Covid-19 and its impacts on financing and investment policies

Covid-19 e os impactos nas políticas de financiamento e investimento

Jonathas Q. Amorim[1], George A. W. Sales[1], and Marta C. Pelucio Grecco[1]

[1] Foundation Institute of Accounting, Actuarial and Financial Research (Fipecafi),
São Paulo, SP, Brazil

Author notes

Jonathas Q. Amorim is now a master's student at the Department of Accounting of Foundation Institute of Accounting, Actuarial and Financial Research (Fipecafi); George A. W. Sales is now a professor at the Department of Accounting of Fipecafi; Marta C. Pelucio Grecco is now a professor at the Department of Accounting of Fipecafi.

Correspondence concerning this article should be addressed to Marta C. Pelucio Grecco, Rua Maestro Cardim, 1170, Bela Vista, São Paulo, SP, Brazil, ZIP Code 01323-001. E-mail: marta.pelucio@fipecafi.org

Abstract

Purpose: To analyze how the Covid-19 has impacted the financing, capital structure, and investment policies of Brazilian companies from a behavioral finance perspective.

Originality/value: The study focused on the behavioral finance literature, Prospect Theory, Big Five Theory, and Pecking Order Theory, in order to substantiate and explain the consequences of the emotions implicit in corporate decisions and their impacts on organizations during the Covid-19 crisis.

Design/methodology/approach: A questionnaire was used, containing 26 questions spread over three sections: 1. investment, financing, and capital structure decisions made in the first half of 2020; 2. personality dimensions of the respondents; and 3. sociodemographic profiles of the respondents. A total of 120 responses was obtained and the ordinary least squares econometric model was applied to identify the influence of biases on corporate decisions.

Findings: The results found showed that managers' decisions have been influenced by heuristics and biases, especially decisions on starting new projects and raising funds, as it was found that overconfidence bias has prevailed in investment and financing decisions. The study also demonstrated that the decline in sales and lost profitability of Brazilian companies due to Covid-19 have led to bold behavior by managers, as they have sought to reverse the impacts of the pandemic.

Keywords: Covid-19, behavioral finance, investment, financing, capital structure

Resumo

Objetivo: Analisar como a Covid-19 tem impactado as políticas de financiamento, estrutura de capital e investimento das empresas brasileiras à luz das finanças comportamentais.

Originalidade/valor: O estudo se debruçou sobre a literatura das finanças comportamentais, Teoria dos Prospectos, Teoria do *Big Five* e Teoria do *Pecking Order*, com o intuito de fundamentar e explicar as consequências das emoções implícitas nas decisões corporativas e os impactos nas organizações no momento de crise da Covid-19.

***Design*/metodologia/abordagem:** Foi utilizado um questionário com 26 perguntas distribuídas em três blocos: 1. decisões de investimentos, financiamentos e estrutura de capital tomadas no primeiro semestre de 2020; 2. dimensões de personalidade dos respondentes; 3. perfis sociodemográficos dos respondentes. Obtiveram-se 120 respostas, e aplicou-se o modelo econométrico Mínimos Quadrados Ordinários para identificar a influência dos vieses nas decisões corporativas.

Resultados: Os resultados encontrados evidenciaram que as decisões dos administradores têm sido influenciadas pelas heurísticas e pelos vieses, principalmente nas decisões de iniciação de novos projetos e captação de financiamento, pois identificou-se que o viés do excesso de confiança tem prevalecido nas decisões de investimento e financiamento. O estudo também demonstrou que as quedas nas vendas e as perdas na lucratividade das empresas brasileiras decorrentes da Covid-19 proporcionaram um comportamento arrojado nos administradores, já que eles buscaram reverter os impactos da pandemia.

Palavras-chave: Covid-19, finanças comportamentais, investimentos, financiamentos, estrutura de capital

INTRODUCTION

In March of 2020, the World Health Organization (WHO) formally announced to the world that the spread of the coronavirus disease 2019 (Covid-19) had reached a pandemic stage. The Brazilian authorities began to create protocols aimed at preventing transmission of the virus among the population and minimizing social and economic impacts, introducing social isolation measures and restrictions on people transit.

Studies carried out by researchers in the academic community, especially in the area of medicine, indicate negative impacts on cognitive functions and decision-making due to social isolation. According to Percudani et al. (2020), social isolation is damaging to mental health and the uncertainty about the future can lead to fear, frustration, anxiety, and mental instability. Similarly, Serafini et al. (2020) highlighted the symptoms of anxiety, unease, and inability.

Social isolation and restrictions of people transit have also caused impacts on the global economy. Uncertainty about the future has worsened due to a lack of clarity regarding the real impact on gross domestic product (GDP) and on the post-pandemic growth rate, published by the International Monetary Fund (IMF) and by the Brazilian Central Bank (Banco Central do Brasil [Bacen]).

