From Consumption Anchoring To Markets Volatility: Evidence, Trends, And Impact Of Recent Research On Behavioral Economics

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Abstract:
This article presents a bibliometric analysis of the specialized literature in behavioral economics from 2010-2022. The objective is to explore the evolutionary nuances of the field through gathering insights on emerging areas in this field. The analysis is based on a set of 1,061 documents from Scopus and Web of Science (WoS), including a zero-inflated negative binomial (ZINB) regression model to analyze factors associated with citation count. In addition, a selection of the 20 most cited articles allowed for a more in-depth bibliographic analysis. The main results of the ZINB model showed that article age, number of authors, JEL classification, and language can have notable impacts on publication citations. The bibliometric analysis also provided an overview of publication and citation trends, the most productive and impactful authors, and the identification of four dominant thematic research axes in behavioral economics. It was also possible to identify current themes related to behavioral research, as well as the role of a set of individual characteristics, norms, values, and emotions in economic decision-making, risks, and preferences.

Keywords: *Behavioral Economics, Bibliometric Analysis, Citation Analysis.*

I. Introduction

Over the course of the previous two decades (2000-2010), economic science has undergone a paradigm shift toward an alternative behavioral perspective (Blanco; Engelmann; Normann, 2011), which earned two Nobel Prizes in Economics within a five-year span (Daniel Kahneman and Richard Thaler). This alternative view encompasses a series of contributions, ranging from Simon (1957) and the notable psychological aspects with Tversky and Kahneman (1974), to more recent advances in the specialized empirical literature (Heukelom, 2007; Sbicca, 2014).

In recent years, researchers have explored why economic decisions may diverge from traditional rationality, resulting in economic and welfare losses. Studies highlight the impact of past information on decision-making, even when agents do not fully understand economic laws, and emphasize concepts such as adaptive learning and bounded rationality (Kahneman, 2003; Hommes, 2011; Dolan et al., 2012). Moreover, inequality aversion, which suggests that decisions may be influenced by concerns over the distribution of gains, and factors such as emotional drivers, social norms, and intertemporal inconsistencies are also crucial in the analysis of economic behavior (Bolton, 1991; Fehr; Schmidt, 1999; Charness; Rabin, 2002; Da; Engelberg; Gao, 2014). The influence of individual characteristics such as gender, age, and income, as well as collective factors like norms and institutions, reinforces the need for a comprehensive theoretical model that accounts for the heterogeneity of economic decisions (McFerran et al., 2010; Falk et al., 2018; Ali; Alam; Rizvi, 2020).

In this context, this paper highlights the trends in the behavioral economics literature over the past twenty years, pointing out prominent research themes, perspectives, and gaps in recent scientific production. The methodology employed combines a mixed approach, using a bibliometric review to analyze the determinants of citation counts, complemented by a literature review. The bibliometric analysis, which includes the identification of trends and thematic mapping, provides essential support to the bibliographic review. Bibliometric analysis is one of the most suitable and sophisticated literature review methods (Kumar et al., 2021) and, in addition to allowing the manipulation of large datasets (big data), it enables the evaluation of the most relevant research topics, gaps, trends, and impacts related to the scientific field, researchers, and institutions (Aria; Cuccurullo, 2017; Verma; Gustafsson, 2020).

This paper is structured into four sections in addition to this brief introduction. The second section provides a literature review on behavioral economics. The third section describes the methodological aspects. The fourth section analyzes and discusses the results by examining the main research topics related to behavioral

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economics, as well as the most relevant authors, institutions, and keyword network mapping. Also in the fourth section, ZIBN regression models are estimated and analyzed for citation counts based on article attributes. Complementing this analysis, the research questions, results, and conclusions of the 20 most cited articles are discussed. The fifth and final section presents the concluding remarks.

II. Challenging Orthodoxy: A Critical Analysis of Neoclassical Economics in Light of Behavioral Economics

Behavioral economics emerges as a distinction from neoclassical economics in an attempt to overcome the unrealistic postulates based on little or almost no empirical evidence. Among a series of issues related to these postulates that differentiate behavioral and neoclassical economics, one can highlight the fact that the latter assumes a set of axiomatic laws without subjecting them to empirical investigation. Most likely, this also implies the absence of analysis regarding whether individuals who conduct their actions in a direction contrary to axiomatic rationality face significant economic or welfare losses (Berg; Gigerenzer, 2010).

Although neoclassical economists promote the promise of empirical realism, their analyses often rely on the assumptions of Friedman's "as-if" doctrine, as highlighted by Berg and Gigerenzer (2010). An example is the proposal to broaden the notion of utility to include psychic costs and benefits, suggesting that elements such as mood can influence liquidity preferences and decisions between consumption and savings. Another example is risk aversion, with Bernoulli's expected utility theory, which has limitations due to the restricted availability of information, and the corrections for these flaws were more statistical than theoretical (Kahneman, 2003).

The inequality aversion hypothesis (Fehr; Schmidt, 1999) suggests that social norms and preferences influence decisions, with individual utility being affected by the returns of others. The model by Bolton (1991), Fehr and Schmidt (1999), and Bolton and Ockenfels (2000) empirically demonstrates that decisions take into account the benefits and costs of being ahead of others and one's own payoffs. However, the model presents many free parameters, arbitrarily adjusted, and behavioral economics needs to innovate to test predictions without parametric adjustments (Bolton; Ockenfels, 2000).

