and relationship with the bank were not significantly affected in the study conducted, in the "real world", it might have different repercussions. Therefore, I recommend before taking any decision to do a pilot or a small experiment to understand if such effects hold. Moreover, one aspect that is prominently vital to consider is that the way individuals perceive organizations' intentions significantly affects how they react to nudge disclosure. The financial sector is frequently perceived as non-ethical and manipulative. Thus, it is even more important to highlight that the nudge aims to improve the decision of the customer and is not done in the interest of the bank. Additionally, considering the results obtained regarding type 1 and type 2 nudge effectiveness, I recommend unifying the different formats of reason to maximize the intended behavior. As mentioned, defaults shape more significantly the behavior, however, adding a reminder or an educational insight, can improve the direction in which the behavior change occurs. Overall, people seemed to like transparency, or at least not react adversely, thus, banks can leverage this strategy, building a strong reputation, which could contribute to enhanced performance.

5.4 Limitations and Further Research

First and foremost, the underlying question of this dissertation has a huge potential to be studied, given the newness and the few existing studies on the topic. Thus, future research can be recommended by proceeding to slight changes in the current study, leveraging on its limitations. Firstly, one limitation of the present study regards the design of the survey,

specifically, the results obtained could be validated by future research, by including two control groups, one for each system, such that it would represent a between-subjects study 2 (type 1 vs. type 2) x 2 (reveal vs. no reveal). In this manner, instead of comparing between nudge types, it would be possible to evaluate how each type performs upon nudge disclosure, being compared with its baseline, i.e., no disclosure, and not between each other.

Additionally, another limitation is the disperse saving contribution answers. Thus, it would be important in the future to understand if the variety of percentages represents reality, or if it was due to the way the experiment was conducted. For that, a question asking participants how seriously they took the present survey should be included, in order to understand up to what extent the results can be extrapolated to practical terms.

Moreover, the differences between type 1 and type 2 nudge, indicated that nudge 1 was effective in the opposite direction, thus setting a higher default rate, could eliminate this problem. Additionally, it would be interesting in the future to include a combination of both types of nudges, as type 1 shaped better consumers' choices, but type 2 could guide this change in the desired intention, leveraging from the advantages of each system.

In addition to this, it is still necessary to do a more in-depth study to investigate why customer/bank relationship, overall, seemed to be more sensitive to nudge disclosure than trust, specifically in terms of the nudge used and goal alignment with the nudge.

In general, there is a lot that is still unknown regarding nudge transparency, particularly in a financial context, so other follow-up studies could analyze if the obtained results vary on whether people are pre- or post-informed, and the duration of nudge effects, to understand if nudges can create enduring behavior change.

6. References

Amos, T. D. K. (1974). Judgment Under Uncertainty: Heuristics and Biases. *Science*, *November*.

Arad, A., & Rubinstein, A. (2018). The People's Perspective on Libertarian-Paternalistic Policies. *The Journal of Law and Economics*, *61*(2), 311–333. https://doi.org/10.1086/698608

Aulianida, D., Liestyasari, S. I., & Ch, S. R. (2019). The Market For Financial Adviser Misconduct. *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699.

Aurier, P., & N'Goala, G. (2010). The differing and mediating roles of trust and relationship commitment in service relationship maintenance and development. *Journal of the Academy of Marketing Science*. https://doi.org/10.1007/s11747-009-0163-z

Barberis, N. C. (2013). Thirty Years of Prospect Theory in Economics: A Review and Assessment. *Journal of Economic Perspectives*, *27*(1), 173–196. https://doi.org/10.1257/jep.27.1.173

Bartling, B., Fehr, E., & Herz, H. (2014). The Intrinsic Value of Decision Rights. *Econometrica*, *82*(6), 2005–2039. https://doi.org/10.3982/ECTA11573

Baumeister, R. F., Masicampo, E. J., & Dewall, C. N. (2009). Prosocial benefits of feeling free: Disbelief in free will increases aggression and reduces helpfulness. *Personality and Social Psychology Bulletin*. https://doi.org/10.1177/0146167208327217

Bolton, G. E., & Ockenfels, A. (2012). Behavioral economic engineering. *Journal of Economic Psychology*, *33*(3), 665–676. https://doi.org/10.1016/j.joep.2011.09.003

Bordalo, P., Gennaioli, N., & Shleifer, A. (2012). Salience theory of choice under risk. *Quarterly Journal of Economics*. https://doi.org/10.1093/qje/qjs018

Bovens, L. (2009). *The Ethics of Nudge BT - Preference Change: Approaches from Philosophy, Economics and Psychology* (T. Grüne-Yanoff & S. O. Hansson (eds.); pp. 207–219). Springer Netherlands. https://doi.org/10.1007/978-90-481-2593-7_10

Brehm, J. W. (1966). Theory of psychological reactance. In *Organisational Change: A Comprehensive Reader*.

