Investor relations: A bibliometric study in behavioral finance, behavioral economics and behavioral accounting

Relações com investidores: Um estudo bibliométrico em finanças comportamentais, economia comportamental e contabilidade comportamental

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Abstract: This study aims to map and characterize the scientific production on behavioral finance, behavioral economy and behavioral accounting, applied to the area of investor relations. Through a bibliometric research carried out in the Scopus database,

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121 publications were found, which were analyzed by statistical and graphic techniques. The results indicate a numerically reduced and volatile production of articles on the subject, without robust growth so far. Few documents were found by author, institution, and journal, as well as a small number of connections, concerning citations, among them. This research area is thus largely unexplored within behavioral finance, although academic production in behavioral economics on the use of prospects for selling complex products is proportionally very broad. Bibliographic coupling indicated four main themes, the most relevant being the influence of the different disclosure means of financial information on investor behavior. These results suggest that the subject has not aroused the interest of researchers and that, although relevant, it is still little explored. On the other hand, the results indicate a broad field for further studies. These findings are relevant, since they allow a clear and comprehensive view on research opportunities in a relevant and still little explored theme.

Keywords – Behavioral finance; Behavioral economy; Behavioral accounting; Investor Relations; Bibliometric analysis.

Resumo: Este estudo tem como objetivo mapear e caracterizar a produção científica em finanças comportamentais, economia comportamental e contabilidade comportamental, aplicadas à área de relações com investidores. Por meio de uma pesquisa bibliométrica, realizada na base Scopus, foram encontradas 121 publicações, que foram analisadas por técnicas estatísticas e gráficas. Os resultados indicam uma produção numericamente reduzida e volátil de artigos sobre o tema, sem crescimento robusto até o momento. Foram encontrados poucos documentos por autor, por instituição e por periódico, além de uma pequena quantidade de conexões, em termos de citações, entre estes. Essa área de pesquisa mostra-se, assim, praticamente inexplorada dentro das finanças comportamentais, embora a produção acadêmica em economia comportamental sobre o uso de prospectos para venda de produtos complexos seja proporcionalmente muito ampla. O acoplamento bibliográfico indicou quatro assuntos principais, sendo o mais relevante a influência dos diferentes meios de divulgação de informações financeiras sobre o comportamento dos investidores. Esses resultados sugerem que o assunto não tem despertado o interesse de pesquisadores e que, embora relevante, ainda é pouco explorado. Por outro lado, os resultados indicam um amplo campo para novos estudos. Tais achados mostram-se relevantes, já que permitem uma visão clara e abrangente sobre as oportunidades de pesquisa de uma temática relevante e ainda pouco explorada.

Palavras-chave – Finanças comportamentais; Economia comportamental; Contabilidade comportamental; Relações com investidores; Análise bibliométrica.

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Introduction

Behavioral finances emerged as an alternative to modern finance theory in an attempt to explain, more broadly, agents' decisions and behaviors. Simon (1955) presented the seminal ideas that would become this major area in finance. Further consolidation of concepts was made by Simon (1972) with the contributions from several major researchers. Advances in the next years were presented by Cyert and March (1963), Slovic (1972), and others contested the rationality of economic agents. According to Schinckus (2011), it was Shefrin and Statman (1984), and De Bondt and Thaler (1985) the first studies to describe empirically applications of behavioral finance. But it was only from the recognition of the studies by Kahneman and Tversky (1974; 1979) with the Nobel Prize that behavioral finance became popular and its findings reached major audiences. The ideas that started with Simon (1955), and grew with a more academic than popular attention by almost half a century, saw in the turn of the millennia an inflection and suddenly began to develop and gain prominence.

In their studies, Kahneman and Tversky (1974; 1979) demonstrated that economic agents do not always decide and act rationally, seeking to maximize their own well-being. Moreover, the willingness to take risks depends on the context or, more specifically, on how choice options are presented. Thus, the idea that agents are rational in financial decisions and other types of decisions has given way to the idea of limited rationality, in which failures in decision making are frequent and follow certain predefined patterns.

From then on, a way for a wide range of research was open, which started to link knowledge from various areas, such as economics, finance, psychology, neuroscience, among others. This field of study has become increasingly prominent, leading researchers such as Daniel Kahneman, Robert Shiller, and Richard Thaller to receive the Nobel Prize in Economics in 2002, 2013, and 2017, respectively. In addition, the number of studies on behavioral finance has been growing intensely in recent years, as can be seen in Figure 1, based on a research carried out on the Scopus database[1].

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[1] Research carried out on October 28, 2018, with the term "behavior* financ*", limited to: title, abstract, and keywords.

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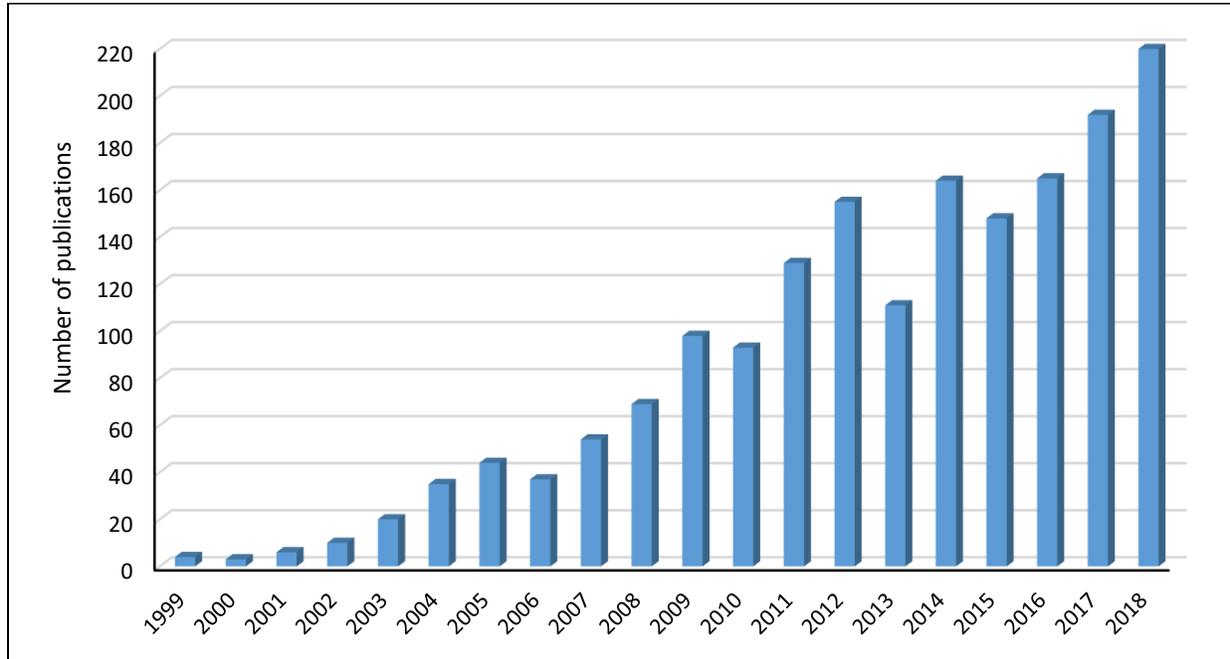