Behavioral economics highlights temporal inconsistency in Laibson's (1997) hyperbolic discounting model, which prioritizes the present over the future in consumption decisions, while O'Donoghue and Rabin (2006) emphasize the impact of prices and financial incentives, criticized by Tversky and Kahneman for ignoring emotional factors. While behavioral economics expands neoclassical theory by incorporating psychological parameters into the utility function, it faces empirical verification challenges, especially regarding psychological processes. Additionally, the notion of universal commensurability, as discussed by Berg and Gigerenzer (2010), is problematic as it assumes that all preferences can be compared and ordered, which is unrealistic in many cases, challenging predictions based on fixed parameters (Hommes, 2011; Blanco; Engelmann; Normann, 2011).

Thus, there is a division between neoclassical economists who see behavioral economics as descriptive, documenting deviations from axiomatic behavior, and those who adopt a normative view, advocating the incorporation of behavioral concepts to prescribe policies without modifying neoclassical foundations. However, the pursuit of more realistic models still relies on adjustments of psychological parameters, often ignoring individual behavior in favor of the collective. Empirical investigation tends to document deviations from this normative model, with economic analysis based on inductive descriptions of human behavior (Berg; Gigerenzer, 2010).

Heukelom (2007) observes that behavioral economics alters and, at the same time, maintains the rational choice model at its core. This questioning of the retention of the rational model is especially analyzed by examining the work of behavioral economics pioneers, Kahneman and Tversky. First, what can be observed is the continued use of mathematics to understand human behavior. In contrast, no distinction was made between determining the rational solution in uncertain situations and the question of what a rational person would actually do in such situations. The mathematical solution, in many cases, diverges from the intuitive idea of a rational solution.

Actions are also shaped by the environment favorable to decision-making (Haroon; Rizvi, 2020; Ali; Alam; Rizvi, 2020; Ashraf, 2020). However, if preferences were stable (as given), environmental variables would play no role. Ecological rationality, in this aspect, avoids universal laws since decisions are adapted to the environment. Complementarily, there is little or almost no evidence that deviations from neoclassical axioms about rational behavior result in economic costs and losses. Thus, contemporary psychology uses the term heuristics to justify such "deviations" from neoclassical axioms, which may represent a shortcut to solving a complex problem. Ecological rationality, in this sense, argues that the function of heuristics is not limited to this shortcut, as greater effort may be exerted to achieve greater accuracy (accuracy-effort trade-off).

As expected, Berg and Gigerenzer (2010) conclude that there is a generalized similarity between neoclassical and behavioral research programs regarding how these fields view economic science as an empirical science. In this sense, there are common limitations concerning the history and advances achieved by these two perspectives, both in terms of predictive accuracy and the descriptive realism of the models. Consequently,

behavioral economics does not bring a paradigm shift in the sense of improving the predictive part and the explanatory power of economic models based on psychology, such as rationality, utility, etc. It is possible to observe that this paradigm shift has not occurred, as many of the mainstream assumptions remain on the research agenda, as can be seen through hypothesis formulations based on mathematical models, methodological individualism, among other aspects.

On the other hand, as one observes, on the one hand, the influence of aspects related to perception, cognition, intuition, and emotional aspects in general, and on the other, the decision-making process of economic agents, especially in more formal models, substantial advances are expected to be hindered by a certain degree of difficulty (Kahneman, 2003). These difficulties may result from the multidimensional heterogeneity constituted by a multiplicity of motivational aspects and purely economic or contextual incentives (Blanco; Engelmann; Normann, 2011), often treated in isolation in case studies, whose various results can only be discussed collectively in review studies like this one.

III.   Data and Methods

This article was conducted in four stages: 1) definition of the research question, 2) data collection, 3) bibliometric analysis (performance and mapping), and 4) literature review. In the first stage, the following research question was defined: What are the trends in the literature on behavioral economics over the last twenty years? This question was crucial for selecting the terms that would be used in the next stage, the data collection, namely: behavioral economics, behavioral finance, rationality, heuristic, anchoring, limits to rationality, Simon, Thaler, Kahneman, Tversky, and prospect theory. The preference for words and terms in English stemmed from the fact that the most widely disseminated scientific output is concentrated in this language. However, results were allowed to be obtained in English, Portuguese, and Spanish.

Searches were conducted in the Scopus[1] and WoS[2] databases between December 17 and 28, 2022, limiting the results to the period from 2010 to 2022. In this stage, the aim was to make the search mechanism as consistent as possible between the two databases, as well as the sequence of characters (strings). In Scopus, the search yielded a set of 566 documents, while in WoS it resulted in 5,263 documents. In WoS, however, a file containing the 500 most cited papers was generated to obtain a more representative sample of the platform. Thus, a total of 1,066 documents were obtained from both databases, which, after excluding 5 duplicate articles, resulted in a final total of 1,061 documents.

Performance refers to a survey capable of identifying the most relevant authors, volume of published articles, citations, institutions, and research areas in evidence (Aria & Cuccurullo, 2017). Like other bibliometric analysis studies (Valtakoski, 2020; Baker, Kumar, & Pandey, 2020; Kumar et al., 2022a; Kumar et al., 2022b), this stage included a regression model to analyze the determinants of the number of citations of the articles. For this procedure, the ZIBN model was used, as the number of citations (dependent variable) is an overdispersed count variable with the inclusion of zeros (Baker, Kumar, & Pandey, 2020; Kumar et al., 2022b). The ZIBN

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[1] Scopus: (ABS (behavioral AND economics) OR TITLE-ABS-KEY (behavioral AND finance) OR ALL (rationality) OR ABS (heuristic) OR ABS (anchoring) OR ALL (limits AND to AND rationality) OR REF (simon) AND REF (thaler) AND REF (kahneman) AND REF (tversky) AND ALL (prospect AND theory)) AND (LIMIT-TO (PUBYEAR , 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015) OR LIMIT-TO (PUBYEAR , 2014)) AND (LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "DECI")) AND (LIMIT-TO (EXACTKEYWORD , "Decision Making") OR LIMIT-TO (EXACTKEYWORD , "Behavioral Economics") OR LIMIT-TO (EXACTKEYWORD , "Prospect Theory") OR LIMIT-TO (EXACTKEYWORD , "Economics") OR LIMIT-TO (EXACTKEYWORD , "Behavioral Finance") OR LIMIT-TO (EXACTKEYWORD , "Loss Aversion") OR LIMIT-TO (EXACTKEYWORD , "Behavioral Research")) AND (LIMIT-TO (DOCTYPE , "ar")).

