de Oliveira, Carlos Henrique Firmino; Lebre Rodrigues, Claudia; Jucá, Michele Nascimento

Article

Determinants of IPO's underpricing: A systematic review

Contemporary Economics

Provided in Cooperation with:
VIZJA University, Warsaw

Suggested Citation: de Oliveira, Carlos Henrique Firmino; Lebre Rodrigues, Claudia; Jucá, Michele Nascimento (2023) : Determinants of IPO's underpricing: A systematic review, Contemporary Economics, ISSN 2300-8814, University of Economics and Human Sciences in Warsaw, Warsaw, Vol. 17, Iss. 3, pp. 252-274, https://doi.org/10.5709/ce.1897-9254.509

This Version is available at:
https://hdl.handle.net/10419/297631

Primary submission: 03.11.2021 | Final acceptance: 09.08.2023

Determinants of IPO´s Underpricing: A Systematic Review

Carlos Henrique Firmino de Oliveira, Claudia Lebre Rodrigues, and Michele Nascimento Jucá

ABSTRACT

In an Initial Public Offering (IPO) process, it is expected that there will be different share price valuations by professionals, due to market flaws, meaning information asymmetry among investors. For stockholders – who previously formed the corporate structure of the company – an IPO opens up possibilities of immediate gains, as they can purchase at prices lower than established by the structuring agent. On the other hand, underpricing is an indirect cost for the company, as, part of the offer is not collected. Identifying these determinants thus becomes relevant, as this information may be essential for defining the most appropriate share price. Consequently, the purpose of this study is to perform a bibliometric analysis (including the Zipf, Bradford and Lotka Laws), followed by a systematic review of papers analyzing this theme. This analysis uses the VOSviewer and Biblioshiny software packages. As a result, informational asymmetry is confirmed as the main theory clarifying the underpricing event. Noteworthy among the determinants are the reputations of the underwriter and share issuer, the presence of corporate governance mechanisms, and the offering size. Among the knowledge gaps opening up opportunities for further studies on this topic are: investigation of the phenomenon in companies in Latin America or comparatively in emerging countries worldwide, use of a behavioral approach to analyze investor motivations, and the presence of institutional investors as IPO inducers.

KEY WORDS: determinants; underpricing, IPO, bibliometric analysis, systematic review

JEL Classification: G12, G15, G32.

Mackenzie Presbyterian University – Graduate Program in Business Management

1. Introduction

The Initial Public Offering (IPO) is a moment of transition between two periods in the company's ownership structure. No longer private, trading in its equity becomes public, and in a controlled environment. An IPO is typically underwritten by investment banks. On that occasion, the stock is usually underpriced. According to Ibbotson (1975) and Sonu (2022), underpricing is a way for market operators to offset the lack of information at the time of an IPO.

Correspondence concerning this article should be addressed to: **Carlos Henrique Firmino de Oliveira**, Mackenzie Presbyterian University, Rua da Consolação 930, São Paulo, SP, Brazil, Zip: 01302-907. E-mail: henriquefirmino@yahoo.com.br

Underwriter responsibilities during an IPO include prospectus preparation. For a primary issue, this document contains the offering price justification, as well as the criteria adopted for its pricing. Different valuation methods are used to do so – multiples, dividend discounts, and future cash flows. However, this initial price may change while prospecting potentially interested parties, known as the book building process (Ong et al., 2020; Roosenboom, 2012).

Moreover, during the IPO process, both primary and secondary shares may be sold. Primary

shares are issued as fresh equity shares to meet a company's capital requirements. In turn, secondary shares refer to existing common stock sold previously to existing investors, such as a venture capital firm. According Huyghebaert and Hulle (2006), as well as Sosnowski (2017), companies complement their primary portion with secondary shares to increase their free float or liquidity. Moreover, earnings management is also likely to influence flotation structures and share prices.

From the investor viewpoint, it is an even greater challenge to price the company, as there are still no historical price datasets for its shares. So, the information in the prospectus prepared by the offering underwriter must be used, or they must conduct their own valuation, based on the available financial statements. In both cases, the information provided is assumed to be trustworthy. This fact allows the investor to repeat the underwriter's valuation processes or to carry out their own, for defining the fair price to be paid for the asset (BSEC, 2003, 2009).

Differences in valuations by different professionals are natural and justified by the diverse perspectives and expectations of macroeconomic scenarios and microeconomic segments related to the company, in addition to its ability to generate earnings for its shareholders. Nevertheless, empirical evidence shows that there is a phenomenon called underpricing. It occurs when – in the first trading session – the share's closing price is higher than the figure estimated by the transaction underwriters (Ibbotson, 1975; Loughran & Ritter, 2002; Silva et al., 2015).

Underpricing has different effects on economic agents, which allows each of them to establish their own strategy. For investors already within the corporate structure, the IPO represents the possibility of immediate gains at the moment the company goes public. For those who participate in the book building – the process of defining the initial share price – and manage to reserve shares at a price lower than that established by the underwriter, it offers the possibility of immediate gains on the day of the IPO. However, for the issuer and investing bank, underpricing represents losses, usually called "money left on the table" (Loughran & Ritter, 2002).