Figure 1. Number of behavioral finance publications
Source: Developed by the authors with data from Scopus database.

Despite this growth shown in Figure 1, some themes within behavioral finance still deserve to receive more attention, such as investor relations. Investor relations are a field of study that represents 7% of the papers in Figure 1, with a production spaced in time, authors and focus. This is, to a certain extent, understandable, since as it is a recent area, many issues still need to be properly explored. However, considering that investor relations are considered a strategic area for organizations, which may even affect their evaluation by the market (NIRI, 2003), it is understood that this is a relevant theme, thus requiring more studies and research, mainly from the perspective of behavioral finance.

Given this context, this study seeks to answer the following problem question: What are the main characteristics of the scientific production on behavioral finance applied to the area of investor relations? From this question emerges the main objective of the research, which is to map and characterize the scientific production on behavioral finance applied to the area of investor relations, through a bibliometric study.

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Theoretical Foundation

Behavioral Finance

Modern finance theory, the prevailing paradigm for several decades, is founded on unrealistic assumptions about human behavior. Such assumptions imply the rationality of the agents, who seek to maximize their own well-being, have homogeneous beliefs and expectations, and can assimilate all available information, among other characteristics (Sharpe, 1964; Lintner, 1965). This theory, however, from such a perspective, failed to satisfactorily explain the various phenomena in the financial markets.

In the 1970s and 1980s, from the studies by Kahneman and Tversky (1974; 1979), behavioral finance emerged as a response, at least in part, to the difficulties faced by traditional theory. According to Barberis and Thaler (2003), some financial phenomena can be better understood if we consider that the agents are not completely rational. That is, they do not update their beliefs correctly or make normatively questionable choices that are incompatible with the expected utility theory.

Behavioral finance, then, began to be extensively studied, and has developed rapidly, with increasing emphasis and significant findings. Among these findings are the various cognitive biases already identified (Das & Teng, 1999), which explain behaviors not understood by the traditional paradigm.

Hirshleifer (2015) describes the process linked to cognitive biases and behavioral finance in general. According to him, people need to make decisions quickly and, to this end, they use mental shortcuts (known as heuristics) that operate automatically below the level of consciousness (Kahneman, Slovic & Tversky, 1982). Heuristics generally work well, but in certain situations they lead to errors in judgment and decision, the so-called cognitive biases. In addition, the mind works with a dual process, being an intuitive system (fast process) and a reasoning system (slow process) (Kesebir & Haidt, 2010). Human thinking is largely intuitive (Kahneman, 2011) and when people are overly confident in their intuitive way of thinking, the chances of making mistakes in judgment and decisions are very high.

Therefore, behavioral finance can be understood, according to Sewell (2007), as "the study of the influence of psychology on the behavior of financial professionals and the consequent effect on markets".

This definition is in line with that presented by Shefrin (2010), who conceptualizes behavioral finance as "the application of psychology to financial decision making and financial markets". Therefore, we can understand that behavioral finance seeks, based on the knowledge of psychology, to understand the decisions and behaviors of agents and financial markets.

According to Costa, Carvalho, and Moreira (2019), behavioral finance originated from behavioral economics. According to them, behavioral finance focuses mainly on errors of judgment and decision making of financial investments. Behavioral economy, in its turn, is broader, focusing on issues such as demand, consumption, price, investments, management decisions, among others. Even with relatively different focuses, these two areas are related, as they seek to explain the decisions and behavior of agents and markets.

When it comes to investor relations, another area that can be associated with behavioral finance is behavioral accounting. This area, although with less significant numerical production than behavioral finance, is relevant in its contributions, as it is directly linked to the control and communication of economic and financial events of organizations, the basis for the financial decision making of managers and investors.

According to Balachandran (1985), behavioral accounting is the application of social science concepts to areas such as budgeting, decision making, control and financial reporting, focusing on the "human element". Behavioral accounting, although with more normative characteristics, focuses on study objects that are also targets of behavioral economics and finance. Thus, for this study, the term behavioral finance will be extended to also include studies in the field of behavioral economics and behavioral accounting.

Investor Relations

Investor relations are an area of great importance to publicly traded companies, as they develop communication and relationships between the organization and stakeholders such as investors, creditors, suppliers, regulatory and supervisory agencies, among others.

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According to Marston and Straker (2001), investor relations can be understood as the communication of company-related information to the financial community, analysts, investors, and potential investors. Rao and Sivakumar (1999), in their turn, define investor relations as a "strategic corporate marketing activity". These definitions, while describing basic investor relations activities, suggest a one-way flow of information from the company to shareholders.

A more complete and widely used definition is presented by the National Investor Relations Institute (NIRI). According to the NIRI (2003), investor relations can be understood as a strategic management responsibility that integrates finance, communication, marketing, and compliance with securities laws to enable more effective two-way communication between the company, the financial community and others, contributing for the company to achieve a fair market value.

This definition, for Gackowski (2017), contemplates two relevant aspects. First, a legal aspect of complying with the law and communicating company information to shareholders; and, second, a spontaneous aspect of establishing a bilateral relationship with the financial community and, especially, investors. Two other aspects, however, can be highlighted in this definition: the strategic aspect, since investor relations must be planned and part of the organization's strategy; and the influence of investor relations on company value, as financial market agents are alert to any new information that might influence investment decisions.