In an attempt to minimize the impact of Covid-19, Brazilian companies are expected to make investment, financing, and capital structure decisions with the aim of preserving liquidity, reducing both financial and operational leverage levels, and remodeling business units or products.

Behavioral finance suggests that the inefficiency and market anomalies seen are due to the behaviors of investors operating in the market. According to Chaudhary (2013), distortions of cognitive functions and emotions interfere in decision-making. Jahanzeb (2012), in turn, claims that behavioral finance provides support in understanding the influence of emotions on decision making, as well as offering ways to protect against such interferences.

In the same context, behavioral finance, seen through the lens of some of the pillars of psychology that study emotions, explains the behaviors of decision-makers. Prospect theory explores these behaviors in relation to the risk involved. The theory also proposes that a feeling of loss causes a greater mental influence than a feeling of gain, even if they are in the same proportion, and that the loss incurred causes bold behaviors in a search to recover it (Jahanzeb, 2012; Famá et al., 2008).

Brazilian companies have suffered due to the impacts of the pandemic, especially due to the decrease in sales and profitability. This leads to questions

regarding the emotions of managers and how these can influence investment, financing, and capital structure decisions. The Big Five Theory explores the relationship between personality traits and behavioral biases, and it can be applied to finance in order to understand the decision-making process depending on the individual's personality (Faveri & Knupp, 2018).

The capital structure of companies should be focused on maintaining business continuity, and so the pecking order for fundraising activities should be respected (Myers & Majluf, 1984). Futema et al. (2009) found in Brazilian companies evidence of a preference for the use of their own resources to fund internal investments.

According to Leone and Guimarães (2013), research in the field of behavioral finance in Brazil is limited, especially when the environment analyzed is experiencing a recession or crisis. In the literature, behavioral finance studies focus on abnormal reactions by the capital markets, especially when due to investors' irrational decisions.

Thus, this study seeks to answer the following question:

- How has the coronavirus pandemic impacted the financing, capital structure, and investment policies of Brazilian companies from a behavioral finance perspective?

This study is timely given that Brazilian companies are still being impacted by the Covid-19 pandemic, and, until now, there has been a lack of clarity regarding the economic recovery and the loosening of social isolation measures. Considering that investment, financing, and capital structure policies can be influenced by managers' emotions due to the uncertain and irrational environment, this study helps expand the research on behavioral finance by investigating the impacts of emotions on corporate decisions, especially at a time of crisis and from the internal agent's perspective.

THEORETICAL FRAMEWORK AND OUTLINING OF HYPOTHESES

Investment, financing, and pecking order decisions from a behavioral finance perspective

Among the studies that have investigated the influence of behavioral finance on investment decisions, the one by Chaudhary (2013) concluded that behavioral finance has contributed to protecting investment strategies

from cognitive errors. Jahanzeb (2012) states that although irrational decisions are not identified in all agents, their impacts can result in enormous losses. Pimenta and Ribeiro (2010) identified that sociodemographic profiles together with overconfidence bias can negatively impact investment decisions.

According to Ramiah et al. (2015), investment decisions based on market anomalies do not follow economic grounds or models and, moreover, follow market trends originating from good or bad news. In addition, the authors claim that investment decisions that are not based on information made available to the market or on economic models can be categorized as irrational decisions.

Leone and Guimarães (2013) suggest that scientific research should identify the influence of emotions on investment and financing decision-making, as well as make economic viability models less biased using the inputs provided by studies on behavioral finance. Bazerman (2004, as cited in Feitosa, 2010) highlights that the introduction of financial modeling and external information can contribute to reducing biases in decisions.

The studies on behavioral finance have also recently contributed to explaining financing and capital structure decisions, as well as exposing the impacts of biases on financing decisions and decisions on whether or not to issue new stock. Barberis and Thaler (2003) argue that biases can lead to rash decisions by internal agents and, especially, to an increase in debt to fund internal projects, which can even destroy shareholder value.

Shefrin and Statman (2011) identified the use of overconfidence bias by financial institutions in the United States, leading to an increase in the financial leverage of those institutions and, consequently, to the 2008 financial crisis. Heaton (2002) argues that when internal agents are influenced by overconfidence bias they do not issue new stock, as they believe that the undervalued stock will be redeemed at nominal value in accordance with future cash flows. According to the author, this behavior would explain the Pecking Order Theory.

Some authors have found empirical evidence regarding the use of an internal fundraising pecking order before seeking external resources, in accordance with the theory (Vasiliou & Daskalakis, 2009; Futema et al., 2009; Barberis & Thaler, 2003). The studies of Myers and Majluf (1984) were pioneering in revealing this behavior and the preference for internal sources of funding. This preference was originally identified in the seminal study of Modigliani and Miller (1958). Pecking order theory involves biased decisions by managers, as the tax benefits of debt are not considered according

to Trade-Off Theory, and market *momentum* is not taken advantage of to issue new stock in line with market *momentum* theory (Barberis & Thaler, 2003).