[2] WoS: behavioral economics (Todos os campos) or behavioral finance (Todos os campos) or rationality (Todos os campos) or heuristic (Todos os campos) or anchoring (Todos os campos) and Economics or Sociology or Political Science or Public Administration or Psychology Experimental or Psychology Social or Psychology or Psychology Applied or Behavioral Sciences or Social Sciences Interdisciplinary or Psychology Multidisciplinary or Neurosciences or Psychology Developmental or Business Finance or Business or Social Issues or Development Studies (Categorias da Web of Science) and Economics or Business or Business Finance or Management or Sociology or Behavioral Sciences or Psychology Experimental or Social Sciences Interdisciplinary or Psychology Multidisciplinary or Neurosciences (Categorias da Web of Science) and Artigo (Tipos de documento) and 6.10 Economics or 6.122 Economic Theory or 6.73 Social Psychology (Citation Topics Meso) and Artigo (Tipos de documento) and Artigo or Acesso antecipado or Artigo de conferência or Capítulos de livros or Retratação de publicação (Tipos de documento) and Economics or Business Finance or Business (Categorias da Web of Science) and English or Spanish or Portuguese (Idiomas) and 2018 or 2017 or 2023 or 2022 or 2021 or 2020 or 2019 (Anos da publicação) and Artigo (Tipos de documento) and Economics or Business Finance or Business or Psychology Applied (Categorias da Web of Science).

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model is appropriate in this case since the response variable, the number of citations, shows dispersion and many zeros, ranging from 0 to 1,085 (Valtakoski, 2020).

Mapping, in turn, allows the creation of conceptual maps involving the relationship between keywords, between authors, institutions, and countries, and also visually represents clusters related to scientific collaboration networks (Aria & Cuccurullo, 2017).

In the fourth and final stage, building upon the previous stage where it was possible to identify the 20 most cited articles, a more detailed bibliographic analysis was conducted. This procedure allowed for the discussion of results, research questions, and conclusions with the greatest impact on the literature on behavioral economics. At this stage, only studies with relevant results and empirical consistency were used, excluding review articles and those with little relevance to the theme of behavioral economics. To achieve this, a thorough analysis of the abstracts was carried out using the most cited articles through the bibliometrix package.

IV. Results and Discussions

Performance analysis

The performance analysis, of a descriptive nature, assesses the contributions to research in behavioral economics, based on a database of 1,061 documents, including articles, book chapters, and conference papers (Aria; Cuccurullo, 2017; Kumar et al., 2021). Although much of this output is associated with a collaboration network, particularly between the USA and other parts of the world, Table 1 also shows a predominance of articles authored by researchers from U.S. institutions. Among these institutions are Harvard University, Chicago, Berkeley, and Yale. Harvard (20.4%), Chicago (18.8%), and Berkeley (10.8%), for example, collectively account for around 50% of the authors of the most cited works on behavioral economics
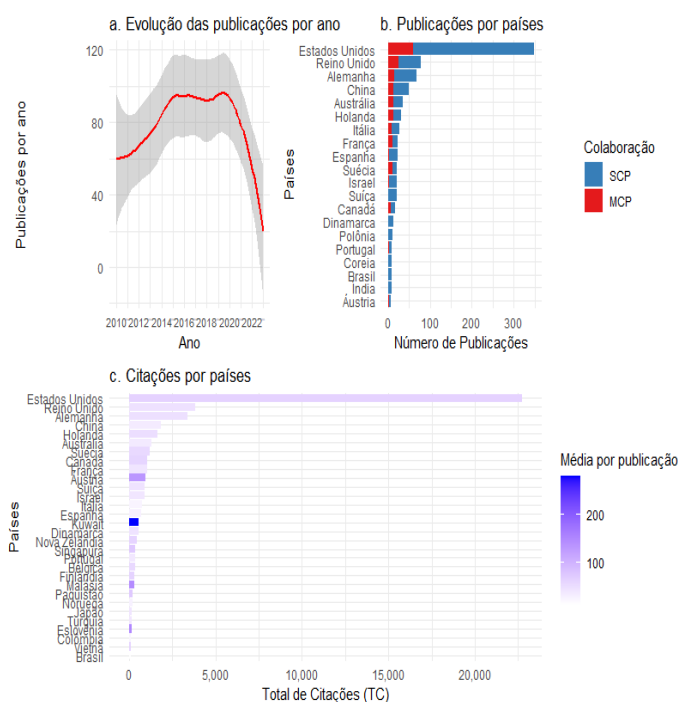
Table 1 – Publications on behavioral economics by authors' affiliation, 2000-2022.

Institution	Publications		
	Nº	%	Accumulates (%)
Harvard Univ	49	20.4	20.4
Univ Chicago	45	18.8	39.2
Univ Calif Berkeley	26	10.8	**50.0**
Yale Univ	22	9.2	59.2
London Sch Econ	17	7.1	66.3
Princeton Univ	17	7.1	73.3
Univ Calif San Diego	17	7.1	80,4
Univ Penn	17	7.1	87.5
Cornell Univ	15	6.3	93,8
Univ Calif Los Angeles	15	6.3	100.0
Total	240	100.0	-

Source: Scopus and Web of Science databases.