Brehm, S. S., & Brehm, J. W. (1981). Psychological Reactance A Theory of Freedom and Control. In *The Encyclopedia of Cross-Cultural Psychology*.

Bruns, H., Kantorowicz-Reznichenko, E., Klement, K., Luistro Jonsson, M., & Rahali, B. (2018). Can Nudges be Transparent and yet Effective? *Journal of Economic Psychology*, *65*(February), 41–59. https://doi.org/10.1016/j.joep.2018.02.002

Camerer, C. F. (1998). *Prosect Theory in the Wild: Evidence from the Field. in Choices, Values, and Frames*. 288–300.

Chartrand, T. L. (2005). The role of conscious awareness in consumer behavior. *Journal of Consumer Psychology*. https://doi.org/10.1207/s15327663jcp1503_4

Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2002). Defined Contribution

Pensions: Plan Rules, Participant Choices, and the Path of Least Resistance. *NBER/Tax Policy and the Economy*. https://doi.org/10.1162/089286402760173467

Choi, J. J., Laibson, D., Madrian, B. C., & Metrick, A. (2003). Optimal defaults. *American Economic Review*. https://doi.org/10.1257/000282803321947010

Dhingra, N., Gorn, Z., Kener, A., & Dana, J. (2012). The default pull: An experimental demonstration of subtle default effects on preferences. *Judgment and Decision Making*, *7*(1), 69–76.

Dillard, J. P., & Shen, L. (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs*, *72*(2), 144–168. https://doi.org/10.1080/03637750500111815

Fehr, E., Herz, H., & Wilkening, T. (2013). The Lure of Authority: Motivation and Incentive Effects of Power. *American Economic Review*, *103*(4), 1325–1359. https://doi.org/10.1257/aer.103.4.1325

Felsen, G., Castelo, N., & Reiner, P. B. (2013). Decisional enhancement and autonomy: Public attitudes towards overt and covert nudges. *Judgment and Decision Making*, *8*(3), 202–213.

Fernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science*, *60*(8), 1861–1883. https://doi.org/10.1287/mnsc.2013.1849

Hacker, P. (2017). Personalizing EU Private Law: From Disclosures to Nudges and Mandates. *European Review of Private Law*, *3*, 651–678. https://ssrn.com/abstract=2914393

Hansen, P. G., & Jespersen, A. M. (2013). Nudge and the manipulation of choice: A framework for the responsible use of the nudge approach to behaviour change in public policy. *European Journal of Risk Regulation*, *4*(1), 3–28. https://doi.org/10.1017/s1867299x00002762

Hausman, D. M., & Welch, B. (2010). Debate: To nudge or not to nudge. *Journal of Political Philosophy*, *18*(1), 123–136. https://doi.org/10.1111/j.1467-9760.2009.00351.x

Hofmann, W., Friese, M., & Strack, F. (2009). Impulse and Self-Control From a Dual-Systems Perspective. *Perspectives on Psychological Science*. https://doi.org/10.1111/j.1745-6924.2009.01116.x

Hong, S.-M. (1992). Hong's Psychological Reactance Scale: A Further Factor Analytic Validation. *Psychological Reports*, *70*(2), 512–514. https://doi.org/10.2466/pr0.1992.70.2.512

Hong, S.-M., & Faedda, S. (1996). Refinement of the Hong Psychological Reactance Scale. *Educational and Psychological Measurement*, *56*(1), 173–182. https://doi.org/10.1177/0013164496056001014

House of Lords. (2011). Behaviour Change Report Declaration of Interests. *Science and Technology Select Committee*.

Johnson, E. J., & Goldstein, D. (2003). Do Defaults Save Lives? *Science*, *302*(5649), 1338–1339. https://doi.org/10.1126/science.1091721

Johnson, E., Meier, S., & Toubia, O. (2015). Money Left on the Kitchen Table: Exploring Sluggish Mortgage Refinancing Using Administrative Data, Surveys, and Field Experiments.". *Work. Pap., Columbia Bus. Sch., New York, NY Article Location*, 1–61.

Jung, J. Y., & Mellers, B. A. (2016). American attitudes toward nudges. *Judgment and Decision Making*, *11*(1), 62–74.

