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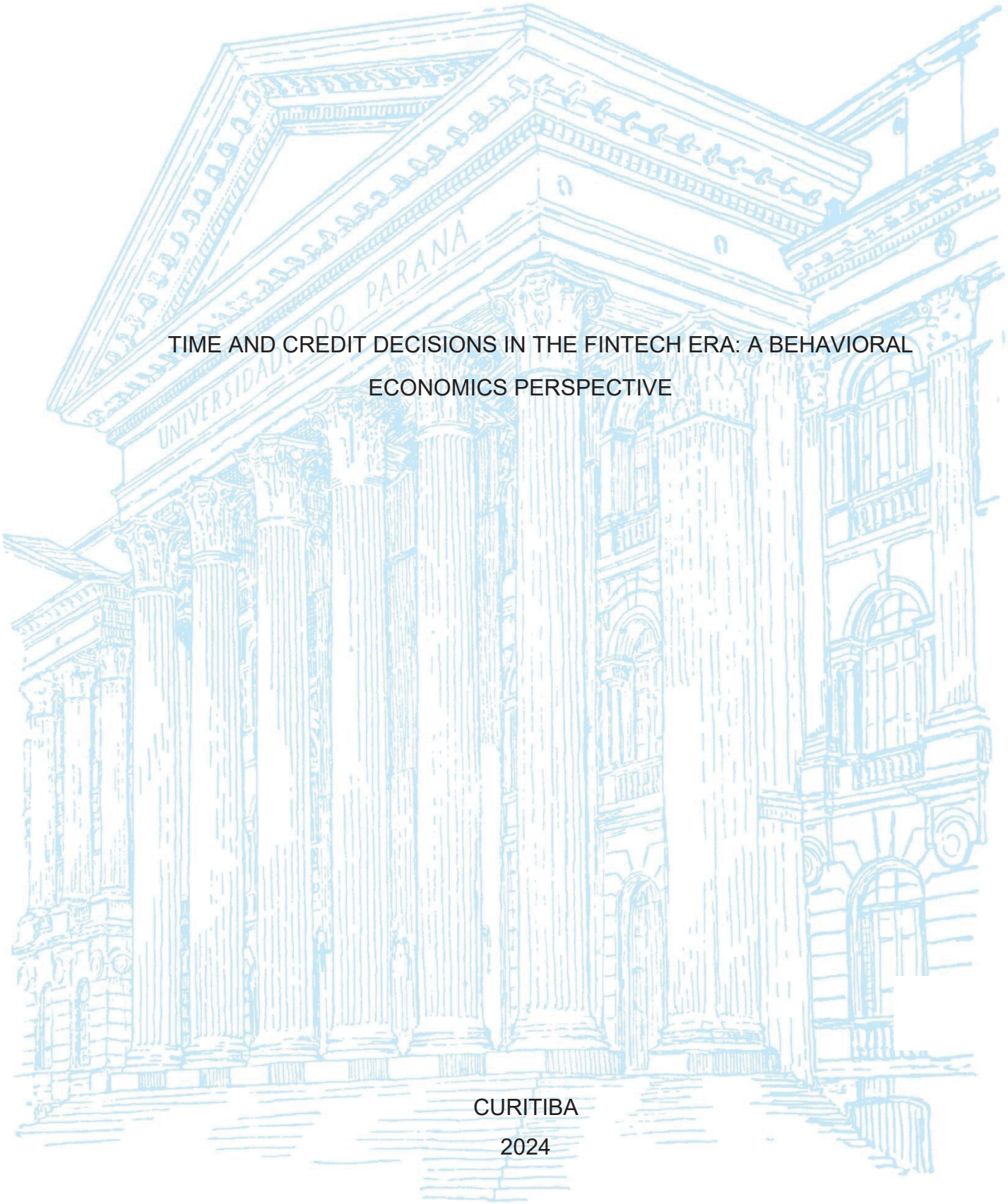

TIME AND CREDIT DECISIONS IN THE FINTECH ERA: A BEHAVIORAL ECONOMICS PERSPECTIVE

CURITIBA

2024

FELIPE JOSÉ MARROCO DO AMARAL ALVES

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Tese apresentada ao Programa de Pós-graduação em Administração, área de Concentração Estratégia e Organizações, do Setor de Ciências Sociais Aplicadas da Universidade Federal do Paraná, como parte das exigências para obtenção do título de Doutor.

Orientador: Prof. Dr. Paulo Henrique Muller Prado

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Os membros da Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação ADMINISTRAÇÃO da Universidade Federal do Paraná foram convocados para realizar a arguição da tese de Doutorado de **FELIPE JOSÉ MARROCO DO AMARAL ALVES** intitulada: ***TIME AND CREDIT DECISIONS IN THE FINTECH ERA: A BEHAVIORAL ECONOMICS PERSPECTIVE***, sob orientação do Prof. Dr. PAULO HENRIQUE MULLER PRADO, que após terem inquirido o aluno e realizada a avaliação do trabalho, são de parecer pela sua APROVAÇÃO no rito de defesa.

A outorga do título de doutor está sujeita à homologação pelo colegiado, ao atendimento de todas as indicações e correções solicitadas pela banca e ao pleno atendimento das demandas regimentais do Programa de Pós-Graduação.

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RESUMO

As fintechs remodelaram a indústria de crédito, oferecendo operações de empréstimo mais rápidas e convenientes, além de taxas de juros mais atraentes aos consumidores. No entanto, a facilidade e a rapidez de acesso ao crédito podem estimular um comportamento impulsivo do consumidor, diminuindo a sua racionalidade e gerando decisões de crédito menos favoráveis. Este estudo investiga empiricamente a relação entre o tempo de tomada de decisão e a favorabilidade das decisões de crédito dos consumidores, amparado pela teoria da racionalidade limitada, e contribui para a corrente de pesquisa que postula que o tempo insuficiente normalmente leva a decisões menos favoráveis, testando esta relação em um novo contexto. Os resultados de quatro experimentos sugerem que o tempo reduzido de tomada de decisão tem uma relação negativa com a favorabilidade das decisões de crédito dos consumidores - o estudo 1 mostrou evidências iniciais para a relação principal proposta; o estudo 2 indicou que a percepção do bem-estar financeiro é o mecanismo subjacente à relação entre o tempo de tomada de decisão e a favorabilidade das decisões de crédito dos consumidores; os estudos 3 e 4 mostraram que, sob efeito do *nudging* de lembrança, os consumidores com menor tempo de tomada de decisão tomam decisões de crédito mais favoráveis, o que não acontece sem o *nudging* de lembrança.

Palavras-chave: fintech; tempo; crédito; tomada de decisão; comportamento do consumidor.

ABSTRACT

Fintech has reshaped the credit industry by offering faster and more convenient lending operations, along with more attractive interest rates for consumers. However, the ease and speed of credit access may stimulate impulsive consumer behavior, impairing consumers' rationality and leading to less favorable credit decisions. This study empirically investigates the relationship between decision-making time and the favorability of consumers' credit decisions, supported by bounded rationality theory, and contributes to the stream of research that postulates that insufficient time usually leads to less favorable decisions, testing this relationship in a new context. The results from four experiments suggest that reduced decision-making time has a negative relationship with the favorability of consumers' credit decisions - study 1 showed initial evidence for the proposed main relationship; study 2 indicated that the perception of financial wellbeing is the mechanism underlying the relationship between decision-making time and the favorability of consumers' credit decisions; studies 3 and 4 showed that under effect of reminder nudging, consumers with reduced decision-making time make more favorable credit decisions, what do not happen without reminder nudging.

Keywords: fintech; time; credit; decision-making; consumer behavior.

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1 INTRODUCTION

Internet, mobile applications, social media, and other such innovations of the last 30 years are not something special anymore – they are just part of our everyday life. The hyperconnected consumers spend most of their time with their devices, dealing with several issues, such as diets, readings, social networks, fuel consumption, and bank transactions (King, 2014).

With the growth of fintech[1]in recent years, it is advisable to examine its impact on consumer behavior, especially regarding credit acquisition, which seems to be a more delicate issue. Fintech has reinvented the lending processes and disrupted the finance industry - online lending generates credit expansion, which stimulates consumption and economic growth, promoting financial inclusion to people that have not been served by traditional banks (King, 2014, Agarwal & Chua, 2020). However, the real impact of fintech to individuals is still controversial (Agarwal & Chua, 2020; Panos & Wilson, 2020).

Fintech is seen as a macro financial innovation that has challenged the role of traditional financial institutions such as banks (Agarwal & Chua, 2020; King, 2014). Besides offering convenience and more attractive interest rates for consumers, fintech lending may lead to more efficient financing and refinancing decisions by households, as lenders work with reduced loan processing times (Agarwal & Chua, 2020; Buchak et al., 2018; Berg et

[1] Fintech, or financial technology, is the term used to describe any technology that delivers financial services through software, such as online banking, mobile payment apps or even cryptocurrency. Fintech is a broad category that encompasses many different technologies, but the primary objectives are to change the way consumers and businesses access their finances and compete with traditional financial services (U.S. Chamber of Commerce, 2021).

al.,2022), which contributes to financial inclusion in general (Morgan, 2021; King, 2014).

On the other hand, the ease of credit access may trigger consumers' short-term impatience on financial decisions, encouraging borrowers to consume more and increase their standard of living, rather than improving their financial well-being (Di Maggio & Yao, 2021). This effect can result in over-consumption and over-borrowing, which have negative consequences on households, especially those with low financial skills (Agarwal & Chua, 2020; Morgan, 2021). Considering the fast developments in fintech, without proper regulation it may lead to instability in the financial system and macroeconomy (Agarwal & Chua, 2020; Morgan, 2021).

There is often a sense of urgency prevalent in most fintech credit offers, boosted by the ease (convenient ways of acquiring credit usually done with mobile platforms) and speed (reduced loan processing time) with which consumers can borrow online (Berg et al., 2022; Fuster et al, 2019; Odinet, 2017; Agarwal & Chua, 2020) - fintech customers can apply for a loan through the lender's website or mobile application and receive approval within a few minutes. The international fintech platform Square, for example, when marketing their lending products, states: "No long forms to fill out" and "You'll usually know if you're approved right away" (Square, 2023).

From the points discussed above, we realized that time would be the most important variable to be addressed in this research. Supported by studies that show that insufficient time and time pressure may impair good judgment and choice (Maule & Edland, 2002; Gonzalez, 2004; Svenson & Maule, 1993; Kocher & Sutter, 2006; Böckenholt & Kroeger, 1993; Starcke &

Brand, 2012; Maule et.al., 2000), we conducted four experiments testing the effect of decision-making time on the favorability of consumers' credit decisions.

Previous studies about fintech and consumer behavior have addressed so far issues related to the adoption of innovative fintech services(Swacha-Lech & Solarz, 2021; Jin et al., 2019; Roh et al., 2024); fintech and the younger generation (Pintér et al., 2021; Bhardwaj, 2019; Abu Daqar et al., 2021); fintech and financial inclusion (Gabor & Brooks, 2020; Arner et al., 2020; Beck, 2020); financial literacy and fintech (Panos & Wilson, 2020; Morgan, 2021; Yoshino et al., 2020); fintech and financial stability (Elsinger et al., 2018; Vučinić, 2020; Fung et al., 2020; Koskelainen, 2023); fintech fraud and consumer protection (Schubert, 2018; Disemadi et al., 2020; Kanungo, 2024; Engels et al., 2020; Saimima & Patria,2021).