There are studies proposing to explain the several views on underpricing and its effects on the different actors involved. Vismara et al. (2015) find price differences among the valuation processes for the same companies and by the same banks at times just before and after IPOs. Paleari et al. (2014) indicate possible strategies adopted by underwriters that could – contrary to common sense – maximize these gains. For Aggarwal et al. (2002), underpricing an IPO maximizes the profits of the company's original owners, at the end of the lock-up period. In turn, Lin et al. (2013) state that underpricing is a way to avoid lawsuits against underwriters and issuers in some jurisdictions.

The recurrence of the underpricing phenomenon in IPO events ends up by attracting day trader attention – stock traders who buy and sell within a single day, pursuing gains through arbitrage. Thus, knowing the factors that positively or negatively influence the dimension of this event is essential, regardless of the type of desired strategy. This information may be crucial for establishing the proper share price in an IPO event (Sohail et al., 2018).

The lack of a profuse literature review on this topic gives rise to the opportunity for a more comprehensive investigation into the determinants of underpricing in IPO events. Consequently, this study aims at contributing to better investment decisions by actors participating in this process, reducing the current informational asymmetry. In addition, knowledge gaps on this topic are highlighted, thus contributing to academic research and the adequacy of pertinent legislation.

Such objectives are verified through a bibliometric analysis and systematic review related to this topic, with the Web of Science (WoS) database as the main source for the identification of studies. To perform the analyses, VOSviewer and Biblioshiny software packages were used. The verification of the main bibliometric laws established by Zipf (1949), Bradford (1934) and Lotka (1926) is also adopted. The survey encompasses the period from 1945 to June 8, 2021, with 21 papers identified in the final sample.

In Section 2 of this study, the literature review is presented, identifying the main theories supporting the underpricing determinants that are mentioned in the final sample papers. Section 3 describes the

bibliometric analysis and systematic review methodologies. In Section 4, the results of both methodologies are reported, with identification of the descriptive statistics of the main characteristics of the papers in the final sample, as well as of knowledge gaps in this field. Finally, Section 5 presents the conclusions, with directions for future studies, and the limitations of this survey.

2. Literature Review

The seminal paper by Ibbotson (1975) confirms the existence of the underpricing phenomenon, although he could offer no explanation for this. According to the author, the three main actors involved in this process are the issuing company, the offering underwriter, and the stock investors. Since then, studies have been carried out to identify theories that clarify this behavior and performing econometric tests that ratify such theories.

From the issuer standpoint, Welch (1989) states that underpricing occurs due to informational asymmetry between company controllers and potential investors. The latter charge a lower premium to invest in higher quality companies, incurring less underpricing. In other words, differences between offering and post-IPO prices are smaller for higher quality companies than those with lower qualifications. This leads to higher quality companies "leaving less money on the table". Attempting to mitigate this trend, lower quality companies spend resources to signal certain characteristics. This fact is perceived by the market, which adjusts its value by reducing the price of its shares. In turn, Ljungqvist and Wilhelm (2003) argue that the issuing company's controllers benefit from underpricing. After the IPO, they profit from selling shares at higher prices on secondary markets or during the follow on.

For underwriters, Carter and Manaster (1990) state that their prestige is related to their ability to market the shares at the IPO time. Investors trust their recommendations to buy a particular stock. According to the authors, underpricing may be explained by the informational asymmetry between investor and underwriter. The investor relies on the underwriter's expertise, which, in turn, upholds its reputation by presenting low-risk companies. Thus, underwriter prestige influences share prices at IPO time.

Loughran and Ritter (2002) also analyze the role of the underwriter in an underpricing event. For the authors, this is a type of indirect compensation. In an initial analysis, the "money left on the table" occurs at the underwriter's expense, as their remuneration is defined as a percentage of the previously negotiated offering price. So, the higher this price, the better their earnings. Nevertheless, underwriters also end up by benefiting from underpricing, because: (a) their marketing costs are lower, due to their ease in finding buyers, and (b) any losses are offset by other indirect gains with their customers, according to bargaining theory. Liu and Ritter (2011) dive deeper into this analysis, to the level of the analyst who prepares the prospectus. The more expert and experienced the analyst, the greater the underpricing in an IPO.

Rock (1986) analyzes the underpricing phenomenon from the investor's view. Those who are better informed can identify shares offered at prices lower than their real market values – the winner's curse. However, the less informed tend to price shares higher than their intrinsic value, transferring funds to more enlightened investors. In brief, in an IPO process, the best-informed investors analyze the prospectus. If the established price makes sense in their analysis, they make their offer at the prospectus price. On the other hand, the least informed investors submit their offers at market prices. This difference would be one of the causes of underpricing.

Noteworthy among the theories seeking to understand underpricing are informational asymmetry, agency, signaling and market timing (Agustina & Clara, 2021; Baron, 1982; Castilho et al., 2019; La Rocca, 2021; Rathnayake et al., 2019; Ritter & Welch, 2002; Welch, 1989). However, the most frequent in empirical studies in this field is informational asymmetry. Table 1 presents an overview of the impacts of the main underpricing determinants associated with these theories. Since some stakeholders involved in the IPO have better access to information than others, the factors contributing to the increase in informational asymmetry are positively linked to underpricing.