According to Hoffmann and Fieseler (2012) state that investor relations should provide the financial and non-financial information necessary for capital market participants to create an adequate and ideally affirmative understanding of the company's assets, strategy, and development. The way information is presented, however, as demonstrated by Tversky and Kahneman (1981), can positively or negatively influence shareholders' perceptions and, consequently, the company's image and market value. The association between investor relations and behavioral finance is, therefore, critical to the success of organizations.

In addition, Laskin (2011) states that one of the main functions of investor relations is to build relationships with the financial community: shareholders, professionals, investors, financial analysts, stock exchanges, and so on. Such relationships, as already widely shown in behavioral science studies, are

affected by beliefs, perceptions, feelings, among other factors, including the influence of various cognitive biases. Therefore, the relevance of research and financial studies involving investor relations and behavioral finance is justified.

Previous Studies

Although studies focused on behavioral finance applied to the investor relations area are of great relevance, no previous bibliometric studies associating these two main axes were found. Nevertheless, we considered relevant to present the bibliometric studies found on behavioral finance[2], aiming to show the criteria and procedures adopted. The studies found are detailed in Figure 2.

Study	Objective	Keywords	Researched Database	Number of Articles Found	Period of the Publications
Costa, Carvalho and Moreira (2019)	Bibliometric analysis of the Behavioral Economics and Behavioral Finance fields.	Behavioral Finance, Behavioral Economic, and Behavioral Accounting	Web of Science	2617 articles	1967 to 2016
Costa, Carvalho, Moreira and Prado (2017)	Bibliometric analysis of Behavioral Finance, financial decision making, and the cognitive biases overconfidence, anchoring effect and confirmation bias.	Decision-making, Behavioral Finance, Behavioral Economic and Behavioral Accounting, Overconfidence, Anchoring, Confirmation bias, Confirmation effect	Web of Science	889 articles	1990 to 2016
Nardy and Famá (2013)	Bibliometric analysis of Behavioral Finance, comparing two periods: 2001 to 2006 and 2007 to 2012	Finance and Psychology (and several others)	Web of Science	687 articles	2001 to 2012

Figure 2. Bibliometric studies on behavioral finance

Even though it is an area of growing relevance, only three bibliometric studies on behavioral finance were found in the following databases: Scopus Database, Spell and Google Scholar. These studies

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[2] Search carried out on November 05, 2018 in the databases: 1) SCOPUS, with the terms "behavioral finance" and "bibliometric" or "bibliographic" or "conceptual" or "theoretical", limited to: title, abstract, and keywords. 2) SPELL, with the term "behavioral finance", limited to: title; and 3) Google Scholar, with all terms mentioned above, alternated. Only articles published in international scientific journals were considered.

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vary in terms of the search terms adopted and the periods of publications considered, but the three researched the same database, Web of Science. In addition, all authors are Brazilian, which may indicate a regional interest in the systematization of this subject.

Another important aspect is that the most recent and most relevant studies, such as Costa, Carvalho and Moreira (2019) and Costa et al. (2017), associate the areas of behavioral finance, economics, and accounting, showing an interest in broadening the scope of publications related to behavioral finance or its objects of study.

Methodology

This study is characterized as theoretical and conceptual (Rocco & Plakhotnik, 2009) and uses bibliometric analysis (Baumgartner, 2010; Zupic & Cater, 2015). Bibliometric analysis can be understood as the application of techniques for the quantification, identification, and analysis of patterns in literary or scientific production on a given subject (Broadus, 1987).

The data source adopted for this research was the Scopus database. Although other studies have used the Web of Science database, as shown in Figure 2, Bergman (2012) argues that the Scopus database presents rigorous indexing and higher citations count. In addition, according to Harzing and Alakangas (2016), is larger than other databases. Thus, we opted for using the Scopus database.

To determine the search criteria, a key step in bibliometric research, a sociolinguistic approach was adopted, admitting the evolution of language when searching terms and considering the use in different environments, both academic and professional. Hence, the current terms, those currently being used, were the terms adopted for this research.

Concerning behavioral finance, the terms were selected based on those used by recent studies and published in relevant journals, such as Costa, Carvalho and Moreira (2019) and Costa et al. (2017). These authors used the terms behavioral finance, behavioral economics, and behavioral accounting in their bibliometric research.

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The choice of these terms is justified as they are the most current terms and because these three areas often share objects of study, such as investor relations. Thus, the following terms were adopted for this study: *behavioral finance*, *behavioral economics* e *behavioral accounting*.

Regarding the selection of terms related to the investor relations area, it was necessary to broaden the research to include not only the academic terms, which resulted in more conceptual researches, but also the applied terms that included the reports and media. This comprised three steps: First we searched, on the Thomson Reuters Eikon[3] database, the five largest Ibovespa and S&P 500 companies, as shown in Figure 3.

Ibovespa	Market Value (in R$ billion)	S&P 500	Market Value (in US$ billion)
Petróleo Brasileiro SA Petrobras	348.52	Apple Inc.	838.89
Itaú Unibanco Holding SA	316.95	Microsoft Corp.	791.49
Vale SA	291.29	Amazon.com Inc.	741.63
Ambev SA	260.33	Alphabet Inc.	723.64
Banco Bradesco SA	235.07	Berkshire Hathaway Inc.	519.25

Figure 3. Largest Ibovespa and S&P 500 Companies

Second, we verified on these companies' websites the terms used related with investor relations. From these terms, the most common and related with this study's scope were selected. The selected terms were: *investor relations*, *financial report*, *annual report*, *10-k*, *financial statement,* and *financial information*. In addition to these, as a third step, we also considered relevant to include the term *disclosure*, that appeared in our academic terms, which in the financial-accounting context refers to the disclosure of financial information for public access.