However, for our knowledge, there are no studies exploring the effect of decision-making time on the favorability of consumers' credit decisions with fintech. This study aims to address this gap, giving theoretical contribution to behavioral economics research. We reinforce the stream of research that postulates that insufficient time usually leads to less favorable decisions. We demonstrate the explanation mechanism of financial wellbeing, which is not the most common application of the variable. Finally, we strengthen the nudging theory, demonstrating that reminder nudging has a significant impact on consumers' credit decisions.

From a practical point of view, we expect that the results of this study may contribute to identify opportunities for the formulation of public policies on financial education, as well as the improvement of current regulation on

fintech[2], so that more conscious and rational decisions can be taken by consumers, avoiding, consequently, the proliferation of cases of default and over-indebtedness, what would represent significant losses for borrowers, in most cases also for lenders, and ultimately for the society as a whole.

The remainder of this study is structured as follows. In the next section, we develop the theoretical framework of the research. Followed, we present four empirical studies to test the proposed hypotheses. Finally, we address a discussion of theoretical contributions, potential managerial implications, and limitations and directions for future research.

2 THEORETICAL BACKGROUND

The theoretical background of this study encompasses the following sections: (1) Bonded rationality is the background of this work as a whole – it explains how consumers can make decisions applying heuristics and influenced by cognitive biases, especially in the case of credit decisions. (2) Time and decision-making topic focus on studies that show that insufficient time and time pressure usually impair good judgment and choice. (3) The mediation role of financial wellbeing encompasses the introduction of financial wellbeing concept, which is relatively new in the literature, and how it can be an explanation mechanism of our proposed main relationship. (4) The moderation role of nudging topic introduces the nudging theory, showing the basis on which we can rely on to suggest that nudging strategies can improve consumers' credit decisions.

[2] In Brazil, the first regulation on fintech took place in 2018 (Resolutions CMN 4.656 and CMN 4.657 /2018), having received six amendments so far (May 2024) and is still under debate by members of the Brazilian financial sector regulatory structure (Banco Central do Brasil, 2024).

2.1 BOUNDED RATIONALITY

There is no unified theory of bounded rationality, but in general it refers to situations when rationality may not be supported by mathematical maximization and statistical reasoning. The concept was coined by Herbert Simon (1955, 1959, 1978, 1982) to contrast with the axioms of the neoclassical theory of perfect rationality. A core idea is that rationality is bounded because there are limits to our cognitive capacity, available information, and time. According to Simon (1955), bounded rationality considers individual's limited capacities in acquiring and processing information – the decision-makers are not cognitively able to identify the alternative which promises the highest expected utility. They use information selectively instead, reducing computational efforts.

The classical decision-making theories in economics were defined by focusing on behavior as the outcome of a logical process, what was known as *rational choice theory* – the core idea is that all action is fundamentally rational, in the sense that people calculate the probable costs and benefits of any action before deciding what do to do (Scott, 2000). Consumers, for example, are expected to choose among the alternatives which are always known, and with no limits to the complex computations they should perform to determine which alternatives are best (Green, 2002). In sum, people should behave in a way that maximizes their net expected gains, based on the estimates of the difference between expected positive and negative utility (Kulviwat et al., 2004). Those traditional views were firstly questioned as a new stem of research emerged, called "economics of information" – its main assumption is that information is imperfect; obtaining information can be

costly; and there are important asymmetries of information, which are affected by actions of firms and individuals (Stiglitz, 2000; 2002).

Simon's concept of bounded rationality emerged in the mid-20th century and implies that the actors do not consider all the available information and do not aim for utility maximizing. For the author, rational behavior means a behavior appropriate to the achievement of specific goals, within the limits imposed by given conditions and constraints - bounded rationality is not dependent on the use of mathematical algorithms and considers the constraints on computational capacity - it emphasizes problem-solving rather than finding the optimal solution (Simon, 1978,1982).

Simon (1978) notes that rationality will be bounded when situations are particularly complex, and it is not easy to identify the best course of action. A solution is to accept a satisficing (good enough) rather than a maximizing (the best) alternative. According to Simon (1978, p.345), "decision makers can satisfice either by finding optimal solutions for a simplified world, or by finding satisfactory solutions for a more realistic world". Consistently, *maximizers* spend a lot of time looking for the "best" option whereas *satisficers* stop searching as soon as they find a "good" alternative (see also Schwartz, 2004).

From the perspective of bounded rationality, people may or may not be fully rational depending on the circumstances and contexts. In most situations, people end up using decision-making shortcuts – referred to in the behavioral economics literature as *heuristics*. Heuristics do not require careful deliberation, whereas they do not necessarily lead to wrong decisions. They are fast (for requiring less computational efforts) and frugal (in the use of information). Heuristics are common-sense rules of thumb derived from

experience – they are applied to make relatively quick decisions in uncertain situations when the availability of information is difficult and/or time-consuming (Van Raaij, 2016). Gigerenzer et al. (1999) suggest that the human mind has an “adaptative toolbox” for decisions involving heuristics, enabling smart choices to be made with minimal information and exploiting the structure of information, considering the environmental context.

In the context of decision-making, judgmental heuristics are used with problems that require some probabilistic assessment or inference. These heuristics are sensitive to some factors that are normatively irrelevant for the decision and insensitive to other factors which are essential for the decision (Shafir &Kahneman, 1999). According to Shafir and Kahneman (1999, p.285), “a judgmental bias is a systematic discrepancy between intuitive judgement and a relevant normative standard”, being the standard the conformity with the principles of probability theory, or the statistical rules of hypothesis testing.

Heuristics are mostly viewed as an inevitable solution rather than the most effective strategy. Using them can provoke adverse effects as cognitive biases lead to results contrary to rational choice principles (Tversky & Kahneman, 1974; Elliehausen, 2010; Berthet, 2021). On the other hand, several empirical studies have demonstrated that in some circumstances, heuristics can perform as well or even better than the models based on trade-offs – exhaustive comparisons of attributes and performances of each alternative (Gigerenzer & Goldstein, 1999; Goldstein & Gigerenzer, 2002; Luan & Gigerenzer, 2019).

Whilst heuristics simplify the decision-making process with generally reasonable decision tools, if they are misapplied, they can lead to serious

mistakes. According to Tversky and Kahneman (1974), using heuristics provokes biases or deviations in information processing. As being shortcuts that reduce the time and effort needed to perform certain tasks, heuristics can lead to serious and systematic errors (Tversky & Kahneman, 1974; Kahneman, 2011).

Tversky and Kahneman (1974) pioneered the analysis of heuristics, referring to them as strategies to reduce the complexity of tasks and to form intuitive judgements of probability. For the authors, heuristics are intuitive shortcuts, but the problem is with a range of biases that emerge from the misapplication of these quick decision-making tools (see also Stanovich & West, 2008).

In credit decisions, these biases can result in consumers underestimating the cost of borrowing and only giving importance to their ability to repay the loan (Perry, 2008; Meier & Sprenger, 2010; Berthoud & Kempson, 1992). In fact, limited financial literacy can prevent consumers from making informed credit decisions, leading to suboptimal choices (Lavin et al., 2019; Goyal & Kumar, 2021).

In this work, we will focus on how cognitive biases can impact credit decisions based on time issues, which will be addressed on the next topic.

2.2 TIME AND DECISION-MAKING

Time is a fundamental resource in judgment and decision-making. Research has suggested that insufficient time impairs good judgment and choice especially when decision-making occurs in dynamic environments

(Maule & Edland, 2002; Gonzalez, 2004; Svenson & Maule, 1993; Kocher & Sutter, 2006).

In professional and personal context, time is usually viewed as a critical factor – complaints of insufficient time are predominant when people are asked about the reasons of their everyday stressors or hassles (Camberlain & Zika, 1990). Research also shows that the confidence in the quality of the decision declines with time pressure (Böckenholt & Kroeger, 1993; Smith et al., 1982), and this effect occurs due mainly to the use of simpler decision strategies (heuristics), which are associated with lower accuracy, instead of high-information load and time-consuming decision strategies (Smith et al., 1982; Maule & Edland, 2002).

In general, the imposition of deadlines provokes greater anxiety in people, impairing their abilities to perform a task more rationally. Although the effects of time pressure may initially make people more energetic, in situations involving long periods of continuous time-pressured decision making there is a decay in attention and cognitive control (Gonzalez, 2004) and a likelihood of getting to an increased state of fatigue (Maule et.al., 2000).

Indeed, previous research has suggested that time pressure has a negative effect on the quality of decision-making. Zakay and Wooler (1984), for example, found that the effectiveness of decision strategies was significantly lower for decision-makers under time pressure, as subjects trained in decision making strategies improved their performances when conditions allowed sufficient time. Also, with high levels of stress caused by time pressure, decision-makers tend to display a premature closure for the decision, without generating all available alternatives (Starcke & Brand, 2012).

Svenson and Benson (1993) pointed out the relationship between time pressure and the effect of framing on judgment and decision making. Decision frame is a concept introduced by Tversky and Kahneman (1981) and refers to the decision maker's representation of a problem, considering the outcomes associated with different choice alternatives. The studies conducted by Svenson and Benson (1993) showed a decrease in the effect of framing when participants faced time restrictions, whereas there was a stronger effect of framing without time pressure, suggesting that time pressure may impair the quality of the decision.

Maule et.al. (2000) conducted an experiment in which half of the participants were given unlimited time to make a decision, whereas the other half had to decide within a deadline. Consistently with the findings from Svenson and Benson (1993), the time-pressured participants were more anxious than the ones who decided within no time limits, suggesting a likelihood of using heuristics and non-compensatory strategies in a decision-making under time pressure, instead of a more rational and exhaustive decision-making process.

In the context of bounded rationality, scarcity of time may be responsible for deviations from the predictions of classical decision models, as consumers' judgements is usually made based on heuristics when they do not have plenty of time to gather enough information and evaluate different options and their consequences (Kirchler & Hoelzl, 2018). In fact, the heuristics-and-biases program advocates that people do not gather all available information but use simple rules to navigate the vast amount of information available in the world (Gigerenzer et al., 1999).

Traditionally the phases of a decision-making process are information perception; information processing and evaluation; and decision-making. During *information perception* stage, consumers create a visualization of their environment by using internal/external sources of information. The *information processing/evaluation* follows as the second stage, when consumers process relevant information and evaluate alternatives using information from short-term and long-term memory. During the *decision-making stage*, consumers implement their decision based on the preceding process steps – this stage is characterized by application of decision rules and measures to reduce cognitive dissonance (Daxhammer et al., 2023).

On digital environments, a shorter decision process has become increasingly prevalent – consumers are likely to take a shortcut in the decision-making process and go directly to the evaluation of alternatives or even to the decision-making stage (Pousttchi & Dehnert, 2018). Consumers also tend to perform a task faster on smartphones (which has become the predominant medium on digital environments) than on personal computers, as people experience greater psychological comfort while on the device (Melumad & Meyer, 2020; Melumad & Pham, 2020). These factors reinforce our view that insufficient time would represent a biased way of evaluating and deciding between credit alternatives.