Junghans, A. F., Cheung, T. T., & De Ridder, D. D. (2015). Under consumers' scrutiny - An investigation into consumers' attitudes and concerns about nudging in the realm of health behavior Health policies, systems and management. *BMC Public Health*. https://doi.org/10.1186/s12889-015-1691-8

Kahneman, D. (2012). *Thinking, Fast and Slow*. 1st ed. New York : Farrar, Straus and Giroux, [2011] ©2011. https://search.library.wisc.edu/catalog/9910114919702121

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). The endowment effect, Loss Aversion, and Status Quo Bias. *Journal of Economic Perspectives*, *5*(1), 193–206.

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

Kroese, F. M., Marchiori, D. R., & De Ridder, D. T. D. (2016). Nudging healthy food choices: A field experiment at the train station. *Journal of Public Health (United Kingdom)*, *38*(2), e133–e137. https://doi.org/10.1093/pubmed/fdv096

Loewenstein, G., Bryce, C., Hagmann, D., & Rajpal, S. (2015). Warning: You are about to be nudged. *Behavioral Science & Policy*. https://doi.org/10.1353/bsp.2015.0000

Lusardi, A., & Tufano, P. (2015). Debt literacy, financial experiences, and overindebtedness. *Journal of Pension Economics and Finance*. https://doi.org/10.1017/S1474747215000232

Lynch, J. G., & Wood, W. (2006). Special issue editors' statement: Helping consumers help themselves. In *Journal of Public Policy and Marketing*. https://doi.org/10.1509/jppm.25.1.1

Madrian, B. C., & Shea, D. F. (2001). The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior. *The Quarterly Journal of Economics*, *CXVI*(November).

Marchiori, D. R., Adriaanse, M. A., & De Ridder, D. T. D. (2017). Unresolved questions in nudging research: Putting the psychology back in nudging. *Social and Personality Psychology Compass*, *11*(1), 1–13. https://doi.org/10.1111/spc3.12297

Marteau, T. M., Hollands, G. J., & Fletcher, P. C. (2012). Changing human behavior to prevent disease: The importance of targeting automatic processes. In *Science*. https://doi.org/10.1126/science.1226918

Mian, A., & Sufi, A. (2017). Fraudulent income overstatement on mortgage applications during the credit expansion of 2002 to 2005. *Review of Financial Studies*, *30*(6), 1831–1864. https://doi.org/10.1093/rfs/hhw104

Modigliani, F. (1966). The life cycle hypothesis of saving, the demand for wealth and the supply of capital. In *Social Research*.

Osman, M. (2004). An evaluation of dual-process theories of reasoning. *Psychonomic Bulletin and Review*. https://doi.org/10.3758/BF03196730

Owens, D., Grossman, Z., & Fackler, R. (2014). The Control Premium: A Preference for Payoff Autonomy. *American Economic Journal: Microeconomics*, *6*(4), 138–161. https://doi.org/10.1257/mic.6.4.138

Paulhus, D. L., & Carey, J. M. (2011). The FAD-plus: Measuring lay beliefs regarding free will and related constructs. *Journal of Personality Assessment*, *93*(1), 96–104. https://doi.org/10.1080/00223891.2010.528483

Reisch, L. A., Sunstein, C. R., & Gwozdz, W. (2017). Beyond carrots and sticks: Europeans support health nudges. *Food Policy*, *69*, 1–10. https://doi.org/10.1016/j.foodpol.2017.01.007

Rosenberg, B. D., & Siegel, J. T. (2018). A 50-year review of psychological reactance theory: Do not read this article. *Motivation Science*, *4*(4), 281–300. https://doi.org/10.1037/mot0000091

Saunders, M., Lewis, P., & Thornhill, A. (2008). Research Methods for Business Students 5th Ed. In *Research methods for business students*.

Shefrin, H. M., & Thaler, R. (1978). An Economic Theory of Self-Control. *Journal of Political Economy*, *208*.

Simon, H. A. (1972). Theories of bounded rationality. *Decision and Organization*.

Simons, A., Weinmann, M., Tietz, M., & vom Brocke, J. (2017). Which Reward Should I Choose? Preliminary Evidence for the Middle-Option Bias in Reward-Based Crowdfunding. *Proceedings of the 50th Hawaii International Conference on System Sciences (2017)*. https://doi.org/10.24251/hicss.2017.526

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*. https://doi.org/10.1037/0033-2909.119.1.3

Smith, E. R., & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review*. https://doi.org/10.1207/S15327957PSPR0402_01

Steffel, M., Williams, E. F., & Pogacar, R. (2016). Ethically Deployed Defaults: Transparency and Consumer Protection through Disclosure and Preference Articulation. *Journal of Marketing Research*, *53*(5), 865–880. https://doi.org/10.1509/jmr.14.0421

Sunstein, C. R. (2016). People Prefer System 2 Nudges (Kind of). *Duke Law Journal*, *66*(1), 121–168. https://heinonline.org/HOL/P?h=hein.journals/duklr66&i=125

Sunstein, C. R., & Reisch, L. A. (2014). Automatically green: Behavioral economics and environmental protection. *Harvard Environmental Law Review*, *38*(1), 127–158. https://doi.org/10.2139/ssrn.2245657

Sunstein, C. R., & Thaler, R. (2003). Libertarian Paternalism is not an Oxymoron. *The University of Chicago Law Review*, *80*(1), 87–136.