Therefore, the research criteria on the Scopus database was: (*TITLE-ABS-KEY ("behavior* financ*" OR "behavior* economic*" OR "behavior* account*") AND TITLE-ABS-KEY ("investor* relation*" OR "financ* report*" OR "annual report*" OR "10*k" OR "financ* statement*" OR "financ* information" OR "disclosur*")*). The term TITLE-ABS-KEY refers to the limitation of the search to title,

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[3] Consultation to the Thomson Reuters Eikon database, carried out on November 08, 2018, at 4:47 p.m.

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abstract, and keywords. The wildcard character * (asterisk), in turn, allows any variation of the word to be included in the results. The search and data collections occurred in November, 2018.

As a result, 121 publications were found. Given the few documents obtained and the predominance of studies in the format of articles and in the area of finance, economics, and accounting, as presented below, we chose not to apply any filter to the results. The publications base obtained was analyzed through the statistics presented by the Scopus database itself and the VOSviewer software (Van Eck & Waltman, 2010), which allows the mapping of bibliometric networks.

Results

Based on the procedures described in the previous topic and the results obtained, i.e. 121 publications, we proceeded to the analysis of the results, detailed below. The characteristics of these publications, such as type and area, are presented in Figures 4 and 5.

Type of Publication	No.	%
Article	84	69.42
Review	10	8.26
Annals of Events	9	7.44
Article in Publication	7	5.79
Others	11	9.09
Total	121	100.00

Figure 4. Type of Publication

Areas	No.	%
Economy, Econometrics, and Finance	65	30.66
Business, Management, and Accounting	46	21.70
Social Sciences	26	12.26
Psychology	21	9.91
Computer Sciences	12	5.66
Decision Sciences	10	4.72
Others	32	15.09
Total	212	100.00

Figure 5. Publication Areas (including repetitions)

As summarized in Figure 4, of the 121 publications found, 91 are articles, and 7 are in the publication phase. In addition, 19 documents are reviews or publications in annals of events, which, while

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not having the same scientific content as articles, are of great relevance in the academic context. Other publications are books, book chapters etc.

As for the area of publications, as shown in Figure 5, 111 documents, about 92% of the 121 publications found, are within the areas of Economics, Econometrics, and Finance, or Business, Management, and Accounting, also, it is important to notice that the same publication may belong to more than one area. In addition, 21 documents are from the area of psychology, which may be directly linked to the focus of this study. Thus, as commented in the methodology section, the decision not to apply additional filters to the results is justified.

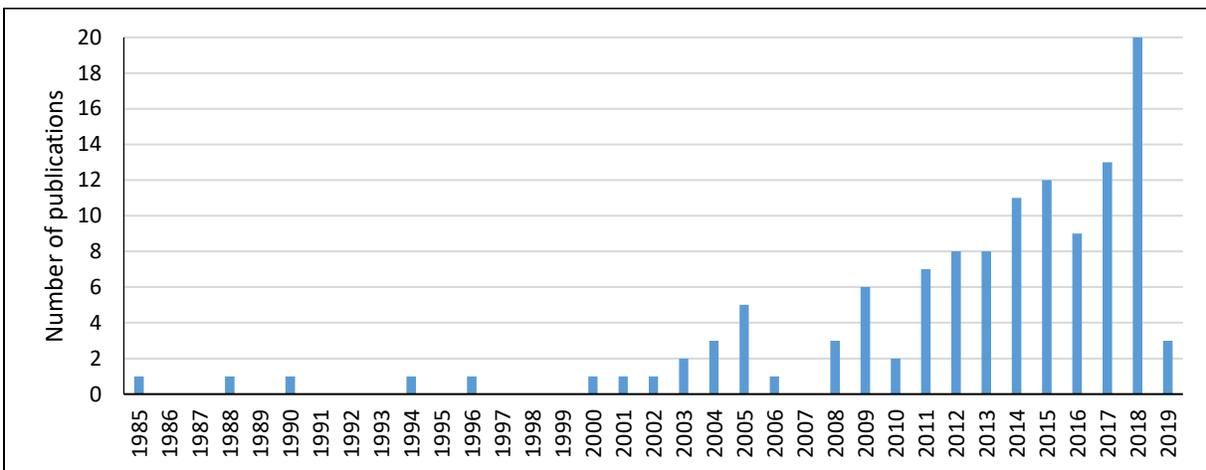Regarding the period of publications, Figure 6 shows the number of publications obtained per year.

Figure 6. Number of publications per year

As can be seen in Figure 6, the number of publications begins to grow after 1999, from one publication in 2000 to 20 publications in 2018. Although this trend is not constant throughout this period, a more intense and significant growth in the last decade can be perceived, which can be confirmed by the results obtained by the t-test, presented in Table 1. This trend is further intensified in the last five years, 2014 to 2018, with an annual average of publications two times greater than the previous five years, 2009 to 2013.

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Table 1.
T-test - Average publications every five years

Period	No. Publications average	P-value
2014 to 2018	13.0***	0.002
2009 to 2013	6.2***	0.005
2004 to 2008	2.4**	0.051
1999 to 2003	1.0**	0.034
1994 to 1998	0.4	0.178
1989 to 1993	0.2	0.374
1989 to 1993	0.5	0.182

Note. Significance levels of 95% (**) and 99% (***).

According to the data presented in Table 1, it can be understood that the behavioral finance theme applied to the investor relations area has been gaining relevance over time, especially in the last two decades. The annual average of publications, going from one publication per year, from 1999 to 2003, to 13 publications per year, from 2014 to 2018, indicates this growing relevance and the progressive interest on the subject by researchers and journals. Also, considering a more immediate period, from 2016 to 2018, we can see in Figure 6 a growth of over 100% in the number of publications, from 9 publications in 2016 to 20 publications in 2018, which confirms that this is a current and timely topic for further research. The continuation of this growth trend, however, shall only be confirmed in the coming years.

Among the 121 publications found, the oldest article was Balachandran (1985), which presented the concept and an introduction to behavioral accounting. Regarding the most recent articles, three stood out: Martin, Boyer, Léger and Dumont (2019), who analyzed the cognitive effects on pattern recognition in financial information systems; Wang et al. (2019), who verified whether rumors on social networks and subsequent clarifications by companies affected abnormal stock returns; and Garcia-Blandon, Argilés-Bosch, and Ravenda (2019), who examined whether, in view of the quality of financial reporting, the auditor's gender affects audit quality.