Table 1
Underpricing Determinants and Associated Theories

Determinants	Theories associated to each determinant	Relationship with underpricing
Corruption	Informational asymmetry and Agency	Positive
Underwriter's reputation	Informational asymmetry, Agency and Signaling	Positive
Corporate governance	Informational asymmetry and Signaling	Negative
Issuing size	Informational asymmetry and Signaling	Positive
Market's cold and hot periods	Signaling and Market timing	(Positive) / Negative
Company size	Informational asymmetry and Signaling	Negative
Anchor investor	Informational asymmetry	Negative
Directors' heterogeneity	Signaling	Negative
Executive director's duality	Agency	Positive
Corporate reputation	Signaling	Negative

Corruption is cited among these factors. An environment with a higher level of institutional distortion is more subject to regulatory failures, allowing the disclosure of inaccurate information or the occurrence of unexpected events (Wang & Song, 2021).

Another determining factor of underpricing is the influence of the underwriter. Also, according to the informational asymmetry theory, a good reputation acts as a mitigating factor for IPO underpricing (Beatty & Welch, 1996; Carter & Manaster, 1990; Dhamija & Arora, 2017; Habib & Ljungqvist, 2001; Jamaani & Ahmed, 2020; Kenougios et al., 2007; Loughran & Ritter, 2002; Roosenboom, 2012). Furthermore, according to the signaling theory, the establishment of a more transparent and diversified control and governance structure sends positive signals to investors, also reducing underpricing (Darmandi & Gunawan, 2013; Hearn, 2011; Hopp & Dreher, 2013; Kaur & Singh, 2019; Li et al., 2019; Xu et al., 2017).

The Agency Theory is related to both of those described above. Policies aiming at curtailing agency conflicts tend to reduce informational asymmetry and send positive signals to the market. One example is a conflict of interest in the multiple hats worn by some executives, such as a Chief Executive Officer (CEO) who also chairs the Board of Directors. This encourages underpricing at IPO time (Agustina & Clara, 2021; Chahine & Tohmé, 2009; Cliff & Denis, 2004; Francis et al., 2010; Fu et al., 2015; Gao & Hou, 2019;).

Finally, the market timing theory states that the phases of macroeconomic market cycles also influence investors. Heating stages (called hot periods) lessen IPO underpricing, while cooling stages (cold periods) have the opposite effect (Agustina & Clara, 2021; Dhamija & Arora, 2017; Gao & Hou, 2019; Hunt McCool et al., 1996).

3. Methodology

The purpose of this study is to answer the question: what are the determinants of underpricing in IPO events? To do so, the seven steps described below are implemented. Steps 1 to 5 comply with both bibliometric analysis and systematic review methodologies, while. Steps 6 and 7 refer exclusively to the systematic review.

Step 1 – Database definition. The final sample of papers was obtained from the Web of Science (WoS) database, one of the world's most important and widely acknowledged data sources. It allows the identification of studies published in high-impact scientific journals, classified by the Journal Citation Reports (JCR) index.

Step 2 – Application of research filters. The combination of keywords used in the WoS search and followed by the Boolean term AND are: "IPO*", "underpr*" and "determin*" in the Topic field, which considers the title, abstract, author's keywords and key-

 DOI: 10.5709/ce.1897-9254.509

Table 2
Paper Sample's Evolution

Sign	Description	No. of papers
(+)	Initial sample obtained by combining the keywords "IPO*" AND "underpr*" AND "determin*"	118
(-)	WoS categories other than "business finance", "economics", "business" and "management"	15
(-)	Types of documents other than "article"	1
(-)	Languages other than "English"	3
(=)	Intermediate sample obtained through WoS filters	99
(-)	Papers not analyzing the underpricing determinants at the IPO time	56
(-)	Papers being out of the analysis scope (long-term or regulatory)	19
(-)	Papers having no econometric models	3
(=)	Final sample	21

words plus of the papers. Table 1 shows the selection of the final sample with 21 papers. The analysis period runs from January 1, 1945 to June 8, 2021.

Step 3 – Obtaining papers. The 21 papers in the final sample were obtained from the following academic research bases: Science Direct, Sage, Wiley, Emerald, WoS, Cambridge, Oxford, Syarif, World Scientific, and Backwell.

Step 4 – Database creation. A file in BibTex format is extracted from the WoS database, with the complete record and cited references of the 21 papers in the final sample. Among the information collected is: title, keywords, author's name, institution to which the author is affiliated, country in which the institution is located, journal name, and number of paper citations in the WoS database.

Step 5 – Bibliometric analysis. Through the Biblioshiny and VOSviewer software packages, objective data from the papers (countries, authors, keywords, institutions, etc). are analyzed for the preparation and analysis of tables and relationship/co-citation maps. The analyses performed through both tools are complemented by the verification of the main bibliometric laws, as follow: (a) Zipf 's Law (1949) on the categorization and estimation of the frequency of keywords with the help of Rank Words software, to calculate Goffman 's T point (transition point from low to high frequency words), a region that theoretically clusters words with high semantic loads; (b) Bradford's Law (1934) addressing examinations of journals publishing many papers, in contrast to those publishing few papers on a given topic; and (c) Lotka 's Law (1926) on the identification of researchers with the most prolific output in a specific field of knowledge.