Thaler, R. H. (2004). *Save More Tomorrow ™ : Using Behavioral Economics to Increase*

Employee Saving Author (s): Richard H . Thaler and Shlomo Benartzi Source : Journal of Political Economy , Vol . 112 , No . S1 , Papers in Honor of Sherwin Rosen : A Supplement to Volume 112 . 112(February).

Thaler, R. H. (2018). From Cashews to Nudges: The Evolution of Behavioral Economics. *American Economic Review*, *108*(6), 1265–1287. https://doi.org/10.1257/aer.108.6.1265

Thaler, R. H., & Sunstein, C. R. (2008). Nudge: Improving decisions about health, wealth, and happiness. In *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press. https://doi.org/10.1016/s1477-3880(15)30073-6

Van Gestel, L. C., Adriaanse, M. A., & De Ridder, D. T. D. (2020). Do nudges make use of automatic processing? Unraveling the effects of a default nudge under type 1 and type 2 processing. *Comprehensive Results in Social Psychology*. https://doi.org/10.1080/23743603.2020.1808456

Vohs, K. D., & Schooler, J. W. (2008). The value of believing in free will: Encouraging a belief in determinism increases cheating. *Psychological Science*. https://doi.org/10.1111/j.1467-9280.2008.02045.x

Wilson Van Voorhis, C. R., & Morgan, B. L. (2007). Understanding Power and Rules of Thumb for Determining Sample Sizes. *Tutorials in Quantitative Methods for Psychology*. https://doi.org/10.20982/tqmp.03.2.p043

Zingales, L., Ashraf, N., Guiso, L., Hart, O., Morse, A., Picarelli, D., Rajan, R., Rolnick, G., Sapienza, P., Seru, A., Shleifer, A., Sufi, A., & Tucker, P. (2015). *Nber Working Paper Series Does Finance Benefit Society?* http://www.nber.org/papers/w20894

7. Appendices

Appendix 1: Research survey

Welcome and thank you very much for participating in this survey!

This questionnaire is about personal financial decisions, within the scope of my master's thesis.

It will take approximately 4 minutes to complete. Participation in this survey is entirely voluntary and anonymous, so I kindly ask you to answer as truthfully as possible. The data will be exclusively held for research purposes and your identity will be kept confidential.

If you have any questions regarding this study, do not hesitate in contacting me: Jessica Rodrigues (152119066@alunos.lisboa.ucp.pt).

Once again, thank you for your cooperation!

Block 1: Saving Importance

Q1 - Currently, how important is saving for you?

- ○ Not important at all
- ○ Slightly important
- ○ Moderately important
- ○ Very important
- ○ Extremely important

Block 2: Nudge Manipulation

(For Type 1 Nudge)

Q2a - Suppose you have a net income of 1000€. Your bank proposes a saving plan, which consists of allocating a percentage of your net income to a savings account, every month, which can be mobilized in advance with an interest penalty.

Feel free to choose the percentage that you would like to allocate to your savings account.

- ○ 6%
- ○ Other (indicate a number from 0 to 100 without the % symbol)

(For Type 2 Nudge)

Q2b - Suppose you have a net income of 1000€. Your bank proposes a saving plan, which consists of allocating a percentage of your net income to a savings account, every month, which can be mobilized in advance with an interest penalty.

Please remember that saving is important, as it helps you to be more protected against eventual financial shocks.

Feel free to choose the percentage that you would like to allocate to your savings account.

(For Control)

Q2c - Suppose you have a net income of 1000€. Your bank proposes a saving plan, which consists of allocating a percentage of your net income to a savings account, every month, which can be mobilized in advance with an interest penalty.

Feel free to choose the percentage that you would like to allocate to your savings account.

<u>Block 3: Nudge Reveal</u>

(For Type 1 Nudge)

Q3a - Did you notice that there was a default option of 6%?

- ○ Yes
- ○ No

This strategy was used so that people would choose a higher percentage.

(For Type 1 Nudge)

Q3b - Did you notice that there was a reminder about saving benefits?