The publications found originated from 39 countries, the most relevant, concerning the number of documents, are presented in Figure 7.

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Country	No. of Publications	%	No. of Citations	%
United States	50	35.46	1769	72.95
United Kingdom	13	9.22	172	7.09
China	10	7.09	25	1.03
Australia	8	5.67	19	0.78
Canada	6	4.26	6	0.25
Netherlands	4	2.84	78	3.22
Israel	4	2.84	54	2.23
Spain	4	2.84	1	0.04
Malaysia	3	2.13	3	0.12
Germany	3	2.13	1	0.04
Others	36	25.53	297	12.25
Total	141	100.00	2,425	100.00

Figure 7. Number of publications and citations by country (with repetitions)

According to Figure 7, it can be seen that the United States is the country from which the largest number of publications originated, with over 41% of the total of 121 publications found. The same publication, however, may have originated from more than one country, which justifies the total of 141 publications shown in Figure 7. The United States also presented the largest number of citations, almost 73% of the total, highlighting the relevance of this country in the researched subject. The United Kingdom, with a smaller number of publications, almost 11% of the total, considering the 121 publications found, and of citations, just over 7% of the 2,425 citations, is placed second, followed by China, Australia, Canada, and others.

The mapping of the citation network by countries, in the VOSviewer software, presented only 11 documents with relationships between them, showing few citations among the found documents. Apart from the small number of publications, there is, therefore, little connection between the studies, which indicates a small number of research developed on the same subjects. This suggests that researchers in different countries have been studying different subjects within the theme of behavioral finance and investor relations, which allows us to assume the development of isolated research and little contribution or partnership between researchers.

Figure 8 shows the citation network by country and the connections found, with the United States being the central element and the main link between the other countries.
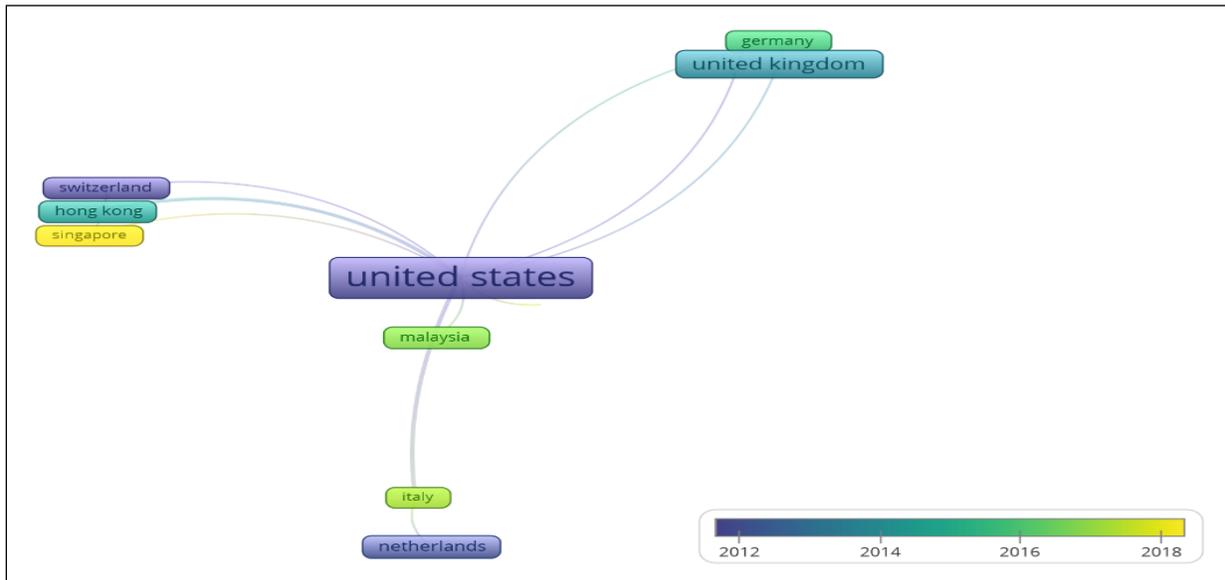
Figure 8. Citations network by country

Regarding the institutions linked to publications, 160 institutions were found, of which 137 were rated to only one publication each. Among the other institutions, with two or more publications, we found that most are located in the United States. Figure 9 shows the top ten institutions, with the largest number of publications, listed by the Scopus database.

Institution	No. of Publications	Country
New York University	5	United States
Ohio State University	4	United States
Carnegie Mellon University	4	United States
Dongbei University of Finance and Economics	3	China
Macquarie University	3	Australia
University of Notre Dame	3	United States
Chinese University of Hong Kong	2	China
University of Illinois	2	United States
University of California, Irvine	2	United States
Cornell University	2	United States
Others	137	
Total	160	

Figure 9. Top institutions in number of publications

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As shown in Figure 9, few researches were found per institution, indicating that it might be a topic that has not been subject to continuous publications. In addition, the mapping of the citations network by institution[4] using the VOSviewer software showed only 17 connections between the institutions, suggesting that, as far as the researched theme is concerned, there is little relation among them.

Regarding the journals in which the publications occurred, 80 journals were identified, of which only 12 presented two or more published documents. Of the total of journals, therefore, 85% of them had only one publication on the subject. Journals with two or more publications are detailed in Figure 10, with their respective SJR impact factors (SCImago Journal Rank), available from the Scopus database.

Journal	No. of Publications	%	SJR
Journal Of Behavioral Finance	13	12.15	0.418
Journal Of Accounting And Economics	4	3.74	6.875
Accounting Review	3	2.80	3.946
Emerging Markets Finance And Trade	3	2.80	0.404
Plos One	2	1.87	1.164
Contemporary Accounting Research	2	1.87	2.604
Accounting Forum	2	1.87	0.932
Journal Of Economic Psychology	2	1.87	0.918
Journal Of Economic Behavior And Organization	2	1.87	1.583
Journal Of Consumer Policy	2	1.87	0.560
Journal Of Behavioral And Experimental Finance	2	1.87	0.475
Advances In Accounting Behavioral Research	2	1.87	0.155
Others	68	63.55	-
Total	107	100.00	

Figure 10. Top journals in number of publications

According to Figure 10, only one journal stood out in number of publications, the Journal of Behavioral Finance, with 13 publications, representing 11% of the total of 121 publications found. All other journals had only one to four publications, indicating that although the subject matter is relevant, there are few studies published per journal. Some publications, such as books and book chapters, were not

[4] The map could not be attached due to the difficulty of visibly adjusting it to the available space.

published in journals and, therefore, the number of publications presented in Figure 10 is less than the 121 publications obtained by the search criteria adopted.