Regarding changes in capital structure in times of crisis, some studies have identified empirical evidence of alterations in these structures caused by moments of uncertainty. Robust evidence was found concerning changes in capital structure in times of crisis in the Japanese market (Danso et al., 2021). Vieira (2013) identified a shift toward deleveraging in Portuguese companies after the 2008 crisis, which significantly modified their capital structures. Similarly, Chatzinas and Papadopoulos (2018) found evidence of a change in the capital structure during the 2008-2014 financial crisis in Greece.

According to the findings of Leone and Guimarães (2013) and Ramiah et al. (2015), behavioral finance plays the role of providing assumptions based on studies of managers' behavior and emotions, in order to adjust the economic models used in the viability analyses of investments and financing. Both Bazerman (2004, as cited in Feitosa, 2010) and Ramiah et al. (2015) highlight that market agents tend to use the available information to adjust their financial models. Thus, the study raised the following hypothesis:

- H1: When formed without the use of economic models and information available in the market, investment, financing, and capital structure decisions can be considered biased.

Behavioral finance

According to Jahanzeb (2012), the research in the field of behavioral finance emerged between 1953 and 1963, when the psychological aspects behind investment decisions were explored. The rise of behavioral finance emerged in the 1970s with the articles of Kahneman and Tversky, who studied investors' behaviors from the perspectives of heuristics and emotions (Jaiswal & Kamil, 2012).

According to Jahanzeb (2012) and Jaiswal and Kamil (2012), behavioral finance is rooted in the branches of psychology that study individuals' behaviors using heuristics. Heuristics are divided into seven main cognitive systems that lead to irrational decisions, namely: representativeness, conservatism, anchoring, perseverance, overconfidence, optimism, and availability.

Pimenta and Ribeiro (2010) define heuristics as rudimentary methods developed by human beings through their habitual experiences, and poor use of them can lead to biases or illogical decisions. Yoshinaga et al. (2008) highlight that biases originate from the irrational choices of individuals, who are influenced by their past experiences or mistaken assumptions of the future.

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According to Barberis and Thaler (2003), the representativeness heuristic introduces the biases of choices or judgments made considering the characteristics of the event and previous experiences, many of which are simplistic or based on common sense. Leone and Guimarães (2013) define the representativeness heuristic as being the means by which individuals measure the possibilities of causalities of events taking into account their previous experiences.

Regarding the anchoring heuristic, Yoshinaga et al. (2008) propose that decisions are always made based on an initial indicator or estimate, and those who make these decisions make adjustments to adapt the estimate, but, in general, do not achieve the expected objective. Besides, Leone and Guimarães (2013) clarify that the anchoring heuristic involves each individual's primary assumptions, which serve as a regulating parameter, but they are not precise.

With respect to the overconfidence heuristic, Jahanzeb (2012) describes it as being the bias that influences individuals' decisions due to their beliefs that their judgments or choices are always right. According to Yoshinaga et al. (2008), individuals presume that their choices in times of uncertainty or crises are concrete truths, but, from this perspective, these choices are not always concise, given that many of them are anchored in initial assumptions or indicators.

Barberis and Thaler (2003) focus on the overconfidence and representativeness heuristics – the former contributes to rash decisions and the latter represents the tendency of individuals to measure probabilities of causalities of events based on their previous experiences. Moreover, Jahanzeb (2012) draws attention to the risks assumed in financing decisions. Thus, the study raised the following hypothesis:

- H2: The sociodemographic profiles of company size or position occupied have a positive correlation with biased decisions related to fundraising, canceling projects, and modifying capital structure.

According to Barberis and Thaler (2003), financing and capital structure decisions based on Pecking Order Theory are considered biased, given that managers do not consider the tax benefits of debt and do not take advantage of high prices to issue new stock. In light of this, the study raised the following hypothesis:

- H3: There is a positive correlation between the fundraising pecking order of Brazilian companies and their managers' decisions, especially when these present representativeness and anchoring biases.

Prospect Theory

Prospect Theory emerged between 1974 and 1979, through research in the field of psychology that studied the behaviors of market agents. According to Kahneman and Tversky (2013, p. 1) "decision making under risk can be viewed as a choice between prospects or gambles". According to Jahanzeb (2012), Prospect Theory has been able to identify an opposing relationship between individuals' perceptions of gains and losses, as well as making inferences about the influence of losses on the level of risk assumed in investment decisions.

Jahanzeb (2012) describes the five main concepts, based on the Prospect Theory, that have contributed to the rise of behavioral finance. The concepts are conception, regret avoidance, loss aversion, mental accounting, and self-control.