- ○ Yes
- ○ No

This strategy was used so that people would choose a higher percentage.

(For both Type 1 Nudge and Type 2 Nudge)

Q4 - Why do you think the bank followed this strategy?

- ○ To increase the available amount of money in the bank
- ○ To increase my personal savings

Q5 - After knowing about this strategy, what is the percentage that you would like to save?

Q6 - Do you feel your trust in the bank is stronger or weaker after this strategy?

- ○ Much weaker
- ○ Weaker
- ○ No change
- ○ Stronger
- ○ Much stronger

Q7 - How do you think this strategy will affect your customer/bank relationship?

- ○ Very negatively
- ○ Negatively
- ○ Neither negatively nor positively
- ○ Positively
- ○ Very positively

Block 4: Free Will

For each statement below, choose the option that best suits you.

Q8 - People have complete control over the decisions they make.

- ○ Strongly disagree

- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Q9 - People must take full responsibility for any bad choices they make.

- Strongly disagree
- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Q10 - People can overcome any obstacles if they truly want to.

- Strongly disagree
- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Q11 - Criminals are totally responsible for the bad things they do.

- Strongly disagree
- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Q12 - People have complete free will.

- Strongly disagree
- Disagree

- Neutral/Don’t know
- Agree
- Strongly agree

Q13 - People are always at fault for their bad behavior.

- Strongly disagree
- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Q14 - Strength of mind can always overcome the body's desires.

- Strongly disagree
- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Block 5: Psychological Reactance

For each statement below, choose a number from 1 (strongly disagree) to 5 (strongly agree).

Q15 - Regulations trigger a sense of resistance in me.

- Strongly disagree
- Disagree
- Neutral/Don’t know
- Agree
- Strongly agree

Q16 - I find contradicting others stimulating.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q17 - When something is prohibited, I usually think, "That's exactly what I am going to do."

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q18 - I consider advice from others to be an intrusion.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q19 - I become frustrated when I am unable to make free and independent decisions.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q20 - It irritates me when someone points out things which are obvious to me.

- ○ Strongly disagree

- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q21 - I become angry when my freedom of choice is restricted.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q22 - Advice and recommendations usually induce me to do just the opposite.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q23 - I resist the attempts of others to influence me.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q24 - It makes me angry when another person is held up as a role model for me to follow.

- ○ Strongly disagree
- ○ Disagree

- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Q25 - When someone forces me to do something, I feel like doing the opposite.

- ○ Strongly disagree
- ○ Disagree
- ○ Neutral/Don’t know
- ○ Agree
- ○ Strongly agree

Block 6: Demographics

Q26 - Gender

- ○ Male
- ○ Female

Q27 – Age

Q28 - Where do you live?

▼ Afghanistan (1) … Zimbabwe (195)

Q29 - Education Level

- ○ Primary Education
- ○ High School
- ○ Bachelor’s degree
- ○ Master’s degree
- ○ Doctorate

Q30 - Professional Situation

- Unemployed
- Student
- Student-Worker
- Employed
- Retired
- Other

Q31 - What is your monthly household income after deducting taxes?

- Less than 1000€
- 1001€-2000€
- 2001€-3000€
- 3001€-4000€
- 4001€-5000€
- More than 5000€