This same pattern of the United States' relevance in publications on behavioral economics, regarding author affiliations and the sources where the articles are published, is reflected in the significant participation of U.S. institutions and journals. This is also evident in the number of publications and citations throughout the period. Figure 1 shows that the field has grown significantly since 2014, driven by the recognition of pioneers with the Nobel Prize in 2002 and 2017 (Garcia-Marques; Ferreira, 2014; Klagenberg, 2019). Scientific collaboration involves more than 2,700 researchers from various countries, with a prominent presence from the U.S., United Kingdom, Germany, and China. U.S. authors stand out in terms of citation numbers, although those from Spain, Austria, and Malaysia have the highest average number of citations per article.

Figure 1 – Publications on behavioral economic by number of ducuments, 2000-2022.

Source: Scopus and Web of Science databases.

As observed in Figure 2, the number of citations (a) has been declining since 2010, but it has also shown growth in recent years. This increase in citations of articles on behavioral economics is clearly linked to the awarding of one of its early disciples, Richard Thaler, in 2017 (Klagenberg, 2019). Regarding the sources, Figure 2 also highlights a significant participation of journals belonging to U.S. publishers (b). The journals J Behav Exp Financ, Annu Rev Psychol, J Financ, and Rev Financ Stud are published by U.S.-based publishers (Elsevier, Annual Reviews, Wiley-Blackwell, and Oxford University Press). Many scientific journals are published by international publishers and are not directly associated with any specific country.

Figure 2 - Publications on behavioral economics by number of citations, 2000-2022.
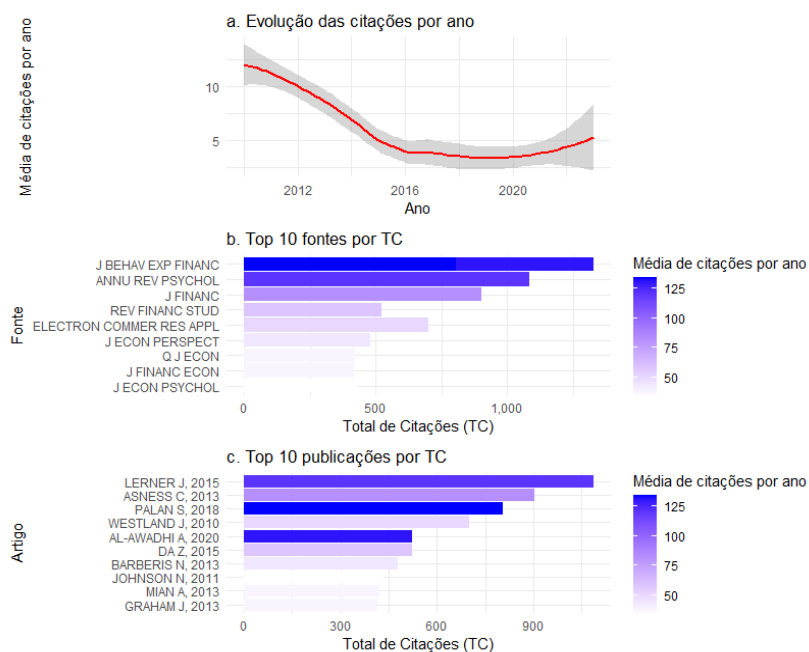
Source: Scopus and Web of Science databases.

Instead, these journals publish articles from researchers from different countries around the world and are widely recognized in their respective research fields. The Journal of Behavioral and Experimental Finance, for example, publishes research in behavioral finance, while the Annual Review of Psychology publishes annual reviews of research in psychology. The Journal of Finance and the Review of Financial Studies publish research in finance in general.

Regarding the most cited authors (c), Lerner (2015) ranks first, followed by Asness (2013) and Palan (2018). These articles are also among those with the highest average annual citations. Another author worth mentioning is Al-Awadhi (2020), who, despite being relatively recent compared to the others, has one of the highest averages of citations per year.

Factors associated with the number of citations

The impact of a paper can be measured by the number of times it is cited, that is, the number of citations (Donthu et al., 2021). This analysis is relevant as it allows us to explore the factors that may influence the impact of articles in the field of Behavioral Economics. Following recent studies (Kumar et al., 2022a; Kumar et al., 2022b), this work estimates the coefficients (β), incidence rate ratios (IRR), and confidence intervals (95% CI) of the ZIBN model. This model provides estimates related to both a count model without zero inflation and a zero-inflated model (ZIM).

In addition to the variables identified in the literature as important for explaining the number of citations of documents (article age, number of authors, number of words in the abstract and title, and country of the lead author) (Kumar et al., 2022b), the results presented in Table 2 highlight the relevance of other variables, such as language and JEL classification.

Table 2 - Estimates of the ZIBN Regression Model for the number of citations according to the selected variables.

	Dependent Variable: Number of citations						
	zero-inflated count data						
	count model				*ZIM*		
Variable	**β**	**IRR**	**IC 95%**		**B**	**IRR**	**IC 95%**
Age	**1.297*****	**3.658**	(1.18 to 1.41)		**-3.628*****	**0.027**	(-4.82 to -2.44)
of the article	(0.059)				(0.609)		
Number of authors	**0.085*****	**1.089**	(0.03 to 0.14)		-0.056	0.946	(-0.45 to 0.34)
	(0.029)				(0.203)		
Number of words in the title	**-0.019*****	**0.981**	(-0.03 to -0.01)		-0.061	0.941	(-0.18 to 0.06)
	(0.007)				(0.062)		
Number of words in the abstract	**-0.003*****	**0.997**	(0.0 to 0.0)		-0.002	0.998	(-0.01 to 0.01)
	(0.001)				(0.005)		
JEL Classification							
Without (ref.)							
With	**0.132****	**1.141**	(0 to 0.26)		0.045	1.046	(-1.22 to 1.31)
	(0.066)				(0.646)		
Thematic Axis							
(a) Information, Incentives, and Uncertainties (ref.)							
(b) Decision-Making Models					-1.411	0.244	(-4.13 to 1.3)
					(1.385)		
(c) Market, Return, and Investment					-0.052	0.949	(-2.57 to 2.47)
					(1.285)		
(d) Individual Aspects of Choices					-1.386	0.250	(-4.54 to 1.76)
					(1.607)		

Continues...