Conception, which involves the effect of certainty, is explained as the wide difference between the weights attributed to (certain) guaranteed gains and highly probable gains (Kahneman et al., 1991).

The concept of regret avoidance emerges when investors try to minimize the emotional impacts of losses and poor choices. The resulting feeling of loss can cause irrational behavior. Thus, the investor's decision is more likely to be risky when facing moments of losses than when experiencing times of gains, as, in this case, they become more risk-averse (Jahanzeb, 2012).

Loss aversion behavior is seen by Kahneman and Lovallo (1993) as a marginal reduction in the utility of gains. The utility function describes the behavior of the ratio of an expected financial value in a particular situation with a personal value attributed by the investor to that same situation. The ratio of various different expected values and their respective attributed values shows, within the range of expected values, the investor's behavior in relation to risk. The various stipulated points create a curve, which is named utility function (Bell, 1988).

The concept of mental accounting proposes that individuals unconsciously organize their finances in a vicious circle, in which gains are previously earmarked to cover expenses (Jahanzeb, 2012). This concept is also relevant in times of crisis, especially for joint enterprises, as internal agents often use annual budgets as spending targets, that is, resources are spent even in case of sales losses or economic downturns. In addition, the concept of mental accounting is in line with the anchoring heuristic, since decisions are based on initial references.

Finally, the concept of self-control suggests that investors monitor their emotions so as not to cause losses or irrational changes in investment strategy.

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Jahanzeb (2012) highlights that self-regulation can contribute to minimizing losses and preserving the portfolio. Pimenta and Ribeiro (2010) concluded that overconfidence can be mitigated through self-control and self-regulation.

Leone and Guimarães (2013) identified the interferences of biases and emotions in times of crisis and concluded that there was a significant change in the behavior of market agents from the perspective of mental accounting and availability bias, mainly due to optimistic and pessimistic emotions.

Big Five Theory (personality traits)

According to Faveri and Knupp (2018), the Big Five Theory emerged in 1930 with the works of the researcher Gordon Allport, which resulted in the identification of the five dimensions of personality. Gosling et al. (2003) point out that the Big Five model has been widely accepted in the academic world to measure the dimensions of personality.

Although there are several complex models that have used different factors to measure each dimension of personality, the more simplified Big Five model has gained space primarily in the academic world due to the ease of applying it. The 10-item big five inventory (BFI-10) emerged based on a 44-item model. Rammstedt and John (2007) identified that, when compared to the 44-item model, the 10-item model remained valid and reliable for measuring the dimensions of personality.

The BFI-10 model covers the five dimensions known as intellect/openness, conscientiousness, agreeableness, stability, and extroversion (Anderson et al., 2011; Faveri & Knupp 2018). The use of key questions allows the identification of the characteristic of each dimension, in which the lines of thought and feelings that help to categorize human behavior are defined (Anderson et al., 2011).

According to Anderson et al. (2011), the Big Five Theory has contributed to identifying the characteristic of the personality traits of individuals, which are used to define the lines of thought that help to define human behavior. Thus, the study raised the following hypothesis:

- H4: There is a positive correlation between risk-averse personality trait and cancellations and fundraising with the aim of preserving company cash flow.

Anderson et al. (2011) also highlight that extroverted and intellectual personality traits have a positive correlation with risk-prone decisions. Thus, the following hypothesis was raised:

- H5: There is a positive correlation between bold personality trait and starting new projects.

METHODOLOGICAL PROCEDURES

This descriptive study seeks to identify the causes and effects of the Covid-19 pandemic on company decisions, as well as the relationship between executive personality trait and investment, financing, and capital structure strategies in times of crises. The research procedure employed was a survey. A quantitative approach was used, employing statistical techniques to measure the relationships between both personality and sociodemographic profiles and biased investment, financing, and capital structure decisions.

The data were collected using a virtual survey, made available between July 15, 2020 and August 17, 2020 on social media, such as LinkedIn and Facebook, as well as through the mailing list of the National Association of Finance, Business, and Accounting Executives (Anefac). The sample consisted of 120 answers.

The questionnaire was made up of 26 questions spread over three sections: 1. identification of investment, financing, and capital structure decisions in the first half of 2020, with the aim of investigating the use of bias in decision making; 2. identification of the five levels of the personality dimensions among the respondents in order to relate them to investment, financing and capital structure decisions; and, finally, 3. identification of sociodemographic profiles with the aim of identifying the risks associated with investment, financing and capital structure decisions.

The companies' investment and financing decisions were identified through three investment questions, three financing questions, and three capital structure questions, with the aim of detecting the use of bias in their decisions. Closed, structured, and non-concealed questions were elaborated. The study used the representativeness, anchoring, overconfidence, conception, and regret avoidance biases.