Appendix 2: Sample demographic characteristics

Table 1- Sample demographic characteristics

Variables		*Type 1 Nudge*		*Type 2 Nudge*		*Control*		*Total*	
Participants Total #		198	32.3%	201	32.8%	214	34.9%	613	100.0%
Gender	Male	97	49.0%	86	42.8%	109	50.9%	292	47.6%
	Female	101	51.0%	115	57.2%	105	49.1%	321	52.4%
Age	<18	7	3.5%	7	3.5%	11	5.1%	25	4.1%
	18-29	67	33.8%	83	41.3%	78	36.4%	228	37.2%
	30-39	25	12.6%	18	9.0%	21	9.8%	64	10.4%
	40-49	35	17.7%	32	15.9%	40	18.7%	107	17.5%
	50-59	40	20.2%	31	15.4%	27	12.6%	98	16.0%
	60-69	19	9.6%	26	12.9%	27	12.6%	72	11.7%
	>69	5	2.5%	4	2.0%	10	4.7%	19	3.1%
Country	Portugal	180	90.9%	190	94.5%	201	93.9%	571	93.1%
	Other	18	9.1%	11	5.5%	13	6.1%	42	6.9%
Education	Primary Education	2	1.0%	2	1.0%	2	0.9%	6	1.0%
	High School	58	29.3%	55	27.4%	68	31.8%	181	29.5%
	Bachelor's degree	97	49.0%	98	48.8%	110	51.4%	305	49.8%
	Master's degree	41	20.7%	44	21.9%	33	15.4%	118	19.2%
	Doctorate	0	0.0%	2	1.0%	1	0.5%	3	0.5%
Profession	Unemployed	2	1.0%	6	3.0%	4	1.9%	12	2.0%
	Student	46	23.2%	47	23.4%	57	26.6%	150	24.5%
	Student-Worker	9	4.5%	7	3.5%	7	3.3%	23	3.8%
	Employed	113	57.1%	112	55.7%	108	50.5%	333	54.3%
	Retired	11	5.6%	13	6.5%	17	7.9%	41	6.7%
	Other	17	8.6%	16	8.0%	21	9.8%	54	8.8%
Income	<1000€	51	25.8%	48	23.9%	42	19.6%	141	23.0%
	1001€-2000€	72	36.4%	82	40.8%	78	36.4%	232	37.8%
	2001€-3000€	38	19.2%	43	21.4%	46	21.5%	127	20.7%
	3001€-4000€	16	8.1%	16	8.0%	26	12.1%	58	9.5%
	4001€-5000€	8	4.0%	4	2.0%	10	4.7%	22	3.6%
	>5000€	13	6.6%	8	4.0%	12	5.6%	33	5.4%

Appendix 3: Assumption check

Table 2 - Shapiro-Wilk test for normality

Variables		*Statistic*	*Sig.*	*Decision*
Demographic	Male	0.63575	.000	Rej. H0
	Age	0.9205	.000	Rej. H0
	Portugal	0.27316	.000	Rej. H0
	Education	0.83718	.000	Rej. H0
	Profession	0.84124	.000	Rej. H0
	Average Income	0.85284	.000	Rej. H0
Dependent	Saving Cont.	0.78294	.000	Rej. H0
	New Saving Cont.	0.76275	.000	Rej. H0
	Change Sav. Cont.	0.46840	.000	Rej. H0
	Trust	0.64508	.000	Rej. H0
	Relationship	0.68486	.000	Rej. H0
Independent	Intention	0.41561	.000	Rej. H0
	Saving Importance	0.81870	.000	Rej. H0
	Average FW	0.99287	.005	Rej. H0
	Average PR	0.99049	.001	Rej. H0

Note: H0 = Population follows a normal distribution. Decision at 5% significance level.

Table 3 - Levene's test for homogeneity of variances

Variables		*df1*	*df2*	*Statistic*	*Sig.*	*Decision*
Demographic	Male	2	610	1.0555	.349	Not Rej. H0
	Age	2	610	1.0924	.336	Not Rej. H0
	Portugal	2	610	1.1772	.309	Not Rej. H0
	Education	2	610	0.1983	.820	Not Rej. H0
	Profession	2	610	0.9573	.385	Not Rej. H0
	Average Income	2	610	1.9432	.144	Not Rej. H0
Dependent	Saving Cont.	2	610	19.4560	.000	Rej. H0
	New Saving Cont.	1	397	34.5680	.000	Rej. H0
	Change Sav. Cont.	1	397	5.8060	.016	Rej. H0
	Trust	1	397	0.1770	.674	Not Rej. H0
	Relationship	1	397	0.4574	.499	Not Rej. H0
Independent	Bank Intention	1	397	0.6011	.439	Not Rej. H0
	Saving Importance	2	610	0.7360	.480	Not Rej. H0
	Average FW	2	610	0.7415	.477	Not Rej. H0
	Average PR	2	610	3.9383	.020	Rej. H0

Note: H0 = All populations have equal variances across groups. Decision at 5% significance level.

Appendix 4: One-Way ANOVA for demographic variables

Table 4 - One-Way ANOVA Table for Male

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	0.74	0.3710	1.487	.227
Within groups	610	152.17	0.2495		
Total	612	152.91			

Table 5 - One-Way ANOVA Table for Age

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	88	43.95	0.151	.860
Within groups	610	177311	290.97		
Total	612	177399			

Table 6 - One-Way ANOVA Table for Portugal

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	0.15	0.07521	1.177	.309
Within groups	610	38.97	0.06389		
Total	612	39.12			

Table 7 - One-Way ANOVA Table for Education

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	1.5	0.7299	1.367	.256
Within groups	610	325.8	0.5341		
Total	612	327.3			

Table 8 - One-Way ANOVA Table for Profession

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	0.3	0.1527	0.102	0.903
Within groups	610	915.8	1.5012		
Total	612	916.1			