Step 6 – Preparation of the (sub) categorization matrix. In this step, the categories and subcategories of the paper analysis are identified, as shown in Table 3. Each of the nine categories has non-exclusive subcategories. This means that a single paper may be classified into more than one subcategory. Thus, the sum of the subcategory frequency count for each category totals 100%. In the coding process, up to three subcategories are assigned to each category in each paper.

Step 7 – Systematic review. After coding the (sub) categorization matrix in Table 2 for the final sample, a frequency count of subcategories is performed, in order to identify knowledge gaps. These gaps are then compared to the subcategories in Category 9 – Directions for Future Studies, pinpointing aspects suitable for further studies.

4. Analysis of the Results

The results presented in Subsections 4.1 and 4.2 are related to Steps 1 to 5, as well as Steps 6 and 7 in Section 3 – Methodology, referring respectively to the bibliometric analysis and systematic review. All results refer to the 21 papers in the final sample, listed in Table 2.

Table 3

(Sub) Categorization Matrix

Categories	Subcategories	Description
1. Main topics	A. Determinants of IPO´s underpricing	Verification of possible determinants capable of impacting the companies' underpricing during their IPO moment. Among these determinants are those mentioned in category 4 of this Table 3.
	B. Deliberate underpricing	Underpricing occurs because of a commercial strategy of the underwriter or of the issuer itself.
	C. Valuation	The underpricing is due to the company's misjudgment.
2. Theories related to hypotheses	A. Informational asymmetry	Different players have different levels of information, which leads to unequal pricing of the same asset.
	B. Signaling	Issuers employ resources to influence investors' value perception.
	C. Agency	The conflict of interests among stakeholders tends to worsen the informational asymmetry problem and it incurs costs for its mitigation.
	D. Market timing	The markets' macroeconomic cycle phase influences investors' decisions.
	E. Others	Other theories unrelated to 2A to 2D subcategories.
3. Methodologies	A. Cross section regression	A cross-sectional data set consisting of a sample of a unit of analysis, taken at a given point in time.
	B. Regression with binary dependent variable or Logistic regression	Assumes the behavior of a logistic function of accumulated probability (logit) or accumulated normal (probit). The dependent variable is equal to zero or one.
	C. Panel data regression	It considers a temporal and a spatial dimension. The same cross-sectional unit (e.g. companies) is monitored over time (e.g. years).
	D. Two-stage least squares regression (2SLS)	This technique is an extension of the Ordinary Least Squares (OLS) method. It is applied when the error terms of the dependent variable are correlated with the independent variables.
	E. Others	Other methodologies/econometric models not related to 3A to 3D subcategories.
4. Independent Variables / IPO Determinants	A. Underwriter 's reputation or strategies	The underwriter's type of reputation may influence underpricing - positively or negatively, as well as his strategies.
	B. Corporate governance	Variables related to the formation of the board of directors - e.g., gender, age, experience, etc.
	C. Shareholders	Variables representing the presence or ownership concentration of some specific type of shareholder.
	D. Institutional	Variables capturing the business environment and protection to investor in the market where the IPO occurs.
	E. Market moment	Warming times (hot periods) reduce underpricing at the IPO time. The cooling down times (cold periods) has the opposite effect.
	F. Offering	Variables capturing characteristics intrinsic to the offering – e.g.: size, stock exchange, number of previous subscriptions, etc.
	G. Issuer	Variables representing the issuing company's characteristics - e.g.: age, reputation, size, etc.
	H. Others	Other determinants unrelated to subcategories 4A to 4G.

 DOI: 10.5709/ce.1897-9254.509

Table 3

(Sub) Categorization Matrix (Continued)

Categories	Subcategories	Description
5. Data origin	A. High income countries	Country with annual per capita income from US$ 12,695 (World Bank, 2021).
	B. Developing countries	Country with annual per capita income: Low - less than US$1,046; Low medium - between US$1,046 - US$4,095; and High Medium - between US$ 4,096 and US$ 12,695 (World Bank, 2021).
	C. Both	It includes all countries, the developed and developing ones
6. Analysis period	A. Up to 3 years	Sample over 0 and under 3 years.
	B. From 3 to 5 years	Sample over 3 and under 5 years.
	C. From 6 to 10 years	Sample over 6 and under 10 years.
	D. More than 10 years	Sample over 10 years.
7. Results	A. New perspectives	Studies expanding the frontier of knowledge, through the presentation of a new theory, variable/proxy, method or mathematical model.
	B. Conclusions similar to other studies	Studies not presenting new perspectives or presenting conclusions similar to others previously presented.
	C. New conclusions	Studies bringing new conclusions on topics previously discussed.
	D. Others	Other results not related to subcategories 7A to 7C.
8. Conclusions	A. Confirmation of the main hypothesis	The study confirms the main hypothesis proposed by the author.
	B. Non-confirmation of the main hypothesis	The study does not confirm the main hypothesis proposed by the author.
	C. Inconclusive result regarding the main hypothesis	The study presents inconclusive result on the main hypothesis proposed by the author.
9. Directions for future studies	A. Use of alternative metrics for IPO's determinants	Use of alternative metrics for IPO determinants proxies - e.g.: anchor investor effect on price impact or incorporation of book building in the analyses.
	B. Long-term performance analysis	Comparative analysis between long-term performance and companies' underpricing.
	C. Analysis of IPO's valuation methods	Analysis including the issuing bank participation, as well as the influence of the analyst in charge of pricing.
	D. Not informed	There is no mention of new possibilities for future studies by the authors.