Questions were used in the survey to identify behavioral triggers with probable, possible, and remote probabilities of bias. According to Pereira et al. (2010), the use of this trigger in the formulation of a theoretical case or research question can help in identifying emotional impacts on the decision-making process in a context of uncertainty. Moreover, the use of key questions can identify the characteristic of each personality dimension, in which the ways of thinking and feeling that help to categorize human behavior are

defined (Anderson et al., 2011). The investment and financing questions followed the pattern defined in Table 1.

Table 1

Investment and financing policies

Triggers	Investment policies	Answers
1	Cancellation or postponement of investments	Yes or no
2	Use of tools or financial models	Yes or no
3	Use of information available in the market	Yes or no
Triggers	Investment policies	Answers
1	Starting projects	Yes or no
2	Use of tools or financial models	Yes or no
3	Use of information available in the market	Yes or no
Triggers	Financing policies	Answers
1	Contracting or renewing financing	Yes or no
2	Use of tools or financial models	Yes or no
3	Use of information available in the market	Yes or no

Source: Elaborated by the authors.

With the aim of identifying the probabilities of the use of bias in internal investment and financing decisions, the decisions were classified as: probable, when the respondent made the decision without using economic viability models and without using external information; possible, when the respondent carried out the decision without using economic viability models but did use the information available in the market, or when economic viability models were used but external information was not; and remote, which were the other answers.

After identifying the triggers and risks associated with each respondent's environment, the biases were classified according to behavioral finance and Prospect Theory. The answer combinations were used to identify the possible biases in the decisions, and the biases were used as dependent variables for statistical analysis purposes. The classifications found were compared with the respondents' personality and sociodemographic profiles, as well as the answers involving capital structure.

With the aim of measuring the financial and economic impacts, especially for the maintenance of capital structure policies, the questionnaire contained key questions to identify whether the companies have capital structure or corporate governance policies that regulate decisions or changes in their capital structure.

The results found in the questionnaire regarding changes in capital structure were converted into a proxy for the statistical analyses, with a focus on identifying the relationships with the executives' irrational behaviors due to the influences of the Covid-19 pandemic.

The Brazilian government has provided support measures to help small and medium enterprises, exclusively, cover lost sales and profitability. Among these, there is the National Program for Supporting Small Enterprises (Pronampe), which aims to cover the lack of liquidity, lost sales, and the fulfillment of obligations with third parties of these companies. The survey considered this event to be appropriate for identifying liquidity and leverage risks, as well as associating them with the personality traits, given that, in these companies, the partners, directors, and managers can directly influence investment, financing, and capital structure decisions.

Pecking order theory defends the use of internal resources before seeking external ones. Therefore, we elaborated questions regarding the respondents' preference for the use of their own resources or the use of both third-party and own capital.

The study sought to identify the impacts on corporate decisions, so the data collected in the questionnaire were used specifically concerning capital structure to determine the relationship using the ordinary least squares (OLS) test among the respondents according to their hierarchical level and company size.

In accordance with the work of Rammstedt and John (2007, as cited in Faveri & Knupp, 2018), the Big Five model was used to determine the personality dimensions of the survey respondents. After identifying the personality characteristic of the respondents, it was used as a proxy in the statistical analyses, with the aim of identifying the relationships with the biased behaviors.

Due to its simplicity and ease of use, the BFI-10 model was chosen, and the questions were represented with the following classifications: questions 1-2 represent the intellect dimension; 3-4, the conscientiousness dimension; 5-6, the agreeableness dimension; 7-8, the stability/neuroticism dimension; and, finally, 9-10, the extroversion dimension, as explained in Table 2.

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Table 2

Dimensions and characteristics of personality

Dimension	Statement I see myself as someone who…	Characteristics
Openness/intellect	(i) Has an active imagination.	Curiosity
	(ii) Has few artistic interests.	Liking novelties and new experiences
Conscientiousness	(iii) Is rigorous in their work.	Self-control
	(iv) Tends to be lazy.	Trust
		Coherence
Agreeableness	(v) Is usually trusting.	Cordiality
	(vi) Tends to find defects in others.	Kindness
		Empathy
		Altruism
Stability/neuroticism	(vii) Is calm and copes well with stress.	Adaptability
	(viii) Gets easily agitated.	Maturity
		Optimism
		Calmness
Extroversion	(ix) Is outgoing and sociable.	Kindness
	(x) Is reserved.	Humor
		Assertiveness
		Activeness

Source: Rammstedt and John (2007).

Each question of the personality test provided five answers to evaluate the level of agreement on a five-point Likert-type scale, in which: 1 = I strongly disagree; 2 = I slightly disagree; 3 = neutrality; 4 = I slightly agree; and 5 = I strongly agree.