Variable	Dependent Variable: Number of citations						
	zero-inflated count data						
	count model				ZIM		
	β	IRR	IC 95%		B	IRR	IC 95%
Country of the 1st author							
Outher (ref.)							
USA	**-0.186****	**0.830**	(-0.35 to -0.02)		-0.134	0.875	(-1.47 to 1.2)
	(0,083)				(0.681)		
Europe	**-0.224*****	**0.799**	(-0.38 to -0.07)		0.136	1.146	(-1.02 to 1.29)
	(0,078)				(0.590)		
Language							
Outher (ref.)							
English	**1.971*****	**7.178**	(1.44 to 2.5)		0.037	1.038	(-5.73 to 5.8)
	(0.269)				(2.943)		
Control	**0.0005*****	**1.000**	(0.0 to 0.0)		**-0.001*****	**0.999**	(-0.001 to 0)
(q_age)	(0.00001)				(0.000)		
Constant	-0.269				2.513		
	(0.325)				(3.527)		
Observations	1,038					1,038	
Log Likelihood		-4,540.82				-4,517.82	
theta	1,038					1,127	

Source: Scopus and Web of Science databases. Note: *p<0.1; **p<0.05; ***p<0.01.

The estimates related to age and number of authors are consistent with the literature. Thus, both the age and the number of authors of the article are associated with higher citations (Stremersch; Verniers; Verhoef, 2007; Donthu et al., 2021). Regarding the number of authors, the literature justifies that these results may indicate that more diverse and contemporary content is more present in bibliographies with co-authorships and, therefore, is more likely to be cited due to the ability of this content to attract a greater number of readers (Kumar et al., 2022b).

The factors related to the presentation of the article also showed statistically significant coefficients. For the title length (number of words), the negative coefficient indicates an inverse relationship between the number of words and citations, meaning that articles with shorter titles tend to have a greater impact on average. The same trend is observed for the length of the abstract; thus, the more words an abstract contains, the fewer citations it is expected to receive.

The variable related to the thematic axis of the article did not show significance, indicating that the differences in citations among subtopics are not statistically significant. Regarding affiliation, the affiliation of the first author in the USA or Europe is a significant predictor of citations, but with negative coefficients, indicating lower citation rates compared to other regions.

On the other hand, the regression results indicate that articles published in English tend to receive more citations compared to those in other languages. Additionally, the JEL classification is another important element of document presentation, as it consists of a system created by the American Economic Association (AEA) to classify articles, books, theses, and working papers, enabling more practical searches on specific topics using JEL codes. Thus, the coefficient estimated in the ZIBN regression for this variable shows that articles with JEL codes have an advantage over others, being more likely to be cited.

Scientific mapping

Scientific mapping examines the relationships between citations, authors, keywords, countries, and institutions (Aria; Cuccurullo, 2017; Kumar et al., 2021). Aiming to identify trends and perspectives in behavioral economics, we analyze the interrelations between the keywords of the documents. Using the technique of bibliographic coupling, we conduct scientific mapping based on the assumption that publications with common references are similar in content, forming thematic clusters (Kessler, 1963; Gureyev; Mazov, 2022). Bibliographic coupling reveals a wide range of themes and their recent developments (Kumar et al., 2021).

Studies can also be classified into a network according to co-occurrences, with a higher volume of publications using the keywords decision making, economic, risk, information, behavioral economics, behavioral

research, model, male, humans, behavior, and choice, as shown in Figure 3. Thus, the studies are connected as they constitute the reference list of another publication (Kumar et al., 2021).

Figure 3 - Publications in behavioral economics by keyword co-occurrence, 2000-2022.
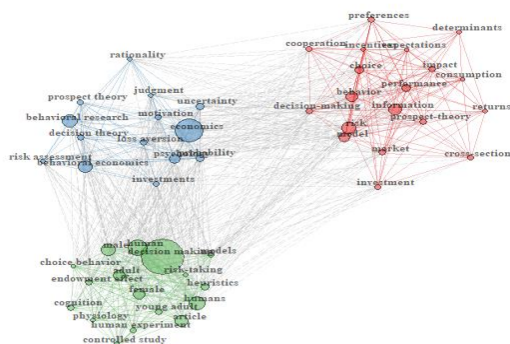
Source: Scopus and Web of Science databases.

The colors in Figure 4 correspond to the highlighted research themes presented in the form of a dendrogram, emphasizing: a) information, incentives, and uncertainties (purple); b) decision-making models (green); c) market, return, and investment (orange); and d) behavioral and economic issues in a broader sense (blue). It is also possible to observe a set of publications on individual aspects of choices (red). Furthermore, current themes related to behavioral research were identified, as well as the role of a set of individual characteristics, norms, values, and emotions in economic decision-making, risks, and preferences.