4.1. Bibliometric Analysis

Figure 1 shows the chronological frequency of the publication of the papers. This shows that, although data uptake began on January 1, 1945, the first paper in the final sample is identified only in 2009. There are no studies in 2014, 2016, and 2018. Between 2009 and 2012, 2015 and 2020, only one paper was published, although 2020 publication rates might have been affected by the Covid-19 pandemic. Two papers were published in 2013 and 2021. However, the latter year, is limited by the deadline for defining the final sample, June 8, 2021. Thus, the largest number of papers in the final sample were published in 2017 and 2019, with three in each year. These results point to growing interest in this field of study.

According to Zipf's Laws (1949), also known as the least effort laws, there is a correlation between the number of different words and their frequency of use. The use of few words with high frequency is constant in the texts. Zipf's First Law states that the product of the series of a word (r) and the frequency of the order (f) with which it appears in the texts is constant (C). See Equation 1.

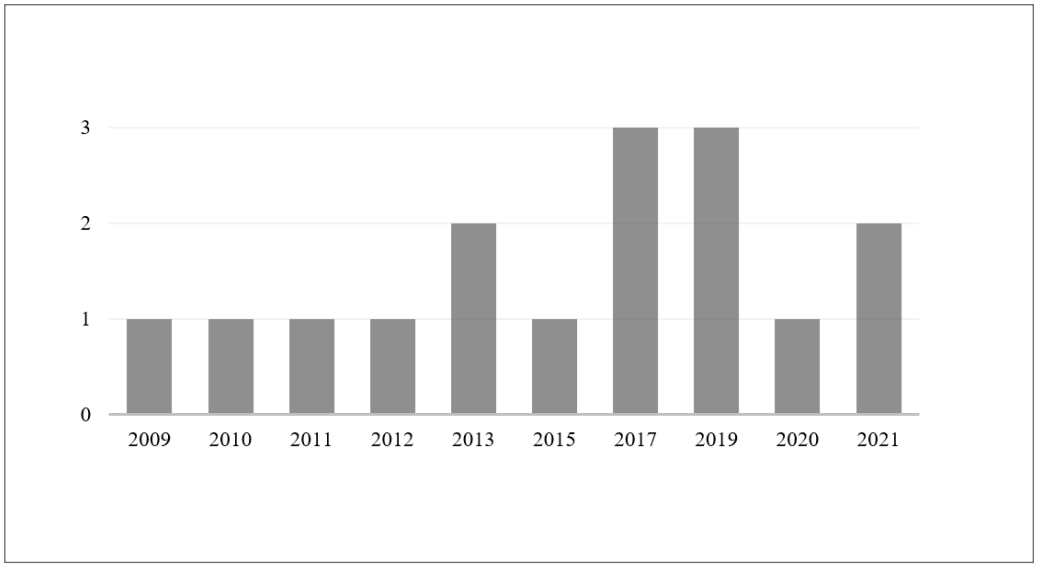
$$r \times f = C \quad (1)$$

Where:
r = series of a word (r)
f = frequency of the order
C = Constant

For words with low frequency, Zipf proposed a Second Law, which was revised and modified by Booth (1967). According to the author, in a given text, several words with low frequency of occurrence have the same ranking. See Equation 2.

$$In = 2I1 / n\,(n+1) \quad (2)$$

Figure 1
Chronological Frequency of Publications



 DOI: 10.5709/ce.1897-9254.509

Where:

In = Number of words with frequency n

I1 = Number of words with frequency 1

n = Goffman's point (transition point between low to high frequency words)

Zipf's Laws define the ends of a word distribution list. Between these endpoints is a transition region from high to low frequency words. According to Goffman (1971), this region contains words with the highest semantic content, being the most suitable for the thematic indexing of a given text. Pao (1978) presents the formula for Goffman's T-point or transition point. See Equation 3.

$$T = \left(-1+\sqrt{1+8I_1}\right) / 2 \quad (3)$$

Where:

T = Goffman's transition point

I_1 = Number of words that have frequency 1

The identification of Goffman's T point occurs through the descending ordering of words by the Rank Words software. Subsequently, those that are repeated only once are identified, to calculate the Goffman's T-point. Then words above the rank indicated by this point are located. Table 4 shows that for the 21 papers in the final sample, this point varies between 56.97 (Fu et al., 2015) and 35.11 (Arugaslan et al., 2004), with an average of 44.12.