Within this context, we expect that:

H1: Consumers' credit decisions will be less (more) favorable when occurring within reduced (extended) decision-making time.

2.3 THE MEDIATION ROLE OF FINANCIAL WELLBEING

Financial wellbeing is a relatively new concept that has appeared in consumer behavior, economic psychology, and behavioral finance research mainly during the last three decades. Although there is no universally accepted definition and no definitive theory regarding its conceptualization and components, we highlight two definitions of financial wellbeing: “a state of being wherein a person can fully meet current and ongoing financial obligations, can feel secure in their financial future, and is able to make choices that allow them to enjoy life” (CFPB, 2017, p.6); and “the perception of being able to sustain current and anticipated desired living standard and financial freedom” (Brüggen et al, 2017, p.229).

Van Raaij (2016) stresses the importance for consumers to have financial matters well-organized and effective for reaching goals of the individual or household –a desirable consumption level, lifestyle and leisure, education of the children, health care, retirement savings, and being able to help other people financially are examples of factors that form the perception of financial wellbeing.

In general, prevalent definitions and measurements of financial wellbeing are divided in three approaches: those that uses *objective measures* of financial wellbeing, such as income and individual financial indicators and do not consider subjective variables (Joo & Grable, 2004; Danes & Young, 2014); those that uses basically individuals’ *subjective perception* of their financial conditions (O'Neill et.al., 2005; Sharma & Alter, 2012); and those that use a combination of *objective and subjective measures* (Shim et.al., 2009; Vosloo et.al., 2014), although we do not see a unified usage of those indicators in the studies from that group.

Previous research has emphasized the importance of adding non-objective approaches to address financial wellbeing, considering its complex personal nature. Brüggen et. al. (2017) states that the perception of financial wellbeing is personal – individuals with the same income level, for example, would have different evaluations of their wellbeing, according to their preferences and values, which is in line with positive psychology research (e.g., Davern et. al., 2007). Also, according to the authors, individuals' perception about their financial conditions may change over time, which suggests that both present and future dimensions must be considered when measuring financial wellbeing (Brüggen et al, 2017).

Aligned with this thought, Netemeyer et. al. (2018) consider individual's ability to manage financial resources aiming to the life he/she wants to live now, and in the near and more distant future as a determinant of one's overall wellbeing. The authors developed a scale to measure the perception of financial wellbeing, comprising two dimensions – current management stress (present dimension); and expectation of future financial security (future dimension), congruent with the cited definitions of CFPB (2017) and Brüggen et. al. (2017).

Other studies point out that individuals' perceptions and attitudes towards financial issues can influence their financial wellbeing assessments. For example, materialism and impulsivity (Mette et.al., 2019), compulsive buying (Gutter & Copur, 2011), risk tolerance (Joo & Grable, 2004), attitudes toward money or debt (Davies & Lea, 1995; Norvilitis et. al., 2003), and personal financial wellness (Joo, 2008) should all influence in capturing the perception of financial wellbeing. Brüggen et al. (2017) are categorical in stating that

since personal and contextual factors change over time, any conceptualization that ignores subjective measures of financial wellbeing would be incomplete.

Research also suggest that financial wellbeing has a strong and positive relationship with overall wellbeing (Van Praag & Frijters, 2003; Hojman et. al., 2016), and personal stress caused by unwise financial behavior should have personal negative consequences - for example, reduced physical health or weaker job performance (Dunn & Mirzaie, 2012; Kim & Garman, 2003).

Several studies correlate negatively insufficient time to decide and time pressure (strict deadlines, for example) with overall wellbeing (Maule & Edland, 2002; Gärling et.al., 2014; Zakay & Wooler, 1984; Busseri & Sadava, 2011; Tov, 2018; Connolly et. al., 2020), basically using a subjective approach - people's judgment of satisfaction with the overall quality of their lives, which is often conceptualized as having two components: a cognitive judgment of satisfaction with life; and affective experiences of positive versus negative emotions (Busseri & Sadava, 2011; Tov, 2018).

From the points discussed above, we speculate that limited time to decide about different credit alternatives (in opposition to decisions within extended time) will negatively impact the perception of financial wellbeing, and a negative state of financial wellbeing will lead to less favorable credit decisions. In other words:

H2: The perception of financial wellbeing is the mechanism underlying the effect of decision-making time on the favorability of consumer's credit decision.

2.4 THE MODERATION ROLE OF NUDGING

The concept of nudging was originally introduced by behavioral economists Richard Thaler and Cass Sunstein (Sunstein & Thaler, 2003; Thaler & Sunstein, 2008), as a subtle way of influencing people´s decisions by providing the right information at the right time, place, and level of complexity, and making the desirable alternative more prominent in the decision architecture (Thaler & Sunstein, 2008). Halpern (2015, p.22) conceptualize nudge as “means of encouraging or guiding behavior, but without mandating or instructing, and ideally without the need for heavy financial incentives or sanctions”. For Mirsch et al. (2017, p.637), nudge is “a simple intervention within the choice architecture to steer individuals by addressing specific psychological effects to make use or overcome them”.

A nudge consists of the way or the order the options to solve a problem are presented, or of disclaimers, reminders and warnings before a decision is to be made, and can take multiple forms, such as images on packaging, decorations, pre-chosen information in forms, apps notifications, default settings for computers, software, and smartphones, and user-interface design elements to guide people´s choices online (Mirsch et al., 2017). According to Thaler and Sunstein (2008), nudges are soft-paternalistic behavioral interventions that do not restrict choice; they are simple and cheap to implement (see also Van Raaij, 2016).

Decision architecture is the way information is designed so that it can influence how people choose from different services or products. From Thaler and Sunstein’s point of view, decision architecture has the power to improve people’s decisions by carefully structuring how information and options are presented to them (Thaler & Sunstein, 2008). A familiar example is the ATMs

(automatic teller machines) that first ask customers to take their bank card before the banknotes are given, so that the incidence of customers forgetting the bank cards in the machine is eliminated (Van Raaij, 2016).

Another common way of nudging is with *default options* – when an insurance company, for example, provides a default in registration of new customers of a percentage of coverage. If costumers do not react before the deadline and change this option (movement called “opt-out”), they will receive the default option. Due to laziness, procrastination and not being motivated to search and compare alternative options (so-called “status-quo bias” by Samuelson and Zeckhauser, 1988), customers usually stay with the default option.

In fact, nudging can be designed in a way to facilitate or to hamper the propensity of consumers to make a good decision, and it has been criticized for lacking transparency and being paternalistic (as the designer or seller determines what should be chosen), steering people towards specific choices, or even manipulating them (Schmidt & Engelen, 2020; Jung & Mellers, 2016; White, 2013). Thaler and Sunstein justify nudging, however, presenting it as libertarian paternalism - people still have the freedom to choose what they want, and give the example of a GPS that helps you to reach your destination more easily, but does not impair your freedom, as you still can take another route if you want (Sunstein & Thaler, 2003; Thaler & Sunstein, 2008).

As we can see, nudging has a strong ethical component, although it is supposedly thought to work in favor of customers and citizens by decision architects, policymakers, or managers in organizations. Thaler (2015) lists

three principles for nudging “for the good”: (1) nudging should be transparent and not misleading; (2) nudging should allow for easy opt out; (3) nudging should be grounded in good reasons to assume that the encouraged behavior will improve welfare of the society and of the people being nudged. According to Kirchler and Hoelzl (2018), lack of transparency, misleading offers, and difficulties in opting out are cumbersome forms of nudges, the exception, not the norm.

In digital environments, designing choice elements with the purpose of implementing nudges is called *digital nudging* (Mirsch et al., 2017; Özdemir, 2020; Schneider et al., 2018), a new area of knowledge that is reaching high relevance in scientific research, as, nowadays, most decisions are taken on screens – websites or mobile applications. Considering how the user-interface of sites or mobile applications is constructed, nudging may be a critical factor when consumers decide the amount and the duration of a loan, for example. Mirsch et al. (2017) stress the importance of digital nudging, as the online environment makes individuals prone to deficient decisions, due to the vast amount of information available online and the difficulties in processing all the relevant information to reach the optimal choice.

Bounded rationality theory has shown that consumer decisions can be made under the effect of cognitive biases, without complete processing of information and in-depth analysis of alternative choices (Tversky & Kahneman, 1974; Elliehausen, 2010; Berthet, 2021; Van Raaij, 2016). In credit decisions, that may lead to hasty decisions, induced, for example, by the way credit agreements are presented (Lea, 2021) – usually not the most favorable to consumers from the perspective of financial education. Consumers are also

influenced by payment/interest bias (Stango & Zinman, 2006) as they focus on the monthly installments, underestimating the interest rate and the repayment duration of a loan.

Nudging strategies can be a solid way for improving credit decisions, as there are quite a few actions that may be used towards a desirable behavior. Research has shown that interventions using reminders has a significant potential to achieve a desirable outcome in different settings (Cadena & Schoar, 2011; Stango & Zinmann, 2014, Karlan et.al., 2016). And, with credit evaluations, it has been suggested that if we give people the opportunity to consider information about the total cost of credit, they will make more favorable judgements – thinking more in terms of the actual total cost of credit, and not the affordability of the repayment instalments (Lea, 2021; McHugh et. al., 2011).

From the points mentioned above, we believe that reminder nudging will reverse the negative effect of reduced decision-making time on the favorability of consumer´s credit decision. Consequently:

H3: Consumers' credit decisions occurring within reduced (extended) decision-making time will be more (less) affected by reminder nudging.

Figure 1 depicts the research model of this study.

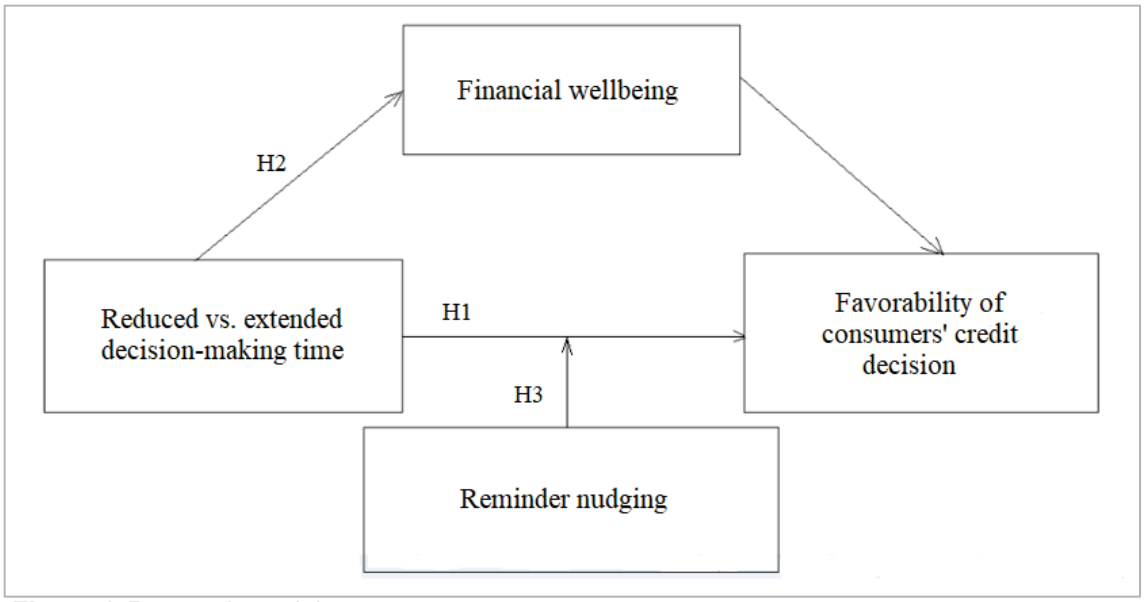

Figure 1. Research model.