The respondents' personality traits were categorized using the simple calculation of subtracting the score found in the sets of questions, always based on the even number question minus the odd number question. After identifying the numerical results, these were classified in a range from -4 (very low personality) through 0 (representing the neutrality level) up to +4 (very high personality), that is, for each set of questions the respondents

were categorized with a score lower than or equal to -2 (low), between -1 and +1 (moderate), and above +2 (high).

Definition of the independent variables

The data gathered through the questionnaire regarding the personality traits and sociodemographic profiles were used as independent variables. It is worth mentioning the use of the position variable, which can indicate the influence on decisions, and the company size variable, which can demonstrate whether medium and small enterprises tend to use biases more often than large enterprises.

The sociodemographic data also played an important role in validating the sample, even though the randomness and linearity requirements of the parameters were fulfilled.

Statistical models

The econometric model used in this study was OLS, with the aim of analyzing the effects of the dependent variables, as well as testing the regressions with the independent variables, considering the other unobserved conditions as *ceteris paribus*. Therefore, the model seeks to correlate the biased decisions, personality traits, and sociodemographic profile parameters to find characteristics of the events and make inferences about the hypotheses regarding the use of irrational decisions by managers in moments of crisis.

The study divided the population into three samples: the first for cancellation and postponement of investment decisions, the second for decisions to begin investments, and the last for financing and capital structure decisions. The 1%, 5%, and 10% statistical significance levels were used for the regression tests of the dependent and independent variables carried out using the Gretl tool.

The study used the assumptions of the regression model with the aim of validating the classic linear model of OLS and the statistical basis of the observed population, considering a 5% level of statistical significance.

The tests of adherence to the normal distribution were satisfied for the cancellation of investments and fundraising samples. The heteroscedasticity tests, in turn, were run using the White test, in which the residuals were revealed to be homoscedastic for all the samples observed. Regarding the multicollinearity tests, no variance inflation factors (VIF) greater than 10 were found for the variables chosen, which indicates the inexistence of collinearity.

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Finally, the X variables were tested, seeking to verify if they were correlated. No correlation was found between these variables, as no statistical significance was identified in the cancellation of investments, starting investments, and fundraising samples.

Despite the test of adherence to the normal distribution presenting 5% statistical significance for the starting investments sample, which indicates an abnormal distribution, the heteroscedasticity test of this population showed statistical insignificance, demonstrating that the residuals are homoscedastic. Therefore, this sample fulfills the statistical requirements of the model.

Thus, all the models fulfilled the requirements of parameter linearity, random sampling, and no collinearity problem hypotheses.

RESULTS ANALYSIS

Sociodemographic profile of the population

The sociodemographic analyses identified the personal and professional characteristics of the population, as well as captured information on the companies in which the respondents work. The results for the sociodemographic profiles found are presented in Table 3:

Table 3

Characterization of the samples

Profile	Sample	%/No.	Profile	Sample	%/No.
Gender	Male	71% (85)	Origin of capital	Brazil	71% (85)
	Female	28% (34)		United States	11% (13)
	I prefer not to say	1% (1)		Others	18% (22)
Age	Maximum	72	Company age	More than 15 years old	63% (76)
	Minimum	25		From 5 to 15 years old	23% (27)
	Mean	45		Less than 5 years old	14% (17)
Position	Board member	37% (44)	Sectors	Services	39% (47)
	Manager	21% (25)		Industry	21% (25)
	Coordinator or supervisor	22% (26)		Financial	17% (20)
	Others	21% (25)		Others	23% (28)

(continues)

Table 3 (conclusion)

Characterization of the samples

Profile	Sample	%/No.	Profile	Sample	%/No.
Area they work in	Financial	42% (50)	Size of the company	Large	33% (40)
	Controlling	28% (33)		Medium-large	12% (14)
	Administrative	6% (7)		Medium	24% (29)
	Others	25% (30)		Small	31% (37)

Source: Elaborated by the authors.

Analysis of the use of bias in investment decisions

The study investigated the use of bias in investment decisions when there was a cancellation, postponement, and start of projects. The hypotheses raised sought to illustrate the use of bias when internal agents did not use economic viability analysis and external information to evaluate these projects (H1). They also sought to infer the influence of the respondents' position and company size on company decisions (H2).

Table 4 shows the result of the regression for the sample of respondents who chose investment cancellation or postponement decisions, which totaled 37 decisions. Despite the model using all the variables of the sociodemographic profile and personality traits, only the ones that presented a relationship with the dependent variable cancellation or postponement of investments bias (Canc_Invest_Bias) were presented. The OLS method showed robustness for both the heteroscedasticity and the multicollinearity analysis.