Figure 4 - Groups of keywords in studies on behavioral economics, 2000-2022.
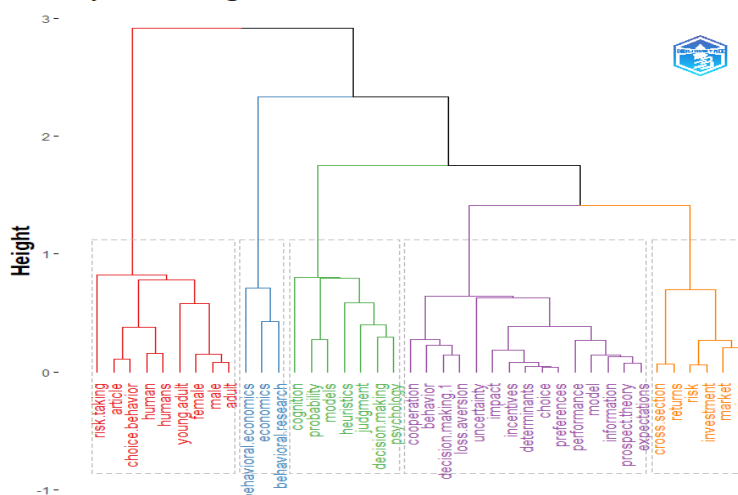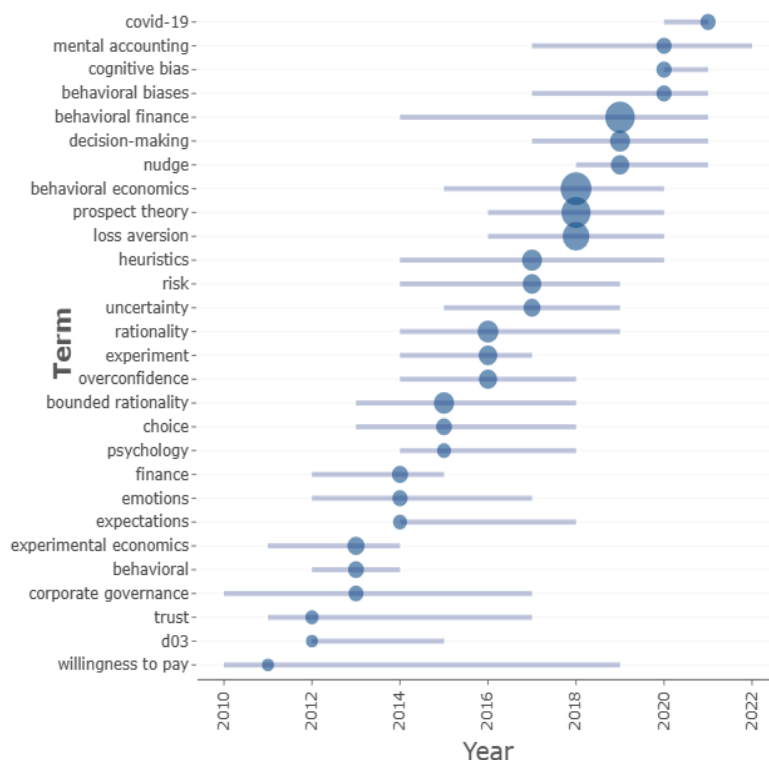

Source: Scopus and Web of Science databases.

The advantage of this technique is that it identifies the most influential publications while also highlighting those with some degree of reciprocity, which can support other types of analysis, such as explaining the patterns of citations and scientific production within these thematic groups. A limitation is that recent publications may be excluded from thematic groups due to their expected number of citations being lower than that of older publications (Kumar et al., 2021; Gureyev; Mazov, 2022). One way to overcome this limitation and identify recent trends is illustrated in Figure 5, which shows that more current studies have focused efforts on understanding behavioral economics in relation to certain aspects of the COVID-19 pandemic, cognitive biases, and behavioral biases.

Figure 5 - Annual trends in behavioral economics studies based on keyword usage, 2000-2022.

Source: Scopus and Web of Science databases.

Bibliographic analysis

The results of the bibliographic analysis allowed for the identification of a diverse set of evidence regarding behavioral economics and its various branches, divided into different thematic axes. In Table 3 below, the research questions, main findings, and conclusions of the 20 most cited studies on behavioral economics are presented. The empirical evidence compiles results ranging from food consumption associated with low self-esteem, anchored in the quantities consumed and the bodies of other consumers (McFerran et al., 2010), characteristics of CEOs (Chief Executive Officers) and the location of firms (Graham; Harvey; Puri, 2013; Mian; Rao; Sufi, 2013), to the influences of emotions (Da; Engelberg; Gao, 2014), information, and measures of social restrictions related to the COVID-19 pandemic (Haroon; Rizvi, 2020; Ali; Alam; Rizvi, 2020; Al-Awadhi et al., 2020).

Table 3 – Main findings in the literature on behavioral economics, 2000-2022.

Study	Question	Results	Conclusions
Asness, Moskwitz & Pedersen (2013)	What are the economic drivers of value and momentum premiums?	The returns of a series of assets are associated with the joint movement of value effect and momentum effect	It is possible to price a variety of assets through a single model that describes returns across asset classes
Al-Awadhi *et al.* (2020)	Do contagious infectious diseases affect stock market outcomes?	Stock market returns are negatively related to the number of COVID-19 infection cases and deaths	The effect was greater on publicly traded stocks in the international market than on stocks with limited access for foreign investors
Da, Engelberg & Gao (2014)	Can market-related sentiment (recession, unemployment, and bankruptcy) explain volatility?	The FEARS predict return reversals: although increases in FEARS correspond to low returns at the market level today, they forecast high returns (reversion) in the coming days	Emotions can influence attitudes to predict fluctuations in the stock market without altering outcomes, such as returns and volume
Johnson & Mislin (2011)	What is the effect of experimental protocols on the level of trust in games?	Subjects spend less in the trust game if they are paid randomly and if the counterpart is a simulated accomplice	Relatively small variations in the protocol can produce substantial changes in measured trust behavior