Table 9 - One-Way ANOVA Table for Average Income

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	7748029	3874014	2.206	.111
Within groups	610	1071433048	1756448		
Total	612	1079181077			

Appendix 5: Sample demographic characteristics for participants that saved more than 50%

Table 10 - Sample demographic characteristics for participants that saved more than 50%

Variables		*Type 1 Nudge*		*Type 2 Nudge*		*Control*		*Total*	
Participants Total #		1	2.6%	21	55.3%	16	42.1%	38	100.0%
Gender	Male	1	100.0%	6	28.6%	5	31.3%	12	31.6%
	Female	0	0.0%	15	71.4%	11	68.8%	26	68.4%
Age	<18	0	0.0%	1	4.8%	2	12.5%	3	7.9%
	18-29	1	100.0%	10	47.6%	9	56.3%	20	52.6%
	30-39	0	0.0%	1	4.8%	0	0.0%	1	2.6%
	40-49	0	0.0%	5	23.8%	1	6.3%	6	15.8%
	50-59	0	0.0%	2	9.5%	1	6.3%	3	7.9%
	60-69	0	0.0%	1	4.8%	2	12.5%	3	7.9%
	>69	0	0.0%	1	4.8%	1	6.3%	2	5.3%
Country	Portugal	1	100.0%	19	90.5%	14	87.5%	34	89.5%
	Other	0	0.0%	2	9.5%	2	12.5%	4	10.5%
Education	Primary Education	0	0.0%	0	0.0%	2	12.5%	2	5.3%
	High School	1	100.0%	7	33.3%	6	37.5%	14	36.8%
	Bachelor's degree	0	0.0%	10	47.6%	6	37.5%	16	42.1%
	Master's degree	0	0.0%	3	14.3%	2	12.5%	5	13.2%
	Doctorate	0	0.0%	1	4.8%	0	0.0%	1	2.6%
Profession	Unemployed	0	0.0%	0	0.0%	1	6.3%	1	2.6%
	Student	1	100.0%	4	19.0%	5	31.3%	10	26.3%
	Student-Worker	0	0.0%	1	4.8%	2	12.5%	3	7.9%
	Employed	0	0.0%	11	52.4%	6	37.5%	17	44.7%
	Retired	0	0.0%	1	4.8%	2	12.5%	3	7.9%
	Other	0	0.0%	4	19.0%	0	0.0%	4	10.5%
Income	<1000€	1	100.0%	7	33.3%	1	6.3%	9	23.7%
	1001€-2000€	0	0.0%	10	47.6%	7	43.8%	17	44.7%
	2001€-3000€	0	0.0%	3	14.3%	3	18.8%	6	15.8%
	3001€-4000€	0	0.0%	0	0.0%	1	6.3%	1	2.6%
	4001€-5000€	0	0.0%	0	0.0%	2	12.5%	2	5.3%
	>5000€	0	0.0%	1	4.8%	2	12.5%	3	7.9%

Appendix 6: Assumption check for the logarithm of saving contribution

Table 11 - Shapiro-Wilk test for normality

Variable	*Statistic*	*Sig.*	*Decision*
Log(Saving Contribution)	0.95029	.000	Rej. H0

Note: H0 = Population follows a normal distribution. Decision at 5% significance level.

Table 12 - Levene's test for homogeneity of variances

Variables	*df1*	*df2*	*Statistic*	*Sig.*	*Decision*
Log(Saving Contribution)	2	610	6.6965	.001	Rej. H0

Note: H0 = All populations have equal variances across groups. Decision at 5% significance level.

Appendix 7: Summary statistics for dependent variables

Table 13 - Summary statistics for dependent variables

Statistic	*N*	*Mean*	*Sd*	*Min*	*Max*
Change Sav. Cont.	399	0.65	10.68	-48.00	90.00
Trust	399	2.87	0.55	1.00	4.00
Relationship	399	2.97	0.53	1.00	4.00

Appendix 8: Welch Two-Sample T-Test

Table 14 – Welch Two-Sample T-Test between type 1 nudge and control group

Mean Type 1	*Mean Control*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
2.06	2.58	-5.00	395.67	.000	-0.72	-0.31

Note: H0: True difference in means is equal to zero.

Table 15 – Welch Two-Sample T-Test between type 2 nudge and control group

Mean Type 2	*Mean Control*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
2.85	2.58	2.58	404.16	.010	0.06	0.48

Note: H0: True difference in means is equal to zero.

Appendix 9: T-Tests for change in the saving contribution

Table 16 – Welch Two-Sample T-Test between type 1 and type 2 nudge for change in the saving contribution

Mean Type 1	*Mean Type 2*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
0.59	0.71	-0.12	308.56	.908	-2.22	1.98

Note: H0: True difference in means is equal to zero.