2.5 ALTERNATIVE EXPLANATION: PRESENT BIAS

Present bias is an important concept in behavioral economics research, derived from the theory of self-control (Strayhorn, 2002). The concept draws on both theoretical and empirical research and deals with trade-offs between one´s present and future self, considering situations when rewards are not always immediate and future benefits are likely to be uncertain (O'Donoghue & Rabin, 2015).

Present bias is seen when people behave inconsistently in terms of time – they overweight short-term gains relative to long-term gains. When looking at a choice over an interval of one day, for example, if they are thinking about prospects today versus tomorrow, they will tend to overweight today's prospects over tomorrow's, but if they are thinking about prospects in a year versus a year and a day, they will probably give higher weight to a year and a day (Baddeley, 2018; Thaler, 1981; Thaler & Benartzi, 2004). Put in another

way, present bias can be viewed as the tendency of exercising patience in the long run, but demonstrating impatience in the short-term (Nguyen, 2016).

Previous empirical research has examined potential effects of present bias on consumer financial behavior. Present biased consumers are likely to spend more (Nguyen, 2016) and save less (Laibson, 1997; Brown & Previtero, 2014), behaving carelessly about the future, compared to other consumers. They are usually not prone to engaging in daily money management tasks (Xiao & Porto, 2019). Present biased consumers are also reported to show less healthy behaviors (Mørkbak et al., 2017), which may also have an impact on their financial habits. Besides that, there is some evidence of a negative correlation between present bias and consumer's financial wellbeing (Middlewood, et al., 2018).

As for borrowing behavior, research shows that present-biased individuals are more likely to have high credit card debts (Meier & Sprenger, 2010; Laibson et al., 2003; Heidhues & Kőszegi, 2010) and low credit score ratings (Meier & Sprenger, 2012). Consumers with present orientation and low levels of self-control are also reported to be more inclined to get and stay in debt (Webley & Nyhus, 2001; Kamleitner et al., 2012) and tend to become overindebted (Gathergood, 2012).

From the points above, we thought that present bias could be another possible explanation for the effect of consumers' decision-making time on the favorability of credit decisions - the ease and speed of taking credit online would supposedly attract present biased individuals, who are more likely to default when compared to traditional banks customers. Thus, present bias was

also tested as a mediation variable in Study 2 (See topic 3.2.2), but it did not show significant results.

3 OVERVIEW OF THE STUDIES AND DATA ANALYSIS

Four experiments were conducted to address our research goals. Decision-making time was manipulated in all of them, as it involves the main relationship to be tested. In Study 1, a 2-minute delay was the differentiating factor between the two sample groups. From Study 2 onwards, we worked with a 1-day delay across the two experimental groups, as it would represent a more realistic difference between consumers' decision-making processes involving fintech and traditional banks. In Study 2 we addressed financial wellbeing, which was found to be the most suitable explanation for the effect of decision-making time on the favorability of consumers' credit decisions. In studies 3 and 4 we added the reminder nudging to our research model, which proved to be a strong moderating variable, reversing the negative way of our main relationship.

3.1 STUDY 1 (PILOT STUDY)

The goal of study 1 was to verify whether the decision-making time affects the favorability of consumers' credit decisions. To achieve this, we manipulated the time in which consumers were exposed to the financing conditions before making their final choices - instantly in the reduced time group and with a 2-minute delay in the extended time group. Although this difference in time is not exactly what happens in a real situation, we believed it would be a proxy of the difference between the sense of urgency and accelerated processing time of fintech and the natural delay in the case of

traditional banks, due to the consumers' wait for processing and approval of the loan.

3.1.1 METHOD

Study 1 consisted in an experiment conducted between August and October 2023, following a *single-factor between-subjects design* (reduced decision-making time vs. extended decision-making time). Data was collected through online questionnaires, using Qualtrics software - Sixty members of Prolific (35 male; M_{age}=27.48; SD_{age}=8.53) participated in this study in exchange for payment. No limitations were established regarding the location of participants, ending up with a regionally diverse sample, being 25% from the USA, 12% from Chile, 12% from Portugal, 12% from South Africa, and the rest spread across different countries.

Participants in the reduced decision-making time condition received the following instructions: "Imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan online. You are on the website of Maincred - an online credit fintech, which offers you two different repayment plans, described below. Which one do you choose (assuming there is no inflation in the period)? (See Table 1)

Participants in the extended decision-making time condition received the following instructions: "Imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan. You are at one of the branches of A.N.G., an international traditional bank, and the manager offers you two different repayment plans,

described below. Which one do you choose (assuming there is no inflation in the period)?" (See Appendix 1 for the full measure).

	Option A	**Option B**
Financed amount	US$5,000.00	US$5,000.00
Monthly interest rate	1.00%	1.00%
Duration	24 months	36 months
Monthly instalments	US$235.37	US$166.07

Table 1: Dependent variable measure

In Option A, the total cost of credit (total of money destinated to interest) is US$648,88; whereas in Option B, the total cost of credit is US$978,52. Thus, option A is the most favorable choice to consumers, according to financial education principles (e.g., Ferreira, 2008).

The manipulation consisted in altering the time for confirming that the loan has been approved, so that the consumers' decision-making time would differ. In the reduced decision-making time group, it occurred immediately after the decision; in the extended decision-making time group, a delay of 2 minutes was imposed– they read the following message during the delay: "please wait while your request in being processed by the bank", consequently, having more time to think about the options (the box with the two different plans remained on the screen). Then, participants were asked to confirm their choices – they read the following message: "Your request has been accepted! Please inform which of the amortization options below you prefer:" The respondent's choice was our dependent variable.

As for control variables, we measured financial skills, in order to avoid bias from financial knowledge – the variable was measured by using multiple choice of basic financial issues - compound interests, investment assets and impact of inflation. (Lusardi & Mitchell, 2011; Rooij et al., 2011) (See Appendix 3 for the full measure).

3.1.2 RESULTS

We performed a chi-square-test, as there were two independent samples, to compare proportions from reduced decision-making time condition vs. extended decision-making time condition. The condition was the independent variable and the task response (least favorable vs. most favorable answer) was the dependent variable. The proportion of favorable responses (Option A) was higher on extended time scenario (74.2%; 23 from 31 respondents) than on reduced time scenario (48.3%; 14 from 29 respondents) ($\chi 2=4.258$, $p=0.039$) (see Figure 2). Thus, hypothesis 1 has been confirmed.

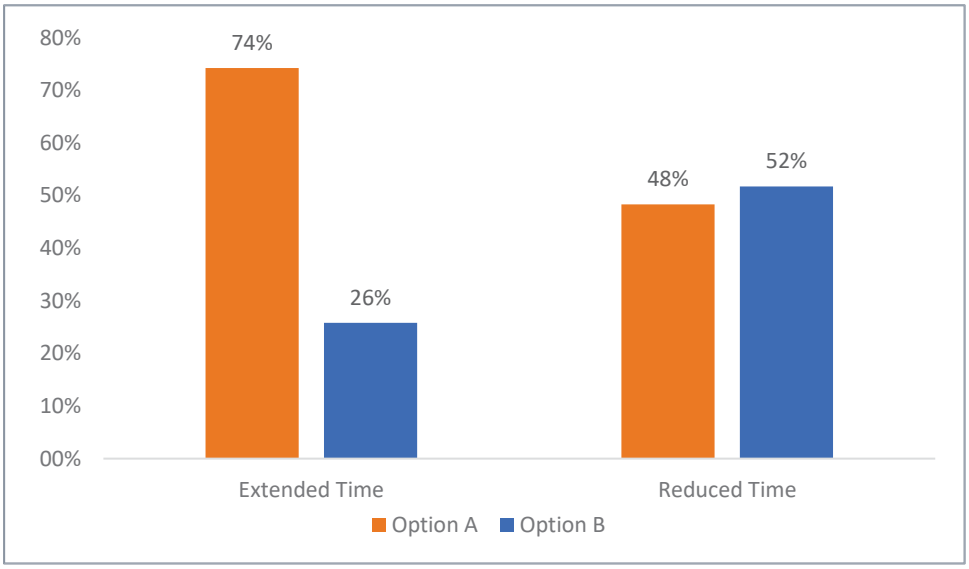

Figure 2. Graphical representation of study 1 chi-square results.

3.1.3 DISCUSSION

Study 1 provided initial evidence that the favorability of credit decisions can be impacted by the consumers' decision-making time. These findings are consistent with prior research in judgement and decision making, which suggest that time constraints have a negative effect on the quality of the decision, as it impairs good judgment and choice (Maule & Edland, 2002; Gonzalez, 2004; Svenson & Maule, 1993; Kocher & Sutter, 2006).

Study 1 aimed to give preliminary indications of the proposed main effect. We realized that mentioning the names of the supposed financial institutions was a limitation of the study, as it might have also affected the results, and not only the manipulated variable (decision-making time). On the following studies we addressed this issue, using the same text on the instructions for both conditions - we wanted to assure that the decision-making time was the only variable being manipulated. We also worked with a longer time interval (1 day) and used larger and homogeneous samples. New variables for mediation and moderation processes were also explored.

3.2 STUDY 2

As Study 1 provided initial evidence for the effect of loan processing time on the quality of credit decisions, we conducted Study 2 to reinforce that relationship, this time powering up the time delay, so that we could reach stronger evidence of how decision-making time can impact the favorability of the decision (hypothesis 1). For this study, we collected a larger sample (100 participants) and added the mediation of financial wellbeing to the research model (hypothesis 2).

3.2.1 METHOD

Study 2 consisted in an experiment conducted in November 2023, following another *single-factor between-subjects design*. Data was collected through online questionnaires, using Qualtrics software. 100 participants (54 female; M_{age}=37.24; SD_{age}=14.16) from the U.S.A.[3] were recruited from Prolific and participated in the study in exchange for payment. Participants were randomly allocated to the two different conditions – reduced time condition and extended time condition. Five participants were excluded from the sample, due to attention checks failure (e.g., Abbey & Meloy, 2017) (2 cases) or for not coming back to finish the study within three days (3 cases), leaving the sample with 95 participants.

Similar to Study 1, the manipulation consisted in altering the time for consumers' decision-making. In the reduced decision-making time group, it occurred immediately after the decision; in the extended decision-making time group, a delay of one day was imposed – participants were asked to return on the following day to finish the study. They were presented the two different options for the loan, so that they would have more time to think about the options (the box with the two different plans remained on the screen until the participant ended the session).

Participants in both conditions read the same instructions for the task: "Now, imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan.

[3]The limitation to North American participants on Prolific was to make the sample as homogeneous as possible and due to the high availability of participants – 49.786 eligible participants when this study was conducted.

You are offered that amount by the financial institution with two different repayment plans, described below. Which one you would choose (assuming there is no inflation in the period)?" Then, they were present the same box as in Study 1, with the same options of loan plans (See Appendix 2 for the full measure).