In addition, as shown in Figure 10, the journals with the highest impact factor, i.e., Journal of Accounting and Economics, Accounting Review, and Contemporary Accounting Research, presented few publications. On the other hand, the journal with the highest number of publications, Journal of Behavioral Finance, with 13 published studies, has a relatively low impact factor. This suggests that research on this subject have not been regularly published in the most relevant journals, which may be mainly due to the small or low quality of the research, or due to the low interest of journals in this subject.

Through the VOSviewer software, the connection between the 80 identified journals was verified. Of these, only 10 were related to each other, once again showing few citations among the documents found. The map of the citations network by journal is presented in Figure 11.
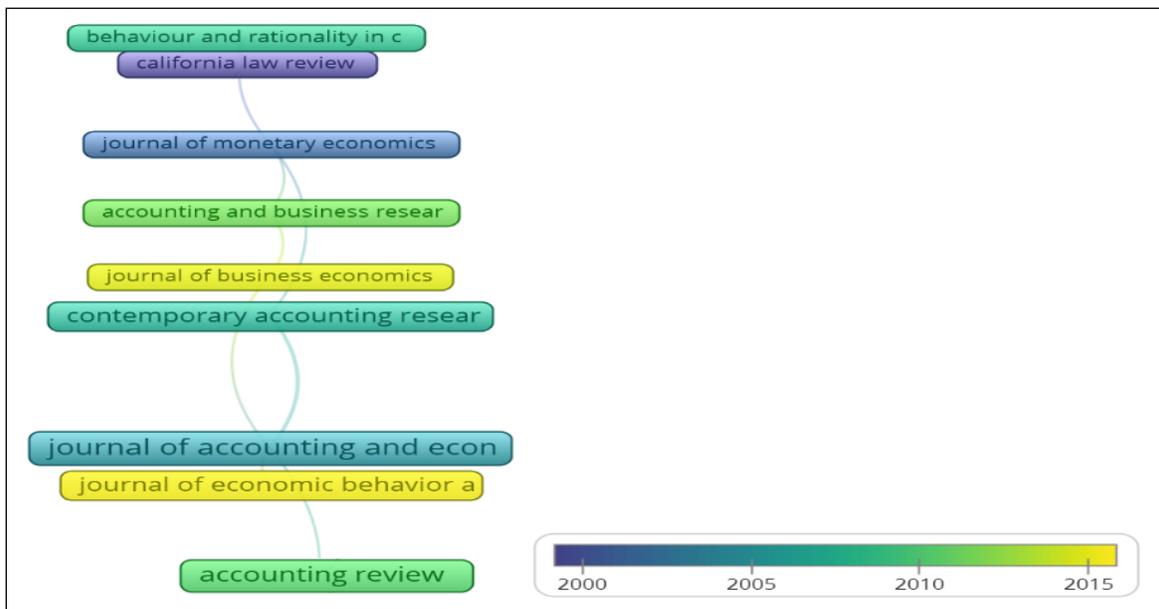

Figure 11. Citations network by journal

Regarding the authors dealing with this theme, 267 authors were identified, the main ones (with the largest number of publications) are shown in Figure 12.

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Author	No. of Publications	H-Index	Institution	Country
Hirshleifer, David	5	59	University of California	United States
Teoh, Siew Hong	5	36	University of California	United States
Acquisti, Alessandro	3	59	Carnegie Mellon University	United States
Hellmann, Andreas	3	9	Macquarie University	Australia
Sunstein, Cass R.	2	147	Harvard University	United States
Loewenstein, George	2	127	Carnegie Mellon University	United States
Loughran, Tim	2	33	University of Notre Dame	United States
Bar-Gill, Oren	2	29	Harvard Law School	United States
Neumann, Dirk	2	29	Universitat Freiburg im Breisgau	Germany
McDonald, Bill D.	2	14*	University of Notre Dame	United States
Kausar, Asad	2	7*	Nanyang Technological University	Singapore
Adjerid, Idris	2	8	Virginia Tech	United States
Tauni, Muhammad Z.	2	5	Zhejiang Gongshang University	China
Fang, Hong Xing	2	3*	Dongbei University of Finance and Economics	China

*H-index obtained in the Scopus database, as it was not found in Google Scholar.

Figure 12. Top authors in number of publications

As shown in Figure 12, among the publications found, there are few studies published by author. Only two authors, David Hirshleifer and Siew Hong Teoh, presented 5 publications, and they both share the same studies. All others presented 3 or less publications, while 253 authors are related to only one publication. This indicates that although there are relevant authors in the scientific field, with a high H-index[5], researching or who have already researched the subject, few authors present sequential deepening in their research. Most authors probably do not linger on the subject, thus resulting in few publications per author.

Moreover, we can also see in Figure 12 that the most relevant authors, Cass R. Sustein and George Loewenstein, with H-indexes, respectively, of 147 and 127, are not the authors with the highest number of publications on the subject. On the other hand, low H-index authors with two published papers and low H-indexes, such as Muhammad Z. Tauni and Hong Xing Fang are among the list of authors with higher

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[5] H-index is an author-level metric that measures both the productivity and citation impact of the publications, initially used for an individual scientist or scholar.