Table 4

OLS, using observations 1-120 (n = 37)

Dependent variable: Canc_ Invest_Bias					
	Coefficient	Standard error	t-ratio	p-value	
Const	8.7491	1.6478	5.3100	< 0.0001	***
Position occupied	-0.141506	0.0691	-2.048	0.0486	**
Agreeableness pers	-1.36374	0.5792	-2.354	0.0247	**
Extroversion pers	-1.65342	0.6719	-2.461	0.0193	**

Source: Elaborated by the authors.

p-value 1%***, 5%**, and 10%*.

The substantive analyses concerning the sample of investment cancellation or postponement decisions, which totaled 37 decisions, identified that 28 respondents (76%) did not use economic viability models or external information, indicating the use of bias in decision making. Following the methodology of probability of use of bias in investment decisions, the probable classification identified that 22% of the respondents made biased decisions, with representativeness, conception, and overconfidence standing out.

The findings are in line with the study of Bazerman (2004, as cited in Feitosa, 2010), which highlights the introduction of linear models and external information for reducing biases in decisions. The work of Rush and Melville (2014, p. 9), in turn, found evidence of the use of multifactor models with a reduction in bias in the empirical studies. Thus, the results found both in the statistical model and in the substantive analyses may reveal the use of bias in investment cancellation or postponement decisions in the first half of 2020, which corroborates H1. This could primarily be due to the effects of the Covid-19 pandemic, as, in this context, it is hard to make decisions, since the economic forecasts and information in this period are biased by others.

In addition, the results found in the OLS model of Table 4 identified that the independent variable position had a negative and 5% statistically significant correlation, thus rejecting H2, as the expectation was to find an influence of directors and managers on project cancellation and postponement decisions. It is suggested that the situation of uncertainty itself found in H1 is a determinant.

The independent variables regarding the personality traits that showed significance for the sample were agreeableness and extroversion. Both correlations were negative, which indicates that the investment cancellation and postponement decision preserved the company's cash flow in the moment of uncertainty. It is worth highlighting that the extroverted personality trait may swing toward the use of overconfidence bias, according to the findings of Anderson et al. (2011).

Table 5 shows the result of the regression for the sample that considered the respondents who made decisions on beginning investments (Beg_Invest_Bias) in the first half of 2020, which totaled 47 decisions. The OLS method showed robustness for the heteroscedasticity and multicollinearity analyses. However, the Chi-squared test presented significance, which resulted in the rejection of the null hypothesis, indicating a normal distribution. Nonetheless, due to the robustness of the regression assumption tests, the model using OLS was not rejected for this sample.

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Table 5

OLS, using observations 1-120 (n = 47)

Dependent variable: Beg_Invest_Bias					
	Coefficient	Standard error	t-ratio	p-value	
Const	1.4218	0.6448	2.2050	0.0330	**
Company size	0.1748	0.1134	1.5410	0.1308	
Position	-0.04390	0.0289	-1.518	0.1365	
Conscientiousness	-0.50637	0.2977	-1.701	0.0963	*
Extroversion	0.4815	0.2773	1.7360	0.0898	*

Source: Elaborated by the authors.

p-value 1%***, 5%**, and 10%*.

The results found in the OLS model in Table 5 identified that the independent variables position and company size did not present a statistically significant correlation at the 5% level, which, again, resulted in the rejection of H2 for decisions on beginning projects. However, the extroverted personality trait variable showed statistical significance at the 10% level, confirming H5, which predicted a positive correlation with the bold trait, expressed by overconfidence, in internal agents who started projects in the pandemic period, in line with the findings of Anderson et al. (2011).

The dispersion between the extroverted and conscientious personality traits demonstrates that the decisions on starting new projects were bold for the period, as conscientiousness, which represents self-controlled decisions, presented a negative correlation with decisions to start projects in this period of uncertainty.

The substantive analyses concerning the sample identified that 25 respondents (53%) did not use economic viability models or external information, providing evidence of the use of bias in their decisions. The biases with the greatest representativeness in the decisions to start a project were regret avoidance, conception, and overconfidence.

Leone and Guimarães (2013) identified that, when adjusted using the behavioral finance assumptions, economic viability models can contribute to a reduction in bias in investment analyses. Bazerman (2004, as cited in Feitosa, 2010) identified that introducing linear models and external information in the models contributed to a reduction in biases in decisions. Therefore, the findings may provide evidence of the use of bias in decisions to start investments, in accordance with H1, when there are biased judgements.

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Analysis of the use of bias in financing and capital structure decisions

The study also investigated the use of bias in financing decisions (Finan_ Bias), especially when there were changes in capital structure, fundraising, and the renovation of new lines of financing with the aim of increasing company liquidity. The hypotheses raised sought to make inferences regarding the use of bias when there was a correlation in pecking order and the respondent presented characteristics of representativeness and anchoring biases (H3). In addition, the risk-averse personality trait is expected to present a correlation with financing and capital structure decisions to preserve company cash flow, in accordance with H4.