Participants in the reduced decision-making time condition answered the task immediately. Participants in the extended decision-making time condition read the following message (along with the box with the two different plans): "We kindly ask you to wait until tomorrow to be invited to answer that and other questions of this survey. In the meantime, you can think about these two options for your loan". Then, they received the invitation on Prolific 24 hours later to finish the remaining questions. They read the following message: "Yesterday you were presented with two different repayment plans for your loan of U$5,000.00, reproduced below. Which one do you choose?" (then being allowed to answer the question).

However, a few participants did not show up on the next day to complete the study. So, we allowed two more days for that, having the sample being completed before the end of the third day. To make sure that this difference (1 day to 2-3 days) would not influence the results, we performed a chi-square test comparing the proportions of these two subgroups - the results showed no difference between the subgroups, so we considered those answers valid.

Regarding the financial wellbeing mediation analysis, we used the financial wellbeing scale developed by Netemeyer et al. (2018), consisting in

10 five-point scale items (“does not describe me at all” to “describes me completely”), divided into two sections (expected future financial security and current money management stress) (See Appendix 4 for the full measure).

Financial skills were measured again as control variable to avoid bias from financial knowledge (Lusardi & Mitchell, 2011; Rooij et al, 2011) (See Appendix 3 for the full measure).

3.2.2 RESULTS

Chi-square test was conducted, comparing proportions from reduced decision-making time condition with extended decision-making time condition. The proportion of favorable responses (Option A) was higher on extended time scenario (64.0%; 32 from 50 respondents) than on reduced time scenario (40.0%; 18 from 45 respondents) ($\chi 2=5.472$; $p=0.019$). Thus, hypothesis 1 has been confirmed, now with a stronger result than on Study 1 (see Figure 3).

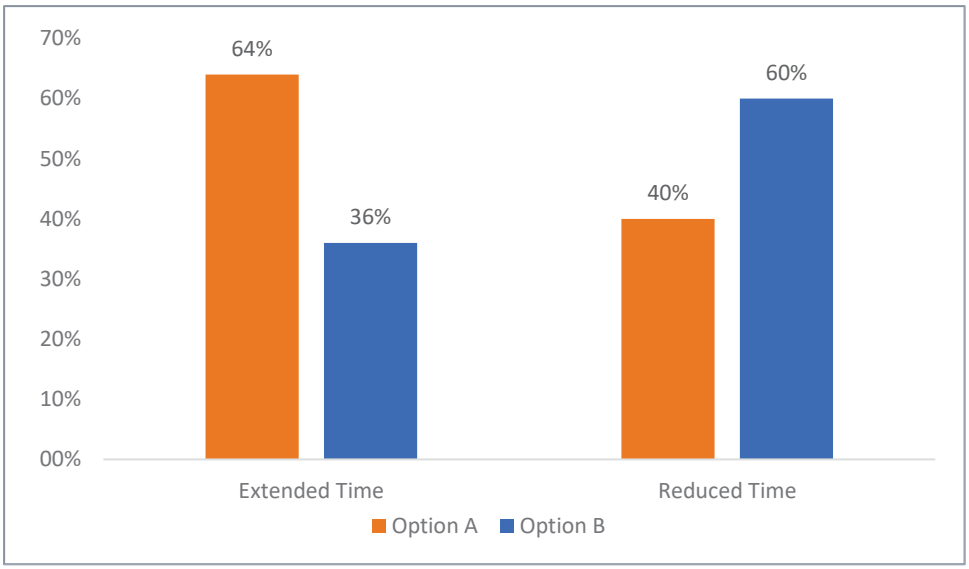

Figure 3. Graphical representation of study 2 chi-square results.

Cronbach´s Alpha was calculated for the financial wellbeing scale: α = 0.907, showing an excellent internal consistency of the scale. Then, an exploratory factor analysis was conducted with the ten items of the scale, considering the regular punctuation of the expected future financial security items, and inverting the punctuation of the current money management stress items, by the method of extraction by principal components, and rotation of the Varimax type, confirming that it is a bidimensional variable. The dimensions were identified with eigenvalues above 1.0, with the total variance of the two dimensions being 70.092 - the dimensions explain 70% of the financial wellbeing construct.

The communalities test indicated statistical importance for all the items in measuring the construct – all results above 0.60. The KMO and Barlett tests were performed, showing significant results (KMO=0.909, p<.0001; Barlett: $\chi 2$ =548.595, df=45, p<.0001), demonstrating that the sample was adequate.

The mediation analysis for hypothesis 2 was carried out using the PROCESS macro (Hayes, 2017) – Model 4, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity. Although we have shown that the financial wellbeing scale is bifactorial, we used the whole scale score, due to the excellent whole-scale Cronbach`s Alpha value.

It showed a significant mediation of financial wellbeing on the main effect - the mediating variable financial wellbeing (F(1,93)=6.6953; p=0.0112; R^2=0.0672) was positively impacted (coef=4.7978; p=0.0112; LLCI=1.1157; ULCI=8.4799) by the decision-making time. It was also found that the

favorability of the decision (Nagelkrk R^2=0.3170; p<0.0001) was significantly and positively impacted (coef=0.1200; p=0.0001; LLCI=0.610; ULCI=0.1790) by financial wellbeing. Furthermore, the indirect effects were significant (coef=0.5757; LLCI=0.1272; ULCI=1.2478), confirming the mediation effect.

According to variables codification (0=reduced time;1=extended time; 0=least favorable answer; 1=most favorable answer), the results show that reduced (extended) decision-making time decreases (increases) the perception of wellbeing. And a low (high) perception of wellbeing explains the least (most) favorable credit decision. The results confirmed hypothesis 2.

Present bias was measured with a classical methodology - the β-δ model (Laibson, 1997; Berns et.al., 2007; Benhabib et.al., 2010; Nguyen, 2016), with real monetary payment for some respondents (5% of the sample was randomly selected to receive real payment for one of their choices as bonus payment in British pounds). Participants were asked to make a few money choices. For example, in choice 1, they had to choose between £$5 today (A) or £$5.25 in one week (B). As the choices moved forward, Option B would become more and more attractive relative to Option A. The switching point represented the moment which participants switched from A to B – the higher was the switching point, the lower was the present bias index (See Appendix 5 for the full measure).

The mediation analysis with present bias was also carried out using the PROCESS macro (Hayes, 2017) – Model 4, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity.

None of the results were significant, which reinforces financial wellbeing as the most suitable explanation for the main effect (hypothesis 2).

3.2.3 DISCUSSION

Study 2 provided further support to the hypothesis that favorability of credit decisions can be impacted by the consumers' decision-making time (hypothesis 1). With a longer time interval differing the two experimental groups, we reached even better results than on Study 1, reinforcing our main argument.

The results are in line with previous research in judgement and decision making, which suggested that time constraints impair good judgment and choice (Maule & Edland, 2002; Gonzalez, 2004; Svenson & Maule, 1993; Kocher & Sutter, 2006).We infer that these findings can be extrapolated to the universe of fintech lending – the sense of urgency imposed by fintech offers, boosted by the ease and speed with which consumers can borrow online, should lead to less beneficial credit decisions, as it provokes less rational choices regarding the total cost of credit and induces overborrowing by naïve consumers (Berg et al., 2022; Fuster et al, 2019; Agarwal & Chua, 2020).

Regarding financial wellbeing mediation, the results are in line with Panos and Wilson (2020), who state that fintech operations may damage financial wellbeing by triggering impulsive consumer behavior. Our findings are also consistent with studies that negatively correlate time constraints with overall wellbeing (Maule & Edland, 2002; Gärling et.al., 2014; Zakay & Wooler, 1984; Busseri & Sadava, 2011; Tov, 2018; Connolly et. al., 2020). And, as we

have already seen, financial wellbeing is strongly and positively correlated with overall wellbeing (Van Praag & Frijters, 2003; Hojman et. al., 2016).

The results of financial wellbeing may also reflect the stress caused by time pressure and insufficient time to decide (Camberlain & Zika, 1990; Maule et al., 2000) and the decline in consumers' confidence in the quality of their decisions (Böckenholt & Kroeger, 1993; Smith et al.,1982). These are factors that reinforce our view that limited time to decide represents a bias in credit decision-making.

The second part of the mediation analysis also showed significant results, which is indirectly in line with Oquaye et. al. (2022), who suggested a positive relationship between responsible financial behavior and financial well-being; and with Brüggen et al. (2017), who pointed out that imbalance in financial wellbeing can negatively affect factors such as quality of life, success, happiness, and general wellbeing.

In the following studies we introduced a new variable to our research model – the reminder nudging. We expected to find evidence for reversing the negative way of our main relationship (reduced decision-making time leading to less favorable credit decisions), as we believe it is a proxy of what happens in fintech lending universe.

3.3 STUDY 3

In Study 3 we aimed to reinforce the results from studies 1 and 2, adding a new independent variable to the research model – a reminder nudge as a moderator of the main relationship. Similar to the previous studies, the

main manipulation consisted in altering the time for consumers' decision-making. In the reduced decision-making time group, it occurred immediately after the decision; in the extended decision-making time group, a delay of one day was imposed – participants were asked to return on the following day to finish the study. They were presented the two different options for the loan, so that they would have more time to think about the options, in the same way as in Study 2.

Participants in both conditions read the same instructions for the task: "Now, imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan. You are offered that amount by the financial institution with two different repayment plans, described below. Which one you would choose (assuming there is no inflation in the period)?" Then, they were present the same box as in studies 1 and 2, with the same options of loan plans (See Appendix 2 for the full measure).

Participants in the reduced decision-making time condition answered the task immediately. Participants in the extended decision-making time condition read the following message (along with the box with the two different plans): "We kindly ask you to wait until tomorrow to be invited to answer that and other questions of this survey. In the meantime, you can think about these two options for your loan.". Then, the received the invitation on Prolific 24 hours later to finish the remaining questions. They read the following message: "Yesterday you were presented with two different repayment plans for your loan of U$5,000.00, reproduced below. Which one do you choose?" (then being allowed to answer the question).

3.3.1 METHOD

Study 3 consisted in an experiment conducted in March 2024, following a *2x2 between-subjects design*. Data was collected through online questionnaires, using Qualtrics software. 220 participants (134 female; M_{age}=38.5; SD_{age}=13.1) from the U.S.A. - following the same criterion from Study 2 - were recruited from Prolific and participated in the study in exchange for payment. Participants were randomly allocated to the four different conditions – reduced time condition; extended time condition; with nudging condition; without nudging condition. As occurred on Study 2, we allowed a limit of three days for participants of the extended-time group complete the study. Even so, 13 participants (5.9% of the sample) did not come back for the second part of the study. Three participants were also excluded from the sample due to attention checks failure, leaving the total sample with 204 participants.

Like the first studies, the manipulation consisted in altering the time for consumers' decision-making. In the reduced decision-making time group, it occurred immediately after the decision; in the extended decision-making time group, a delay of one day was imposed – participants were asked to return on the following day to finish the study (as explained before, we allowed two more days for participants who did not come back on the following day to complete the study). Similar to Study 2, on the first day the participants were presented the two different options for the loan, so that they would have more time to think about the alternatives.