Table 4

Goffman's T-point

No.	Reference	Goffman's T-point
1	Fu et al. (2015)	56.97
2	Habib and Ljungqvist (2001)	48.27
3	Hopp and Dreher (2013)	48.21
4	Chahine and Tohmé (2009)	48.00
5	Li et al. (2019)	46.98
6	Hearn (2011)	46.56
7	Xu et al. (2017)	46.30
8	Francis et al. (2010)	46.19
9	Sahoo (2017)	46.02
10	Jamaani and Ahmed (2020)	46.00
11	Cliff and Denis (2004)	43.91
12	Gao and Hou (2019)	42.93
13	Wang and Song (2021)	42.56
14	Hunt-McCool et al. (1996)	42.51
15	Roosenboom (2012)	42.28
16	Darmadi and Gunawan (2013)	42.23
17	Kaur and Singh (2019)	41.93
18	Dhamija and Arora (2017)	39.15
19	Kenourgios et al. (2007)	38.28
20	Agustina and Clara (2021)	36.08
21	Arugaslan et al. (2004)	35.11
Average of the word frequency		44.12

Source: Rank Words

Next comes an analysis of the region with the words most adherent to the main theme of the text. Here, words not relevant to the study are excluded, such as prepositions, (in) definite articles, pronouns, and adverbs. Then the words with the highest frequency are classified, as shown in Table 5, highlighting occurrences of IPO (19.4 %); issues (9.7 %); determinants (8.06 %); and price (8.06 %) in the papers.

Figure 2 shows the co-occurrence map of the most cited keywords. Again, IPO, Issues, Determinants, and Price stand out with the greatest frequency of repetition in the papers.

In terms of journals importance, according to Bradford's Law (1934) or the Dispersion Law, a restricted group of journals clusters together a larger number of publications on a given subject. Thus, journals form cores, becoming references in specific fields of knowledge and enhancing the quality of published papers.

For Brookes (1969), this Law estimates the relevance of certain academic journals in specific fields of knowledge. Thus, if journals are classified in descending order of productivity, they may be assigned to zones with variations in the ratio 1: n: n^2, etc.

These zones are formed by dividing the total number of published papers, as shown in Table 6. Zone 1 is identified as the subject core, listing journals with two references, particularly the Global Business Review, Journal of Finance, Managerial Finance and Review of Finance Studies. The eight papers in Zone 1 account for 38.10% of the total sample. Meanwhile, Zone 2 has a single publication in each journal. This means that each of the journals represents 4.8% of the total number of papers, indicating publication pulverization.

Figure 3 shows the co-citation network among journals. The most cited are Global Business Review, Review of Financial Studies, Managerial

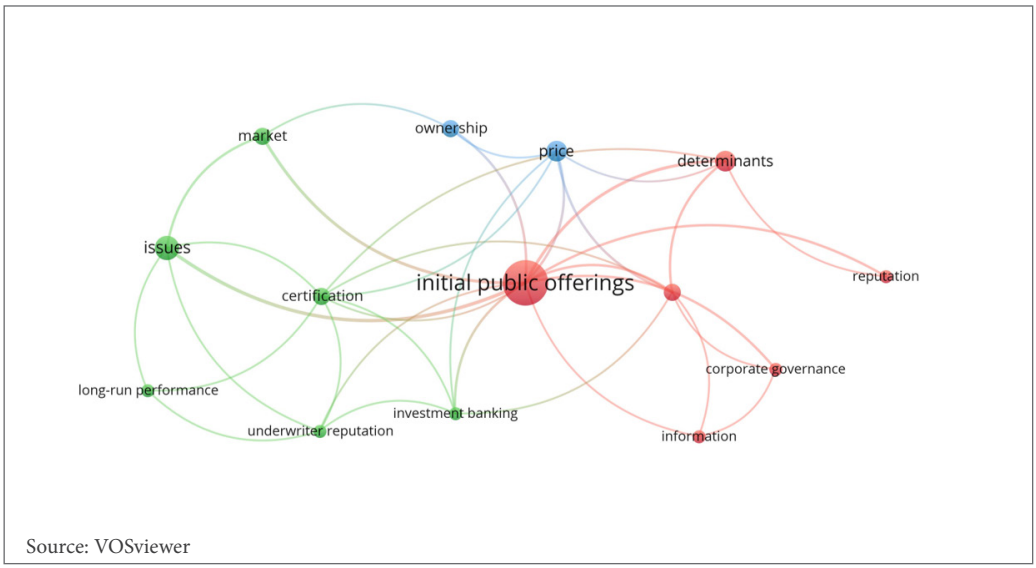
Table 5
Ranking of Keywords According to Zipf's Laws

Determinants	Theories associated to each determinant	Relationship with underpricing
Keywords	Quantity	Frequency
Initial public offerings	12	19.35%
Issues	6	9.68%
Determinants	5	8.06%
Price	5	8.06%
Certification	4	6.45%
Market	4	6.45%
Ownership	4	6.45%
Performance	4	6.45%
Corporate governance	3	4.84%
Information	3	4.84%
Investment banking	3	4.84%
Long-run performance	3	4.84%
Reputation	3	4.84%
Underwriter reputation	3	4.84%
Total	62	100.00%

Source: Biblioshiny

Figure 2

Frequency of the Most Cited Keywords



Source: VOSviewer

Note: The size of the nodes represents the relevance of the terms in the papers. The thickness of the lines means the strength of the connection between them. Finally, the colors indicate the number of groups.