Mian, Rao & Sufi (2013)	Do families with different levels of wealth have different marginal propensities to consume?	Households that suffer greater wealth losses, particularly those with poorer and leveraged families	Debt and the geographical distribution of wealth shocks help explain the decline and inequality in consumption from 2006 to 2009
Graham, Harvey & Puri (2013)	To what extent do personality traits vary between American managers and non-American companies?	CEOs are more optimistic and risk-tolerant than the general population	These characteristics are related to CEO salaries
Falk *et al.* (2018)	Do preference indicators vary with individual characteristics?	Economic preferences of individuals vary according to age, gender, and cognitive ability	Variations in preferences can also be explained by economic outcomes and behaviors
Dolan *et al.* (2012)	What is the capacity of information, incentives, and the environment to influence human behavior?	A set of nine factors (information, incentives, norms, standards, salience, priming, affect, commitments, and ego) influences behavior automatically rather than deliberately	The environments in which people operate can have significant effects on behavior
Ali, Alam & Rizvi (2020)	What is the global reaction of financial markets in terms of decline and volatility when the epicenter of the Coronavirus shifted from China to Europe and then to the US?	Financial asset returns are negatively and significantly related to deaths from COVID-19	The panic situation contributed to unexpected levels of uncertainty and high volatility in financial markets
Lumpkin *et al.* (2011)	What is the dominant logic behind decisions and actions associated with family businesses?	Three mechanisms (representation, self-control, and anticipation) affect decisions involving rewards and outcomes occurring over time	Heuristic properties characterize the dominant logic in decisions made in family businesses
Rennekamp (2012)	Can more readable disclosures change investor behavior?	Investors receiving more readable disclosures revise their evaluation judgments	Agents are less extreme when they are informed about variations in the readability of assessments
Kaplanski & Levy (2010)	What is the effect of aviation disasters on stock prices?	A negative event has a significant effect, with an average market loss of over $60 billion per aviation disaster	Negative sentiment driven by bad mood and anxiety affects investment decisions
McFerran *et al.* (2010)	How does the body type of consumers affect the food consumption of other consumers?	Consumers anchor on the quantities of food selected by those around them	Consumers with low self-esteem are more likely to adopt anchoring
Huang, Teoh & Zhang (2014)	Do companies manage the tone of words in their earnings press releases?	Negative future cash flows and earnings are positively associated with upward perception management events	Companies with balance sheet constraints and older companies are more likely to employ tone management rather than accrual management
Hallsworth *et al.* (2017)	What is the effect of social norm messages on tax compliance?	The inclusion of social norms messages in reminder letters increases the payment of overdue taxes	Moral concerns can influence behavior in other policy areas
Ashraf (2020)	What is the impact of COVID-19-related actions on the stock market?	Advertisements for social distancing measures have a direct negative effect on stock market returns	Government advertisements about programs and policies result in positive market returns
Blanco, Engelmann & Normann (2011)	What motivates inequality aversion behavior?	The multiplicity of reasons for inequality aversion and individual characteristics gives rise to heterogeneity	Aversion to inequality has predictive power at the aggregate level but does not work as well at the individual level
Alm (2012)	How can behavior patterns help explain tax evasion?	Overestimation of audit rates leads to tax evasion	Tax evasion can be explained by behavioral economics
Haroon & Rizvi (2020)	Is there a relationship between the sentiment generated by news and market volatility?	Panic generated by news is associated with increased volatility in stock markets	Uncertainty in financial markets leads to greater price volatility
Hommes (2011)	How do individuals form expectations?	Different types of aggregated behaviors have been observed in different market settings	Expectations are heterogeneous

Source: Scopus and Web of Science databases.

The work of Asness, Moskowitz, and Pedersen (2013) identifies a return pattern for a series of assets. The authors show that the returns of a series of assets are associated with the joint movement of the value and momentum effects, which respectively describe the relationship between an asset's return and the ratio of its long-term value to its current market value (value effect) and the relationship between an asset's value return and its recent relative performance history (momentum effect). Thus, the study concludes that it is possible to price a variety of assets using a single model that describes returns across asset classes instead of specialized models for each market (Asness, Moskowitz, Pedersen, 2013).

Studies have also reinforced the importance of individual characteristics, firms, and their directors. Graham, Harvey, and Puri (2013) show that CEOs are significantly more optimistic and risk-tolerant than the average population, which can be explained by characteristics such as managerial optimism and risk aversion related to CEO behavior and corporate financial policies. Complementarily, Falk et al. (2018) indicate that individuals' economic preferences vary according to age, gender, and cognitive ability. These preferences can also vary with aggregate outcomes, ranging from per capita income levels to the type of business activity they are engaged in and the frequency with which they are exposed to armed conflicts (Falk et al., 2018). Mian, Rao, and Sufi (2013), from the same perspective, found that CEOs who experience greater wealth losses, particularly those from poorer and leveraged families, face a more significant reduction in credit limits, refinancing probability, and credit scores. Finally, Lumpkin et al. (2011) contribute to this body of research by observing that heuristic properties characterize the dominant logic in decisions made in family firms, which are developed through experience and corrected over time.

The role of information has also proven to be a crucial element in the field of behavioral economics. Rennekamp (2012) provides evidence that investors who receive more readable disclosures revise their evaluation judgments. Thus, agents are less extreme when informed about variations in the readability of assessments (Rennekamp, 2012). Huang, Teoh, and Zhang (2014) present results indicating that negative future earnings and cash flows are positively associated with upward perception management events rather than negative perception management information, particularly regarding stock option grants (Huang, Teoh, Zhang, 2014). Hallsworth et al. (2017) also highlight that including messages about social norms in reminder letters increases late tax payment rates. Alm (2012), in turn, emphasizes that the lack of accurate information also matters, as individuals' overestimations of audit rates lead them to commit tax evasion.