Regarding the moderation manipulation, we added a sentence just before the box with the loan options. Participants in the “with nudging” condition read the following message – “Tip: did you know that you calculate your total cost of credit by simply subtracting the financed amount from the total amount to be repaid?”. We believed that this message would nudge the participants to think in terms of total cost of credit, inducing the choice of Option A – the most favorable choice to consumers, according to principles of financial education (e.g., Ferreira, 2008) (see also topic 2.4).

Participants on the “without nudging” condition read the following message – “These are options typically offered by financial institutions at present”, which would function as a filler statement, so that the reading time for the two conditions would not differ.

For the financial wellbeing mediation analysis, we used again the financial wellbeing scale developed by Netemeyer et al. (2018) (See Appendix 4 for the full measure).

Cronbach´s Alpha was calculated for the financial wellbeing scale: $\alpha = 0.892$, showing an excellent internal consistency of the scale. Then, an exploratory factor analysis was conducted with the ten items of the scale, considering the regular punctuation of the expected future financial security items, and inverting the punctuation of the current money management stress items, by the method of extraction by principal components, and rotation of the Varimax type, confirming that it is a bidimensional variable. The dimensions were identified with eigenvalues above 1.0, with the total variance of the two

dimensions being 63.487 - the dimensions explain 63% of the financial wellbeing construct.

The communalities test indicated statistical importance for all the items in measuring the construct – all results above 0.50. The KMO and Barlett tests were performed, showing significant results (KMO=0.906, p<.0001; Barlett: $\chi 2$ =949.799, df=45, p<.0001), demonstrating that the sample was adequate.

Financial skills were controlled again to avoid bias from financial knowledge (See Appendix 3 for the full measure).

3.3.2 RESULTS

Chi-square test was conducted, comparing proportions from reduced decision-making time condition with extended decision-making time condition. The proportion of favorable responses (Option A) was higher on extended time scenario (57.3%; 55 from 96 respondents) than on reduced time scenario (42.7%; 46 from 108 respondents) ($\chi 2$=4.393; p=0.036). The results reinforce the proposed main effect, being consistent with the first two studies, and confirming hypothesis 1 (See Figure 4).

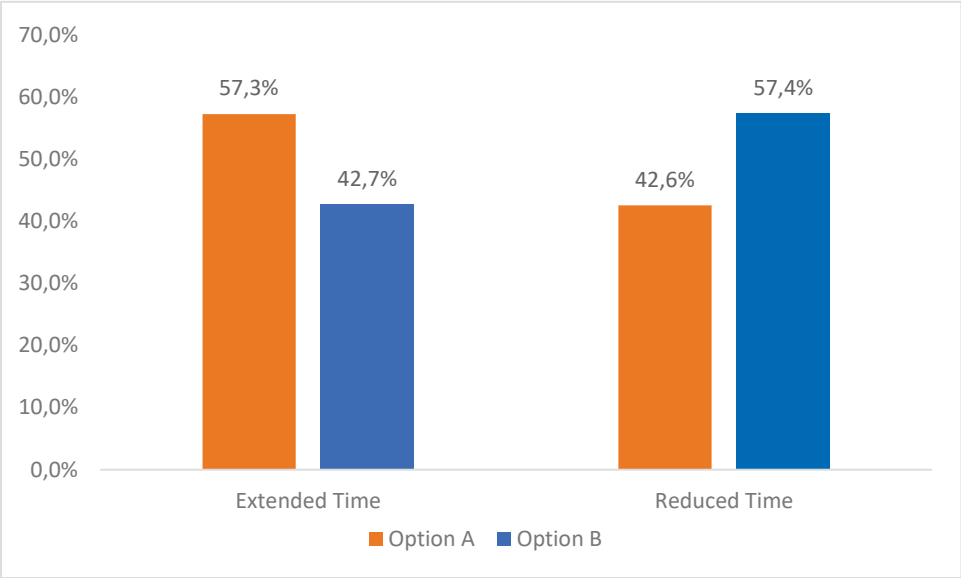

Figure4. Graphical representation of study 3 chi-square results.

The moderation and mediation analysis was carried out using the PROCESS macro (Hayes, 2017) – Model 5, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity. The conditional effects on the main relationship show that with the addition of reminder nudging, the main effect, which is significant without nudging (coef=1.5195; p=0.006; LLCI=0.6631; ULCI=2.3760), ceases to be significant with nudging (coef=-0.4675; p=0.2587; LLCI=-1.2792; ULCI=0.3439). That result indicates the power of nudging in altering the results of the dependent variable, confirming H3.

The main relationships were tested more precisely with the complete chi-square tests. Considering the reduced decision-making time group, the percentage of the least favorable answer (Option B) drops from 72.2% to 42.6% when nudging is added; while the percentage of the most favorable answer (Option A) climbs from 27.8% to 57.4% with nudging - the differences are significant ($\chi 2=9.694$; p=0.002). Considering the extended decision-

making time group, the percentage of the least favorable answer (Option B) climbs from 35.4% to 50.0% when nudging is added; while the percentage of the most favorable answer (Option A) drops from 64.6% to 50.0% with nudging (See Figure 5), but the differences are not significant ($\chi 2=2.086$; $p=0.149$).

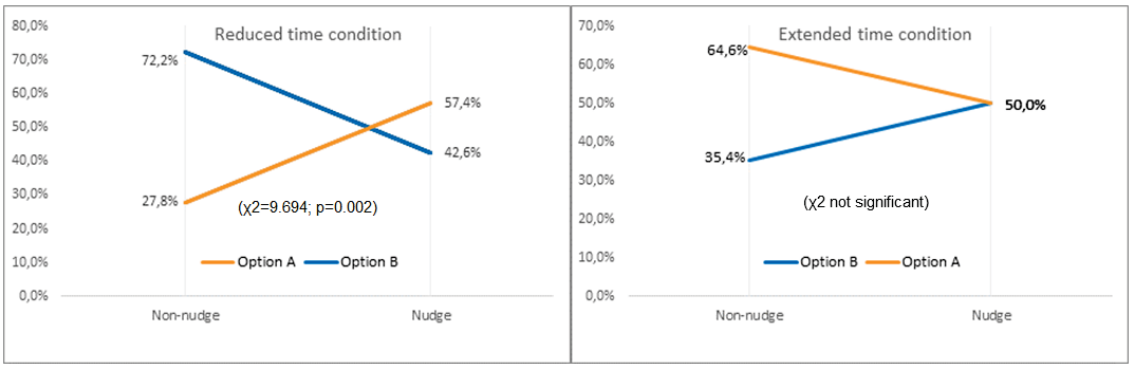

Figure 5. Graphical representation of Study 3 results – reduced vs. extended time.

The mediation analysis for hypothesis 2 was tested using the PROCESS macro (Hayes, 2017) – Model 4, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity, using the whole score of financial wellbeing scale.

It showed a significant mediation of financial wellbeing on the main effect - the mediating variable financial wellbeing ($F(1,202)=4.2438$; $p=0.0407$; $R^2=0.0206$) was positively impacted (coef=2.5625; p=0.0407; LLCI=0.1098; ULCI=5.0152) by the decision-making time. It was also found that the favorability of the decision (Nagelkrk $R^2=0.0814$; $p=0.0016$) was significantly and positively impacted (coef=0.0479; p=0.0046; LLCI=0.0147; ULCI=0.0811) by financial wellbeing. The indirect effects were significant (coef=0.1228; LLCI=0.0023; ULCI=0.3064). The results confirmed H2.

3.3.3 DISCUSSION

Study 3 reinforces the evidence already reached in studies 1 and 2 that the favorability of credit decisions can be impacted by the consumers' decision-making time (hypothesis 1), this time with a larger sample, and a consistent result for the main relationship. As seen in Study 2, previous research in judgement and decision making has indicated that limitations of time impair good judgment and choice (Maule & Edland, 2002; Gonzalez, 2004; Svenson & Maule, 1993; Kocher & Sutter, 2006).

The results from the moderation analysis demonstrated the effect of nudging in altering the favorability of credit decisions, confirming H3. The chi-square tests indicated significant results with the reduced time group (which is the focus of this work, as it is a proxy of what happens with fintech credit decisions), showing that the decisions get more favorable to consumers in 29,6% with the addition of the reminder nudge. On the extended time group, the results were not what was expected for the nudge, showing a negative effect on the most favorable answer, but they were not significant.

We can infer that the incidence of bias is stronger on the reduced-time group and that is probably why nudging worked on this group and not on the other. And we could also see that the difference of time ceases to be significant with the addition of nudging, functioning in this case as a debiasing mechanism, in line with bounded rationality theory (Tversky & Kahneman, 1974; Elliehausen, 2010; Berthet, 2021; Van Raaij, 2016).

The mediation analysis of financial wellbeing also showed equivalent results to Study 2, reinforcing Hypothesis 2 –reduced (extended) decision-making time decreases (increases) the perception of wellbeing, and a low

(high) perception of wellbeing explains the least (most)favorable credit decision.

3.4 STUDY 4

In this study, we aimed to reinforce the results from Study 3, this time testing two new variables for the mediation analysis (financial self-efficacy and financial self-confidence), in an attempt to find other possible explanations for the phenomenon. Self-confidence is an assertion of trust in one's ability to act and follow through on those decisions. Research on financial self-confidence has shown a strong relationship between financial self-confidence and financial wellbeing (Norvilits & Mao, 2013; Barber & Odean, 2001; Skala, 2008), so we believe it would present favorable results for the phenomenon.

Self-efficacy means the competency with which people feel they can complete specific tasks or accomplish specific goals. Financial self-efficacy is related to a person's perceived capacity to control his/her personal finances (Vosloo et al., 2014). Although research on financial self-efficacy is still scarce, there is some evidence that higher financial self-efficacy is correlated with more favorable financial decisions, such as having better retirement plans (Lown, 2011) and lower credit card debts (Tokunaga, 1993). Those kinds of decisions are likely to be impacted by nudging strategies (Soman & Choe, 2023; Cadena & Schoar, 2011; Karlan et.al., 2016), making us believe that it could contribute more significantly to the research model.

None of these variables showed significant results (See Appendix 8 and Appendix 9 for the full results), reinforcing financial wellbeing as the most suitable mediation variable to our research model.

3.4.1 METHOD

Study 4 consisted in an experiment conducted in June 2024, following a *2x2 between-subjects design*. Data was collected through online questionnaires, using Qualtrics software. 350 participants (215 female; M_{age}=40; SD_{age}=12.3) from the U.S.A. - following the same criterion from studies 2 and 3 - were recruited from Prolific and participated in the study in exchange for payment. Participants were randomly allocated to the four different conditions – reduced time condition; extended time condition; with nudging condition; without nudging condition. As occurred on the previous studies, we allowed a limit of three days for participants of the extended-time group complete the study. Even so, 22 participants (6.3% of the sample) did not come back for the second part of the study. Three participants were also excluded from the sample due to attention checks failure, leaving the total sample with 325 participants.

Similar to the previous studies, the manipulation consisted in altering the time for consumers' decision-making. On the first day the participants were presented the two different options for the loan, so that they would have more time to think about the options (the box with the two different plans remained on the screen until the participant ended the session) (See topics 3.2 and 3.3).