Table 6

Ranking of Journals According to Bradford's Law

Zones	Journals	Number of papers	Accumulated quantity	Accumulated percentage
Z1	Global Business Review	2	2	9.52%
	Journal of Finance	2	4	19.05%
	Managerial Finance	2	6	28.57%
	Review of Finance Studies	2	8	38.10%
Z2	Applied Economics	1	9	42.86%
	Asia-Pacific Journal of Business Administration	1	10	47.62%
	Chinese Management Studies	1	11	52.38%
	Corporate Governance – An international review	1	12	57.14%
	Emerging Markets Review	1	13	61.90%
	IIMB Management Review	1	14	66.67%
	International Review of Economics & Finance	1	15	71.43%
	Journal of Banking & Finance	1	16	76.19%
	Journal of Corporate Finance	1	17	80.95%
	Journal of Emerging Market Finance	1	18	85.71%
	Journal of Financial and Quantitative Analysis	1	19	90.48%
	Quarterly Review of Economics and Finance	1	20	95.24%
	Research in International Business and Finance	1	21	100.00%

Source: Biblioshiny

Finance and Journal of Finance. These are the same journals that stand out in Zone 1, as shown in Table 6. This denotes that the frequency of co-citations among journals has a positive link to their productivity. In other words, the number of papers published in a specific journal leads to more co-citations of the journal.

Table 7 lists the ten most cited papers on IPO underpricing determinants. The paper by authors Habib and Ljungqvist (2001) is the most cited, with 230 mentions (37.6%) and an annual average of 10.95 mentions in other academic studies. The other papers have less than 200 total citations and an annual average below 10.

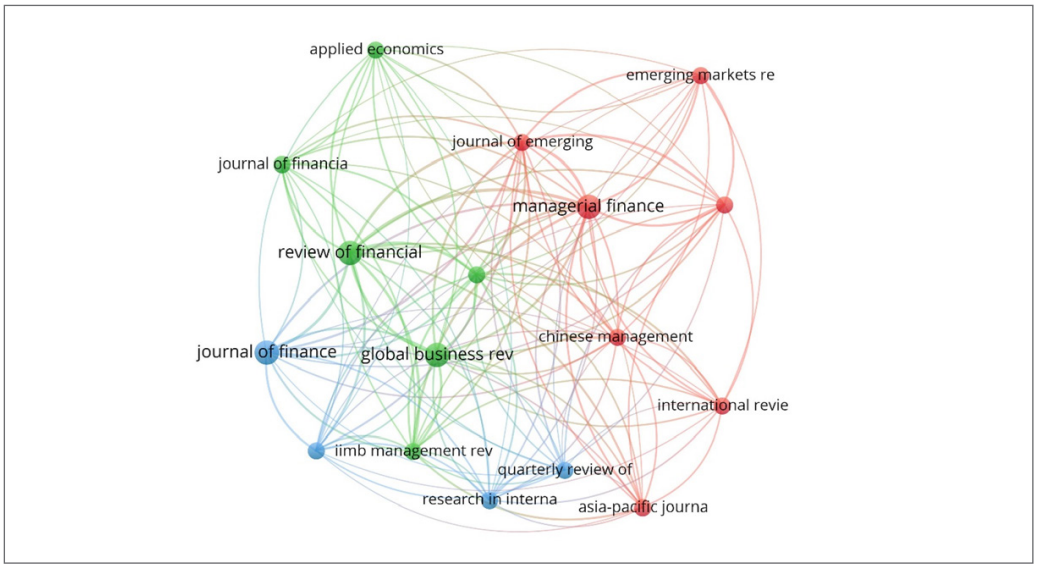
Figure 4 presents the ten most productive authors, identifying three clusters. The criterion used by the VOSviewer software considers the number of citations of each author in the WoS database, multiplied by the number of papers they have published on similar topics. Only author Wang, X. has two papers on the main topic of this study, standing out from others listed in Table 7., each with only one paper published on IPO underpricing determinants.

Still analyzing paper authorship, a total of 46 authors were identified. Among them, three published individually (Hearn, B., Sahoo, S. and Roosenboom, P.), while 43 are co-authors. When considering the geographic concentration of the institutions to which the authors are linked, researchers from sixteen (76.19%) of the papers are associated with institutions in the same country, while five (23.81%) papers were written by authors linked to institutions in other countries.

Figure 5 indicates the countries where institutions to which the authors are linked are located, in descending frequency. Among the 46 authors, sixteen (34.8%) are associated with institutions in the USA; eight (17.4%) in China; five (20.9%) in India; four (8.7%) in Indonesia; and three (6.5%) in the UK. The institutions of the other authors are spread across Greece, Lebanon, Germany, Saudi Arabia, Australia, Austria, Netherlands and Taiwan. It appears that there is a diversification of institutions between the developed and developing nations, reflecting universal interest in the topic addressed by this study. However, the lack of studies in Latin American and African countries is a matter of concern.