Another set of studies examined the relationship between COVID-19 and fluctuations in markets and bond prices. Ali, Alam, and Rizvi (2020) found that returns for most financial bonds were negatively related to COVID-19 deaths. Another study showed that announcements of social distancing measures have a direct negative effect on stock market returns (Ashraf, 2020). Al-Awadhi et al. (2020) observed that stock market returns were negatively related to the number of COVID-19 infection cases and deaths, especially concerning large-cap stocks. The authors also demonstrated that these negative effects were significantly greater in internationally traded stocks (in dollars) than in stocks with limited access for foreign investors (Al-Awadhi et al., 2020).

However, authors investigating the relationship between COVID-19 deaths or increased cases have not delved into understanding or even provided arguments about which mechanisms affected bond prices and market volatility, except for Haroon and Rizvi (2020) and Ali, Alam, and Rizvi (2020), who argue that a panic situation contributed to unexpected levels of uncertainty and high volatility in financial markets, leading to a rapid deterioration in markets. At least two possible pathways in this regard are suggested by prior evidence also covered in this review study (Kaplanski, Levy, 2010; Johnson, Mislin, 2011; Da, Engelberg, Gao, 2014). The first relates to a lack of confidence in markets and institutions, as Johnson and Mislin (2011) showed that subjects send less in the trust game if they are paid randomly and if the counterparty is a simulated accomplice. The second pathway relates to both strictly economic losses and concerns such as unemployment and bankruptcy (Da, Engelberg, Gao, 2014) and more emotionally related issues such as mental health (Kaplanski, Levy, 2010). In this sense, Da, Engelberg, and Gao (2014) observed that fears predict return reversals. However, increases in fears correspond to low returns at the market level today, and there is evidence of high returns (reversal) in the following days. Kaplanski and Levy (2010) complement these findings, showing that negative sentiment driven by bad mood and anxiety affects investment decisions and can therefore impact asset prices. The authors base this argument on results from a study showing that a negative event has a significant effect with an average market loss of over \$60 billion per aviation disaster (Kaplanski, Levy, 2010).

These aspects also relate to the study by Dolan et al. (2012), where results suggest that a set of nine factors (information, incentives, norms, standards, salience, priming, affect, commitments, and ego) influence our behavior automatically rather than deliberately. Among this set of factors, for example, McFerran et al. (2010) observed that self-esteem can be one of the predictors of food consumption. The authors noted that food consumption is associated with low self-esteem and is also anchored in the quantities consumed and the bodies of other consumers (McFerran et al., 2010).

Finally, two studies (Hommes, 2011; Blanco, Engelmann, Normann, 2011) concluded that their results can only be explained by a single model of heterogeneous expectations. Hommes (2011) notes that different types

of aggregate behavior were observed in different market configurations and pathway changes following negative expectation feedback. The results pointed out by Blanco, Engelmann, and Normann (2011) join this evidence by bringing a multiplicity of behavioral motives for aversion to inequality and the heterogeneity of individuals, leading to a multidimensional heterogeneity that is difficult to explain in a simple model. However, the authors observe that while aversion to inequality has predictive power at the aggregate level, it does not work as well at the individual level, and differences in expectations and risk attitudes seem to dominate the differences in concerns about equality, affecting individual behavior (Blanco, Engelmann, Normann, 2011).
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V.   Final Considerations

This work stands out in the literature as a review that comprises two interdependent parts: 1) trend and performance analysis through bibliometric analysis, and 2) a literature review that summarizes the main findings. The trends in behavioral economics studies show a predominance of authors and institutions from the USA, the UK, Germany, and China. A relevant question for research is how much investment in research explains these trends in the field of behavioral economics.

The mapping analyses revealed the occurrence of four relevant themes: a) information, incentives, and uncertainties; b) decision-making models; c) market, returns, and investment; and d) behavioral and economic issues in a broader sense. It was also possible to identify current themes related to behavioral research, as well as the role of a set of individual characteristics, norms, values, and emotions in economic decision-making, risks, and preferences.

Furthermore, the literature review emphasized the importance of individual aspects, as well as the role of information, incentives, emotions, norms, and values in decision-making. There has been a growing number of studies focusing on understanding how the decision-making process and the underlying outcomes are confirmed in situations of uncertainty, fear, insecurity, etc. This analysis even showed how the context of economic crisis, restriction measures, and the tension and fear caused by COVID-19 resulted in greater market volatility. However, research has made little progress in understanding how the fluctuation of emotions due to the announced disaster may have contributed to a change in agents' behavior. Instead, studies have favored economic aspects such as unemployment or restrictions on the operation of certain activities and sectors. Behavioral economics should advance in understanding the mechanisms that lead individuals to change their attitudes.

This study makes significant contributions to the literature, filling some gaps left by previous studies. First, because this article uses an innovative methodology that allows for the incorporation of a considerable volume of articles through bibliometric techniques involving performance analysis and mapping as support for a more detailed literature review. This methodology was able to identify, among other elements, research theme trends, main findings, and future research perspectives. In a scenario where scientific advancement is exponential, working with large volumes of data in review studies is an increasingly emerging necessity. Additionally, the bibliographic data used in this study are extracted from two databases (WoS and Scopus), which correspond to the largest directories of peer-reviewed literature and citations.

Moreover, the ZIBN regression model estimated here includes variables that have not yet been explored in the literature to explain the number of citations, such as the document's thematic axis and dummy variables for language and JEL classification. The results presented here are important for guiding research fields, potentially contributing to increasing the impact of publications and also to the development of underlying subthemes and emerging questions.

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