Table 17 – Welch Two-Sample T-Test between type 1 and type 2 nudge for change in the saving contribution only for individuals that noticed the underlying nudge

Mean Type 1	*Mean Type 2*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
0.60	1.34	-0.71	264.6	.481	-2.79	1.32

Note: H0: True difference in means is equal to zero.

Appendix 10: T-Tests for trust towards the bank

Table 18 – Two-Sample T-Test between type 1 and type 2 nudge for trust

Mean Type 1	*Mean Type 2*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
2.83	2.91	-1.40	397	.162	-0.19	0.03

Note: H0: True difference in means is equal to zero.

Table 19 – Two-Sample T-Test between type 1 and type 2 nudge for trust only for individuals that noticed the underlying nudge

Mean Type 1	*Mean Type 2*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
2.84	2.93	-1.61	345	.109	-0.21	0.02

Note: H0: True difference in means is equal to zero.

Appendix 11: T-Tests for customer/bank relationship

Table 20 – Two-Sample T-Test between type 1 and type 2 nudge for relationship

Mean Type 1	*Mean Type 2*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
2.92	3.02	-2.01	397	.045	-0.21	-0.00

Note: H0: True difference in means is equal to zero.

Table 21 – Two-Sample T-Test between type 1 and type 2 nudge for relationship only for individuals that noticed the underlying nudge

Mean Type 1	*Mean Type 2*	*t*	*df*	*p-value*	*95% CI*	
					Lower	*Upper*
2.92	3.06	-2.61	345	.010	-0.25	-0.04

Note: H0: True difference in means is equal to zero.

Appendix 12: Multiple linear regression models

Table 22 - Multiple linear regression model for change in the saving contribution, trust, and relationship

	Change Saving Contribution	Trust	Relationship
Type 1 Nudge	-0.277	-0.079	-0.109**
	(1.066)	(0.053)	(0.051)
Bank Intention	-3.290**	-0.318***	-0.323***
	(1.547)	(0.077)	(0.074)
Saving Importance	0.441	-0.043	-0.063**
	(0.644)	(0.032)	(0.031)
Average FW	0.725	0.046	0.063
	(0.880)	(0.044)	(0.042)
Average PR	1.896*	-0.167***	-0.112**
	(1.144)	(0.057)	(0.055)
Constant	-5.856	3.667***	3.656***
	(5.266)	(0.264)	(0.252)
Observations	399	399	399
R^2	.023	.076	.085
Adjusted R^2	.010	.064	.074
Residual SE	10.628 (df = 393)	0.532 (df = 393)	0.508 (df = 393)
F Statistic	1.824 (df = 5; 393)	6.462*** (df = 5; 393)	7.323*** (df = 5; 393)

*Note: *p<0.1; **p<0.05; ***p<0.01. Not corrected for heteroskedasticity.*

Table 23 – Breusch-Pagan Test for multiple linear regression models

Model	*df*	*Statistic*	*Sig.*	*Decision*
Change in saving contribution	5	9.5601	.090	Not Rej. H0
Trust	5	8.0729	.152	Not Rej. H0
Relationship	5	10.2840	.068	Not Rej. H0

Note: H0 = Error variances are all equal. Decision at 5% significance level

Table 24 - Multiple linear regression model for change in the saving contribution, trust, and relationship only for individuals that noticed the underlying nudge

	Change Saving Contribution	Trust	Relationship
Type 1 Nudge	-0.979	-0.089	-0.143***
	(1.006)	(0.056)	(0.053)
Bank Intention	-3.753***	-0.309***	-0.309***
	(1.448)	(0.081)	(0.077)
Saving Importance	0.622	-0.052	-0.075**
	(0.602)	(0.034)	(0.032)
Average FW	0.111	0.052	0.067
	(0.819)	(0.046)	(0.043)
Average PR	1.916*	-0.150**	-0.070
	(1.096)	(0.061)	(0.058)
Constant	-3.477	3.644***	3.596***
	(4.970)	(0.278)	(0.262)
Observations	347	347	347
R^2	.032	.078	.093
Adjusted R^2	.018	.064	.079
Residual SE (df = 395)	9.312 (df = 341)	0.520 (df = 341)	0.492 (df = 341)
F Statistic (df = 3; 395)	2.260** (df = 5; 341)	5.752*** (df = 5; 341)	6.974*** (df = 5; 341)

*Note: *p<0.1; **p<0.05; ***p<0.01. Not corrected for heteroskedasticity. Only for individuals that noticed the underlying nudge.*