number of publications on the subject. Thus, it is understood that the theme has not attracted researchers to specialize in the subject, despite its potentiality, making room for authors from related areas to contribute in a non-systematic way.
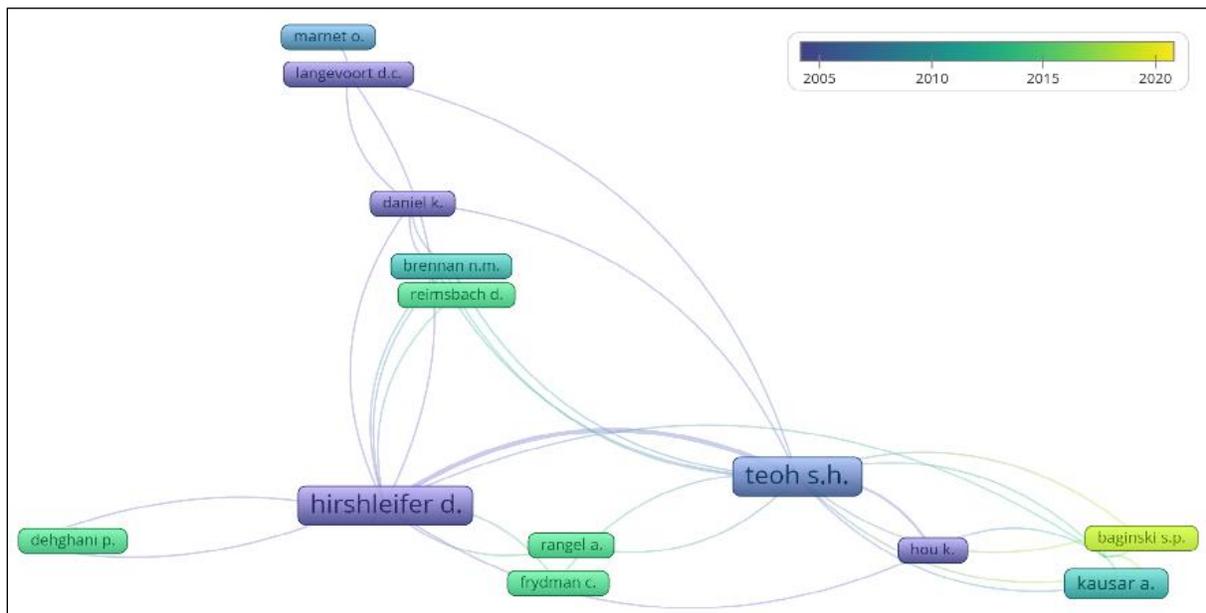

Figure 13. Citations network by author

Figure 13 presents the citations network by author. As can be seen, few authors presented connections to each other in terms of citations. Of the 267 authors found, only 20 had studies connected by citations. This confirms previous perceptions that, even though it is a relevant subject, with great impact on organizations, the topic has been poorly researched, and moreover, few researchers have studied closely or worked together or partnered in research on the theme.

To verify which authors researched close or related subjects, we used bibliographic coupling, which allows us to verify authors who cite the same sources and share references. Thus, it was possible to identify groups of authors studying a common subject, as presented in Figure 14.
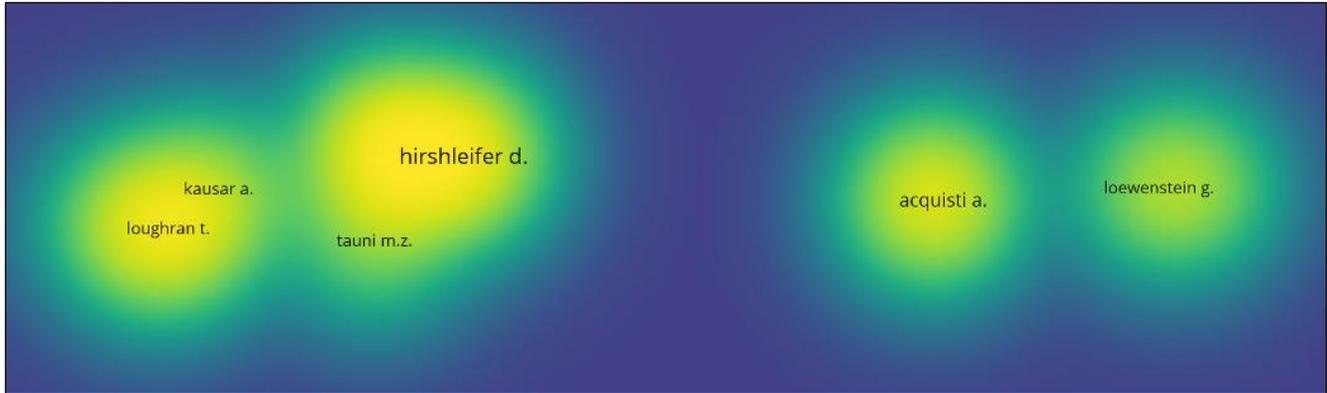
Figure 14. Bibliographic coupling by author

As a criterion, we considered the occurrence of at least two documents per author, which resulted in only four main subjects, as shown in Figure 14. The first subject, with greater density in Figure 14, was approached by Hirshleifer and Teoh (2003a; 2003b), Tauni, Fang, and Iqbal (2016), and Tauni, Rao, Fang and Gao (2017), who verified the influence of different means of disclosure of financial information on investor behavior. The second subject, approached by Baginski, Demers, Kausar and Yu (2018), with Kausar being one of the authors, and Loughran and McDonald (2015), examined the linguistic tone used in financial reports and its possible consequences on investor behavior. The third subject, farther from the previous two, researched by Adjerid, Acquisti, Brandimarte and Loewenstein (2013), with Acquisti as co-author, and Acquisti (2014), dealt with the transparency of the disclosed information and, although related to the companies' financial information, the authors' main focus was on consumers. The fourth subject, addressed by Loewenstein, Sunstein, and Golman (2014), refers to the rules imposed for the disclosure of information and their effects on their recipients, given the occurrence of psychological factors.