Regarding the financial self-confidence mediation analysis, we used the scale developed by Norvilits and Mao (2013), with items divided into confidence in money management ("I am confident I know how to handle my money"), financial products ("I am confident in my abilities to handle credit cards") and where to seek financial advice ("If I had questions about money, I

know where to ask for advice") - items were measured on a five-point Likert-type scale from 1 (strongly agree) to 5 (strongly disagree) (See Appendix 6 for the full measure).

As to the self-efficacy measure, a six-item scale developed by Lown (2011), related specifically to financial matters (e.g., "When unexpected expenses occur, I usually have to use credit"; "I worry about running out of money in retirement) was used – in this case , the following categories measured the construct: 1 = Exactly true; 2 = Moderately true; 3 = Hardly true; 4 = Not at all true (See Appendix 7 for the full measure).

For the financial wellbeing mediation analysis, the financial wellbeing scale from Netemeyer et al. (2018) was used (See Appendix 4 for the full measure).

Cronbach´s Alpha was calculated for the financial wellbeing scale: α = 0.918, showing an excellent internal consistency of the scale, even better than the samples from studies 2 and 3. Then, an exploratory factor analysis was conducted with the ten items of the scale, following the same procedures from the previous studies, by the method of extraction by principal components, and rotation of the Varimax type, confirming that it is a bidimensional variable. The dimensions were identified with eigenvalues above 1.0, with the total variance of the two dimensions being 70.136 - the dimensions explain 70% of the financial wellbeing construct.

The communalities test indicated statistical importance for all the items in measuring the construct – all results above 0.60. The KMO and Barlett tests were performed, showing significant results (KMO=0.927, p<.0001; Barlett:

χ2=2021.109, df=45, p<.0001), demonstrating that the sample was adequate. The results were better than on studies 2 and 3, consistent with a larger sample.

Financial skills were also controlled in Study 4 (See Appendix 3 for the full measure).

3.4.2 RESULTS

Chi-square test was conducted, comparing proportions from reduced decision-making time condition with extended decision-making time condition. The proportion of favorable responses (Option A) was higher on extended time scenario (58.6%; 89 from 152 respondents) than on reduced time scenario (46.2%; 80 from 173 respondents) (χ2=4.912; p=0.027). The results reinforce the proposed main effect, being consistent with the first three studies, confirming hypothesis 1 (See Figure 6).

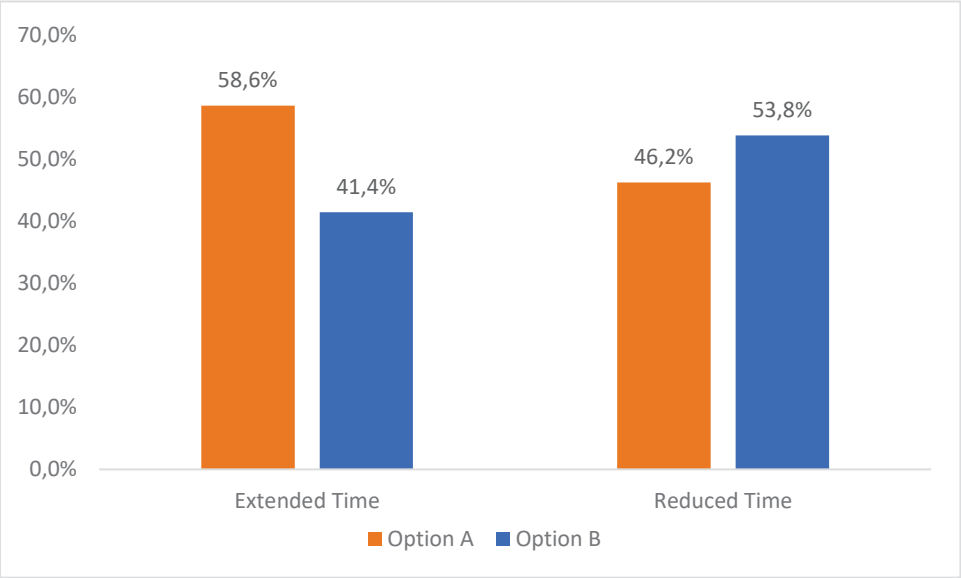

Figure 6. Graphical representation of study 4 chi-square results.

The moderation and mediation analysis for hypothesis 3 was carried out using the PROCESS macro (Hayes, 2017) – Model 5, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity. Considering the conditional effects on the main relationship, we observe that with the addition of reminder nudging, the main effect, which is significant without nudging (coef=0.7804; p=0.0183; LLCI=0.1321; ULCI=1.4287), ceases to be significant with nudging (coef=0.0450; p=0.8907; LLCI=-0.5970; ULCI=0.6871).The results indicate again the power of nudging in altering the results of the dependent variable, confirming H3.

The main relationships could again be verified more precisely with the complete chi-square tests. Considering the reduced decision-making time group, the percentage of the least favorable answer (Option B) drops from 62.4% to 45.5% when nudging is added; while the percentage of the most favorable answer (Option A) climbs from 37.6% to 54.5% with nudging - the differences are significant ($\chi 2=4.967$; p=0.026). Considering the extended decision-making time group, the percentage of the most favorable answer (Option A) stays in approximately 58% when nudging is added; and the percentage of the least favorable answer (Option B) stays in approximately 41% with nudging (See Figure 7) - the differences are not significant ($\chi 2=0.001$; p=0.978).

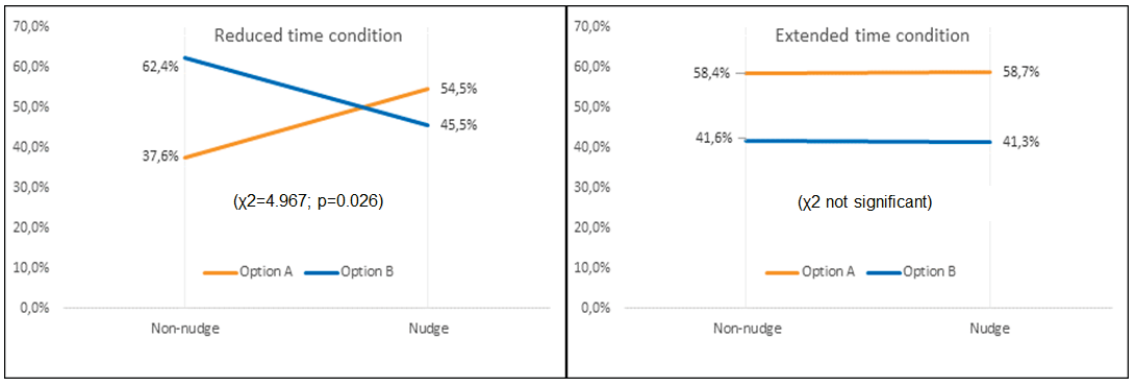

Figure 7. Graphical representation of Study 4 results – reduced vs. extended time.

The mediation analysis for hypothesis 2 was carried out using the PROCESS macro (Hayes, 2017) – Model 4, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity, using the whole score of financial wellbeing scale.

It showed a significant mediation of financial wellbeing on the main effect - the mediating variable financial wellbeing ($F(1,323)=4.7456$; $p=0.0301$; $R^2=0.0145$) was positively impacted (coef=2.2974; p=0.0301; LLCI=0.2226; ULCI=4.3721) by the decision-making time. It was also found that the favorability of the decision (Nagelkrk $R^2=0.0876$; $p<0.0001$) was significantly and positively impacted (coef=0.0503; p=0.0001; LLCI=0.0258; ULCI=0.0749) by financial wellbeing. The indirect effects were significant (coef=0.1157; LLCI=0.0094; ULCI=0.2550), confirming the mediation effect (H2).

3.4.3 DISCUSSION

Study 4 showed results in the same direction of Study 3, giving us more consistency for the moderation analysis. Both outcomes reinforce the idea that a reminder nudging has the power to guide consumers to more favorable choices. On the extended time group, the results were more in line of what

was expect for the nudging (a neutral effect in this case), but, similar to Study 3, the results were not significant.

Bounded rationality theory points out that consumers sometimes are not able to act in a complete rational way, and the most favorable judgements will happen depending on the decision context (Tversky & Kahneman, 1974; Elliehausen, 2010; Berthet, 2021; Van Raaij, 2016). As decisions in economic contexts are often based on irrational motives (Loerwald & Stemmann, 2016), the reminder nudging strategy do make a point in helping consumers to make better decisions.

4 GENERAL DISCUSSION

The current research investigated the impact of decision-making time on the favorability of consumers' credit decisions. Study 1 provided initial evidence that reduced decision-making time leads to less favorable credit decisions for consumers. All the followed studies replicated this effect.

On Study 2, we concentrated efforts on identifying the explanatory mechanism of the proposed relationship – financial wellbeing was identified as the most suitable variable for that purpose.

In an attempt to identify how the negative way of the proposed relationship (reduced decision-making time leading to less favorable credit decisions) could be reverted, reminder nudging was tested and proved to be a strong moderating variable for the main effect. Studies 3 and 4 showed a consistent pattern of results for that relationship.

4.1 THEORETHICAL CONTRIBUTIONS

The current research contributes to the fields of behavioral economics and consumer behavior by broadening existing knowledge about the impact of decision-making time on the favorability of consumers' decisions and giving new applications for financial wellbeing and nudging theories.

The results of this study reinforce studies that warn us about the potential detrimental effects of fintech on consumers' wellbeing, for the sense of urgency inducted by the ease and speed with which transactions are made (Agarwal & Chua, 2020; Di Maggio & Yao, 2021; Morgan, 2021; Panos & Wilson, 2020; Odinet, 2017). These implications are congruent with prior research in judgement and decision making, which suggested that time constraints impair good judgment and choice (Maule & Edland, 2002; Gonzalez, 2004; Svenson & Maule, 1993; Kocher & Sutter, 2006).

Financial wellbeing is a stream of research that is basically in an early stage. We believe this study fills a gap on the role of situational factors in financial wellbeing addressed by Greenberg and Hershfield (2019), as we showed that decision-making time impacts the perception of financial wellbeing. One of the research agenda items proposed by Brüggen et al. (2017) is revealing processes that deteriorate or strengthen financial wellbeing over the short and long run. This study contributes with this issue, showing that the perception of wellbeing is the mechanism underlying the effect of decision-making time on the favorability of consumer's credit decisions. We demonstrated that a low perception of wellbeing (provoked by reduced decision-making time) impairs the favorability of credit decisions.

Finally, the current research strengthens the nudging theory, demonstrating that reminder nudging has a significant impact on consumer behavior. Empirical studies have shown that consumers' decisions are often taken influenced by emotions and heuristics that may impair consumers' best judgements (Tversky & Kahneman, 1974; Elliehausen, 2010; Berthet, 2021; Daxhammer et al., 2023). We demonstrated that reminder nudges have the power to reverse unfavorable decisions made within reduced time. For our knowledge, this is a novel approach to the nudging theory.

4.2 MANAGERIAL IMPLICATIONS

The main relationship tested in this research has shown us a strong need for adjustment in fintech regulation as it pointed out that limited consumers' decision-making time leads to less favorable credit decisions. We believe it is necessary to establish a minimum period of time for consumers to close credit deals with fintech - instant decisions without sufficient rational basis should not be encouraged. We strongly suggest that financial regulatory bodies study this issue.