Table 6 shows the result of the regression for the sample that considered the respondents who made financing and capital structure decisions in the first half of 2020, which totaled 22 decisions.

Table 6

OLS, using observations 1-120 (n = 22)

Dependent variable: Finan_Bias					
	Coefficient	Standard error	t-ratio	p-value	
Const	0.8484	0.9255	0.9167	0.3748	
Company size	-0.207842	0.1216	-1.709	0.1095	
Position occupied	-0.0688064	0.0380	-1.812	0.0915	*
Openness/intellect pers	-0.715967	0.3987	-1.796	0.0941	*
Conscientiousness pers	-1.01950	0.3920	-2.601	0.0210	**
Target	0.6577	0.3387	1.9420	0.0726	*
Need for fundraising	1.2863	0.2989	4.3040	0.0007	***
Pronampe	0.7594	0.4026	1.8860	0.0802	*

Source: Elaborated by the authors.

p-value 1%***, 5%**, and 10%*.

The results found in the OLS model identified that the independent variable position had a 10% statistically significant and negative correlation, a result that, again, rejects H2, as the expectation was to find an influence of directors and managers on the fundraising and financing decisions of these

companies. The variables relating to the openness and conscientiousness personality traits showed statistical significance, however, both were negative, which rejects H4, as these traits represent prudence in decisions to preserve cash flow. Regarding the pecking order independent variables, the model identified statistical significance for the capital structure target, need for working capital, and Pronampe variables. It is worth highlighting that the Pronampe variable derives from financing subsidized by the Brazilian government for small and medium-sized companies, which resulted in statistical significance, showing the leverage risk of these companies in the period studied.

The substantive analyses concerning the sample identified that 21 respondents (48%) did not use economic viability models or external information, which indicated the use of bias in decision making, even in the stressful economic environment. According to the methodology of probability of use of bias in financing decisions, it was identified that 12% of the respondents made biased decisions according to the probable classification, highlighting representativeness, conception, and overconfidence. Regarding the pecking order, 22 respondents (51%) stated a preference for the use of internal resources before seeking external financing. And when there is a need for external resources, 49% of the respondents respect a pecking order, in accordance with H3 (positive correlation between the fundraising pecking order and managers' decisions) and the findings of Barberis and Thaler (2003).

According to Ramiah et al. (2015), financing decisions that are not based on information available to the market or on economic models can be categorized as irrational or behavioral decisions. Assunção (2017) identified that the use of information or own knowledge of the effects of biases helps to reduce this cognitive error. The findings both in the statistical model and in the substantive analyses may reveal the use of bias in financing and capital structure decisions, thus corroborating H1 and H3.

CONCLUSION

The study highlighted the effects of biases on investment, financing, and pecking order decisions from the perspective of behavioral finance. It also focused on behavioral finance, Prospect Theory, and the Big Five Theory, with the aim of explaining the consequences of emotions implicit in company decisions and the impacts on organizations.

The findings in this study made it evident that the Covid-19 pandemic and its consequent uncertainties regarding the future have led to biased decisions by the managers of Brazilian companies. Thus, this study clarified for readers the influence of emotions on decisions, as well as alerting them to the "traps" of the cognitive system, which impacts on professional and personal decisions.

For example, the representativeness heuristic, as shown in the study, has caused mistaken decisions due to the experiences acquired by managers in crises prior to Covid-19. These cannot be employed as a parameter for decision-making in the current context, as the Covid-19 pandemic differs from all previous crises. The anchoring heuristic, in turn, has influenced decision-making given that the initial bases used by managers have not considered all the adjustments originating from restrictions on people transit, imposed by the authorities, and the recovery of the Brazilian economy.

The role of the overconfidence heuristic stood out from the rest, in accordance with the statistical results found in this study, as it influenced the choices of managers to start projects and raise new funds. These decisions in combination with the use of overconfidence can lead to an increase in financial leverage and investment with a loss of value.

With regard to Prospect Theory, the study demonstrated that the decrease in sales and profitability of companies have led to bold behaviors in a search to recover them.

The empirical evidence presented here and the impacts of the Covid-19 pandemic have influenced the companies' decisions. This study demonstrated the impacts of biases and personality traits on financing, investment, and capital structure decisions, especially for irrational decisions by managers who present a bold profile for negotiations.

The methodological model introduced in this research not only provided the study with viability, but also the bias measurement approach using questions and key combinations enabled the identification of biased decisions.

This study extends the research on behavioral finance by investigating the impacts of emotions on investment, financing, and capital structure policies, especially in times of crisis. It also provides contributions for accounting, finance, and economics practitioners in terms of protecting against emotional effects on daily decisions.

This study is limited to an environment of uncertainty and emotional instabilities, therefore, we suggest applying this approach to a sample at a time of economic expansion.

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