Regarding the main keywords found, we identified the most relevant terms, presented in Figure 15.
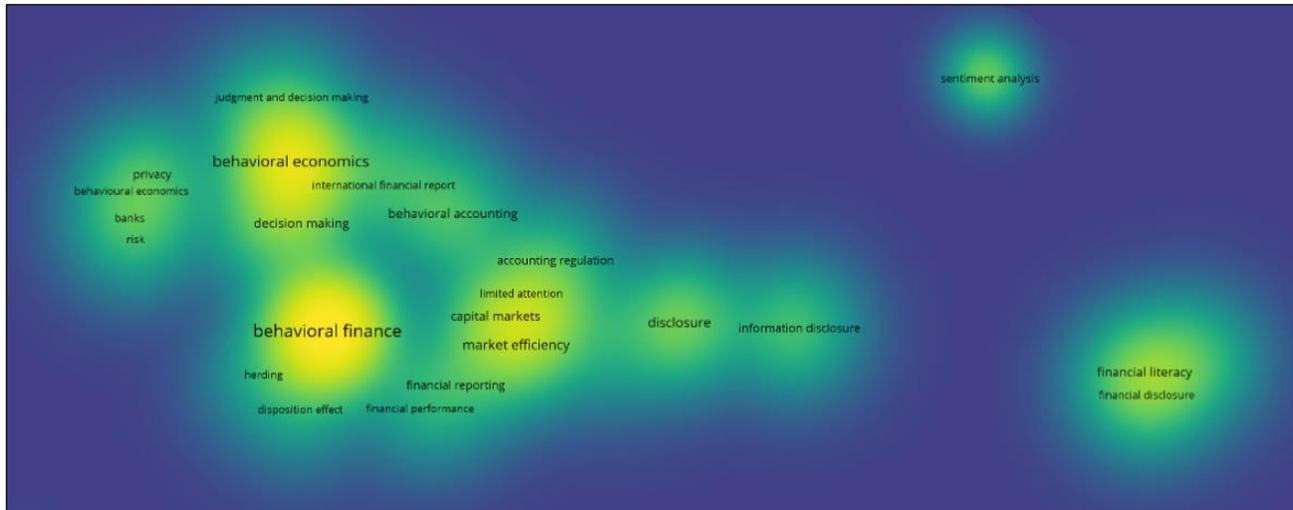
Figure 15. Keyword map by occurrence

Among these terms, there was occurrence of those directly related to behavioral finance, disregarding the more general terms, such as behavioral finance, behavioral economics, among others. Thus, from the terms presented in Figure 15, the following were selected: (1) sentiment analysis, which consists of the technique of analysis of opinion, positive or negative, expressed in a text; (2) decision making and the variation judgment and decision making, which is a subject that has been extensively studied in behavioral finance, given the influence of psychological factors on decisions; (3) limited attention, which refers to the limits of attention in terms of capacity and duration; (4) herding, regarding herd behavior, in which various agents act similarly without any planning; and finally, (5) disposition effect, which refers to the effect on which investors tend to quickly sell assets with earning and hold assets with loss over a longer period.

These terms, although relevant in the context of behavioral finance, are quite insufficient to cover the researched area, as there are several other terms, such as various behavioral biases, that may be linked to the area of investor relations. Moreover, the occurrence of these terms cannot be considered significant among the publications analyzed, since, in the analysis by VOSviewer, it was limited to a minimum of two occurrences. Even so, these were the main terms identified by the VOSviewer software.

Results Discussion

Based on the results found and the analyses carried out, we can see that even in light of the relevance of the subject behavioral finance applied to investor relations, only 121 publications on the subject were identified, a number that might be considered small, given the importance of the investor relations. The emergence and the increasing number of studies on behavioral finance, with 1734 publications in the last 18 years (Figure 1), when compared to 121 publications of this subtopic shows that it still has opportunities to be explored more thoroughly.

In addition, as we were able to verify, there was no robust growth trend in the number of publications on the subject up to 2015. Only from 2016 can this trend be more strongly visualized. This period, however, between 2016 and 2018, is too short to ensure that this trend will materialize for a longer term, which would imply a growing interest on the topic. However, among the main subjects observed, through bibliographic coupling, some recent studies were identified, which may signal such direction.

Studies on the subject have been concentrated mainly in the United States, where the majority and main researchers, journals, and institutions related to the subject are also located. However, few publications per institution were found, in addition to few researchers and relevant journals related to the subject. Moreover, there was little connection between the various studies, researchers, and institutions, indicating the development of isolated research on specific subjects, and few contributions and partnerships between authors and institutions. Few relevant keywords related to behavioral finance were also identified, given the large number of terms related to this area, which may suggest limitations on the scope and subjects addressed by these publications.

Given this, we can assume that the subject of behavioral finance applied to investor relations is not considered an area of expertise in the academic context so far. From another perspective, however, the findings may indicate limitations that, while difficult to overcome, need more insistence and scientific vigor. Given the results obtained, the topic may represent good research opportunities, since it is a subject little explored and with plenty of field for further studies.

Investor relations: A bibliometric study in behavioral finance, behavioral economics and behavioral accounting

Conclusion

This study sought to systematize publications on a subject considered current and relevant, behavioral finance applied to investor relations. Behavioral finance, while still a recent field of study, has been of great interest and is growing rapidly. However, we found that, within the scope of behavioral finance, little attention has been given to investor relations.

Investor relations are an area of great relevance to publicly traded companies as they are responsible for developing a good relationship between the company and external stakeholders, such as current and potential investors. Such a relationship may contribute to improve the company's image, resulting in a possible increase in its market value, or negatively affecting it, leading to investor flight and market devaluation.

Research development in this field of study might contribute to enhance the investor relations communication strategies developed by companies and to the quality of analysis realized by investors of different degrees of professional skills. Providing accuracy and uniformity in financial decisions and contributing to enhance corporate governance. This might result in informatively more efficient markets.

Even so, this study's results pointed to the possibility of development of further research on the subject. So far, publicized research still needs to develop a deeper relation between the researched subjects. Published papers by senior researchers and institutions are still unsystematic, suggesting that researchers have not remained, in a constant way, studying the subject. Thus, it can be concluded that the subject of behavioral finance applied to the investor relations area has not been contemplated, until now, by in-depth and systematic studies in the academic-scientific scope, although it arouses interest of eventual research.

On the other hand, the small number of publications found and the poor relationship between the researched subjects suggest a fertile field of research, still little explored, which may represent good opportunities for studies and publications. Thus, based on this study's findings, future research may take a longer look at the main themes found and verify which ones are still prominent for scientific deepening and new discoveries.

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This study contributes to the research of behavioral finance by pointing to a possible field of research that might be expanded and developed by future researchers. These contributions might be limited by the adoption of Scopus database, but, as argued in methods section, Scopus is seen by academic researchers as a more broad and rigorous.

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