The reminder nudging moderation results indicate that it represents an efficient strategy to stimulate consumers to think in terms of total cost of credit for their credit decisions, leading to more favorable outcomes. The chi-square tests of studies 3 and 4 showed that reminder nudging reverted the unfavorable answers for the reduced-time group (decisions taken within limited time was the focus of this research, as we consider it is a proxy of what happens with fintech lending). Public policies should be encouraged to educate fintech costumers in thinking in terms of total cost of credit when

selecting credit agreements, preventing them to make suboptimal choices. And, as we have seen, nudges are usually inexpensive, easy to apply, and have potential to promote responsible financial behavior (Thaler and Sunstein, 2008; Van Raaij, 2016).

4.3 LIMITATIONS AND FUTURE RESEARCH

This study has some limitations that reflect possible directions for further research. Firstly, the samples of all studies were taken from Prolific, representing a limitation to the external validity of this study. Further investigations should be done using other sources of data (e.g., field studies) to address that issue. Moreover, the results might have reflected some cultural aspects for all the respondents being from the United States - there is an opportunity for a future cross-cultural study to evaluate possible regional differences affecting the results.

Another limitation is the dependent variable measure. We used the same measure for all the four experiments. Future research should test other forms of measuring the favorability of consumers' credit decisions, so that more comprehensive analyses can be done.

Finally, we used only one form of nudging – the reminder nudge. Further research should test other forms of nudging (e.g., warnings; default options; disclosure) and compare the results.

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APPENDIX 1 – DEPENDENT VARIABLE MEASURE (STUDY 1)

1.REDUCED TIME CONDITION (FINTECH)

Imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan online. You are on the website of Maincred - an online credit fintech, which offers you two different repayment plans, described below. Which one would you choose (assuming there is no inflation in the period)?"

	Option A	**Option B**
Financed amount	US$5,000.00	US$5,000.00
Monthly interest rate	1.00%	1.00%
Duration	24 months	36 months
Monthly installments	US$235.37	US$166.07

○ Option A

○ Option B

2. EXTENDED TIME CONDITION (TRADITIONAL BANKS)

Imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan online. You are at one of the branches of A.N.G., an international traditional bank, and the manager offers you two different repayment plans, described below. Which one would you choose (assuming there is no inflation in the period)?"

	Option A	**Option B**
Financed amount	US$5,000.00	US$5,000.00
Monthly interest rate	1.00%	1.00%
Duration	24 months	36 months
Monthly installments	US$235.37	US$166.07

- ○ Option A
- ○ Option B

APPENDIX 2 – DEPENDENT VARIABLE MEASURE (STUDIES 2, 3 AND 4)

Imagine you need to pay an unexpected expense of US$ 5,000.00, but you don't have that amount at the moment, so you decide to take out a loan. You are offered that amount by the financial institution with two different repayment plans, described below. Which one would you choose (assuming there is no inflation in the period)?"

	Option A	**Option B**
Financed amount	US$5,000.00	US$5,000.00
Monthly interest rate	1.00%	1.00%
Duration	24 months	36 months
Monthly installments	US$235.37	US$166.07

○ Option A

○ Option B

APPENDIX 3 – FINANCIAL SKILLS MEASURE (STUDIES 1, 2, 3 AND 4)

Next, you will have a few financial tasks. Please, choose the best answer from the options given.

1. Suppose you have $100 on your savings account, with an interest rate of 10% per year. After 5 years, how much will you have on your savings account? Assume that no money has been deposited in it or withdrawn from it during this period.

- ○ more than $150
- ○ less than $150
- ○ exactly $150
- ○ I don't know

2. Suppose that the interest rate on your savings account is 7% per year and the inflation rate is 10% per year. After 1 year, how much will you be able to buy with the money from that account? Assume that no money has been deposited in it or withdrawn from it during this period.

- ○ more than today
- ○ less than today
- ○ the same
- ○ I don't know

3. Suppose you have $100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?

- ○ more than $200
- ○ exactly $200
- ○ less than $200
- ○ I don't know

4. When an investor spreads his or her money among different assets, does the risk of losing a lot of money:

- ○ increase
- ○ decrease
- ○ stay the same
- ○ I don't know

(Adapted from Lusardi & Mitchell, 2011; Rooij et al, 2011)

APPENDIX 4 – FINANCIAL WELLBEING MEASURE (STUDIES 2, 3 AND 4)

Now, we need you to read the following statements and indicate your level of agreement with them, being 1 = "Does not describe me at all" and 5 = "Describes me completely" (Netemeyer et al., 2018)

	1 - Does not describe me at all	2	3	4	5 - Describes me completely
I am becoming financially secure	○	○	○	○	○
I am securing my financial future	○	○	○	○	○
I will achieve the financial goals I have set to myself	○	○	○	○	○
I have saved (or I will be able to save) enough money to last me to the end of my life	○	○	○	○	○
I will be financially secure until the end of my life	○	○	○	○	○
Because of my financial situation, I feel I will never have the things I want in my life	○	○	○	○	○

I am behind with my finances	○	○	○	○	○
If you are paying attention, please mark option 4	○	○	○	○	○
Whenever I feel in control of my finances, something happens that sets me back	○	○	○	○	○
I am unable to enjoy life because I obsess too much about money	○	○	○	○	○
My finances control my life	○	○	○	○	○

(Adapted from Netemeyer et al., 2018).

APPENDIX 5 – PRESENT BIAS MEASURE (STUDY 2)

Next, you will be asked to make a few choices. Please first look at this question set and then read the description below:

Consider choice 1. You have to choose between £$5 today or £$5.25 in one week. Note that as you move forward (choices), Option B will become more and more attractive relative to Option A. This means that there will be three possibilities: you might always prefer A; you might always prefer B; or you might first prefer A but then swich preference to B at a particular moment (choice).

To present this situation realistically, some respondents will be randomly selected at the end of the experiment to have one of their decisions be actually paid in British pounds as bonus payment on Prolific. You have the probability of 1 in 20 (5%) to have one of your decisions paid out. You will be notified after completing the study whether you are one of the bonus winners.

	Option A	Option B
A: £$5 today or B: £$5.25 in one week	○	○
A: £$5 today or B: £$5.50 in one week	○	○
A: £$5 today or B: £$5.75 in one week	○	○
A: £$5 today or B: £$6 in one week	○	○
A: £$5 today or B: £$6.25 in one week	○	○
A: £$5 today or B: £$6.50 in one week	○	○
A: £$5 today or B: £$6.75 in one week	○	○
A: £$5 today or B: £$7 in one week	○	○
A: £$5 today or B: £$7.25 in one week	○	○
A: £$5 today or B: £$7.50 in one week	○	○

A: £$5 today or B: £$7.75 in one week	○	○
A: £$5 today or B: £$8 in one week	○	○

The next set of questions is similar in structure, and so it requires little further explanation. What do you prefer?

	Option A	Option B
A: £$5 in one week or B: £$5.25 in 2 weeks	○	○
A: £$5 in one week or B: £$5.50 in 2 weeks	○	○
A: £$5 in one week or B: £$5.75 in 2 weeks	○	○
A: £$5 in one week or B: £$6 in 2 weeks	○	○
A: £$5 in one week or B: £$6.25 in 2 weeks	○	○
A: £$5 in one week or B: £$6.50 in 2 weeks	○	○
A: £$5 in one week or B: £$6.75 in 2 weeks	○	○
A: £$5 in one week or B: £$7 in 2 weeks	○	○
A: £$5 in one week or B: £$7.25 in 2 weeks	○	○
A: £$5 in one week or B: £$7.50 in 2 weeks	○	○
A: £$5 in one week or B: £$7.75 in 2 weeks	○	○
A: £$5 in one week or B: £$8 in 2 weeks	○	○

(Adapted from Nguyen, 2016)

APPENDIX 6 – FINANCIAL SELF-CONFIDENCEMEASURE (STUDY 4)

Now, we need you to read the following statements and indicate your degree of agreement with them, where 1 = Strongly Disagree and 5 = Strongly Agree (remember that there is no right or wrong answer, only the one that is closest to your opinion.

	1 - Strongly disagree	2	3	4	5 - Strongly agree
I am confident that I know how to handle my money	○	○	○	○	○
If I wasn't sure what to do financially, I know that I could find the information I need	○	○	○	○	○
If I had questions about my money, I don't know anyone that I could ask for advice	○	○	○	○	○
I am confident in my abilities to handle credit cards	○	○	○	○	○
I am confident in my abilities to handle my bank accounts	○	○	○	○	○
I wish that I knew more about managing my money	○	○	○	○	○
I don't know as much about money management as most of my friends do	○	○	○	○	○

If I needed to take out a loan, I would know how to start the process	○	○	○	○	○
I am worried about my lack of financial knowledge	○	○	○	○	○
I will be able to handle my money in the years to come	○	○	○	○	○

(Norvilits& Mao, 2013)

APPENDIX 7 – FINANCIAL SELF-EFFICACY MEASURE (STUDY 4)

Now, please respond to the following statements using these response categories: 1 = Exactly true; 2 = Moderately true; 3 = Hardly true; 4 = Not at all true.

	1 - Exactly true	2 - Moderately true	3 - Hardly true	4 - Not at all true
It is hard to stick to my spending plan when unexpected expenses arise	○	○	○	○
It is challenging to make progress toward my financial goals	○	○	○	○
When unexpected expenses occur, I usually have to use credit	○	○	○	○
If you are paying attention, please mark option 3	○	○	○	○
When faced with a financial challenge, I have a hard time figuring out a solution	○	○	○	○
I lack confidence in my ability to manage my finances	○	○	○	○
I worry about running out of money in retirement	○	○	○	○

(Lown; 2011)

APPENDIX 8 – FINANCIAL SELF-CONFIDENCE RESULTS (STUDY 4)

The mediation analysis for financial self-confidence was carried out using the PROCESS macro (Hayes, 2017) – Model 4, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity.

It did not show a significant mediation of financial self-confidence on the main effect - the mediating variable financial self-confidence ($F(1,323)=0.2965$; $p=0.5865$; $R^2=0.0009$) was not impacted (coef=0.4889; p=0,5865; LLCI=-1.2776; ULCI=2.2555) by the decision-making time. The favorability of the decision (Nagelkrk $R^2=0.0857$; $p<0.0001$) was significantly and positively impacted (coef=0.0586; p=0.0001; LLCI=0.0295; ULCI=0.0878) by financial self-confidence.

APPENDIX 9 – FINANCIAL SELF-EFFICACY RESULTS (STUDY 4)

The mediation analysis for financial self-efficacy was carried out using the PROCESS macro (Hayes, 2017) – Model 4, with 5,000 bootstrap samples, bias correction and standard errors that are consistent with heteroscedasticity.

It did not show a significant mediation of financial self-confidence on the main effect - the mediating variable financial self-efficacy ($F(1,323)=0.3993$; $p=0.5279$; $R^2=0.0012$) was not impacted (coef=0.2984; p=0,5279; LLCI=-0.6306; ULCI=1.2274) by the decision-making time. The favorability of the decision (Nagelkrk $R^2=0.1099$; $p<0.0001$) was significantly and positively impacted (coef=0.1325; $p<0.0001$; LLCI=0.0759; ULCI=0.1892) by financial self-efficacy.