Figure 3

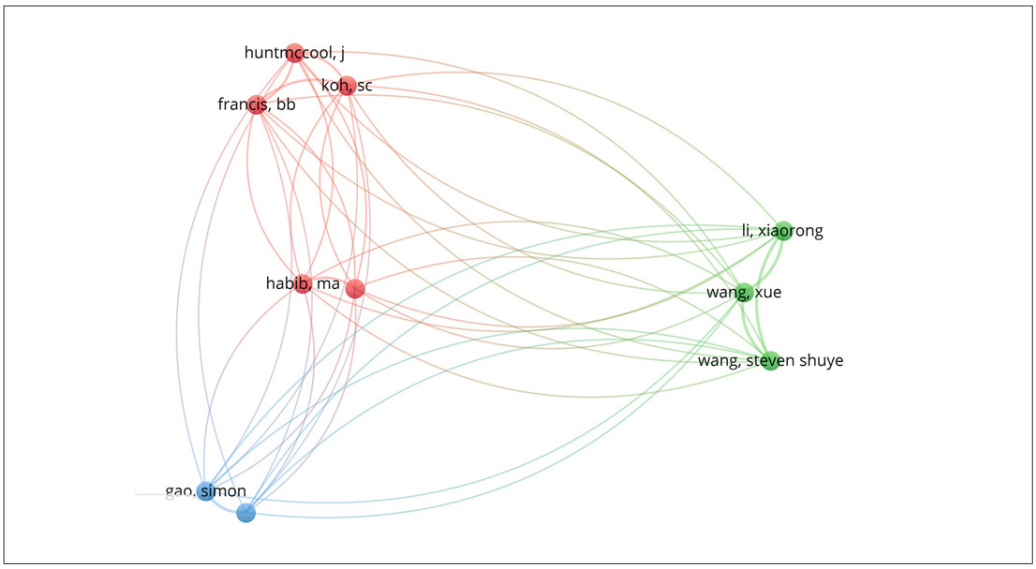
Co-citation Map Among Journals



Source: VOSviewer

Note: The size of the nodes represents the relevance of the terms in the papers. The thickness of the lines means the strength of the connection between them. Finally, the colors indicate the number of groups.

Figure 4
Map of the Ten Most Productive Authors



Source: VOSviewer

Note: The size of the nodes represents the number of papers published per author. The color of the nodes corresponds to the citation among the authors of the papers analyzed in the final sample.

Table 7
The Ten Most Cited Papers

References	Number of citations	Frequency of citations	Annual average of citations
Habib & Ljungqvist (2001)	230	37.64%	10.95
Cliff & Denis (2004)	164	26.84%	9.11
Chahine & Tohmé (2009)	49	8.02%	3.77
HuntMcCool et al. (1996)	37	6.06%	1.42
Francis et al. (2010)	28	4.58%	2.33
Darmadi & Gunawan (2013)	23	3.76%	2.56
Roosenboom (2012)	23	3.76%	2.30
Arugaslan et al. (2004)	23	3.76%	1.28
Hopp & Dreher (2013)	17	2.78%	1.89
Kenourgios et al. (2007)	17	2.78%	1.13
Total	611	37.64%	

Source: Biblioshiny

Still examining author productivity, Lokta's Law (1926), or Inverse / Square Law, states that a limited number of researchers produce many papers on a given subject, denoting clusters of authors around specific themes. This Law is shown in Equation 4:

$$a_n = a_1 / n^2, n = 1, 2, 3 \ldots \quad (4)$$

Where:
an = number of authors who published n papers
a1 = number of authors who published one paper
n = number of papers published per author

In Equation 5, Chung and Cox (1990) clarify that the number of authors with a single published paper, according to Lotka's Law, would be:

$$a_1 = 6 / \pi^2 = 0{,}6079 = 60{,}8\% \quad (5)$$

Thus, an author with two published papers should have a frequency of 15.2% ($0.6079/2.^2$), while an author with three published papers would score 6.8% ($0.6079/3^2$). Table 8 shows the numbers and percentages of papers published by the sample authors. The Lotka's Law default values are shown in the right-hand column. Quite clearly, there is a lower percentage of authors publishing larger numbers of papers, which confirms Lotka's Law. Two (4%) of the 46 authors published two papers related to IPO underpricing determinants. Another 44 (96%) published single papers on this topic, even lower productivity than the default reference obtained by Lotka (60.79%).

4.2. Systematic Review

The systematic literature review seeks to identify knowledge gaps related to the theme of IPO underpricing determinants. To do so, according to step 6 of Section 3 – Methodology, a (sub) categorization matrix is prepared, as shown in Table 3. Next, the frequency count of the subcategories in each category is carried out, as described for Step 7 of Section 3 – Methodology. Noteworthy is that a single category may contain up to three subcategories. The sum of the frequency count of the subcategories for each category thus totals 100%, and not the total of the 21 papers in the final sample. Papers with lower frequencies are compared with the Category 9 subcategories (Directions for Future Studies) to obtain aspects suitable for further studies. Table 9 presents a brief overview of the goals and main conclusions of the 21 papers in the final sample.

Figure 5
Frequency of Papers per Country of the Institution to which the Authors are Linked

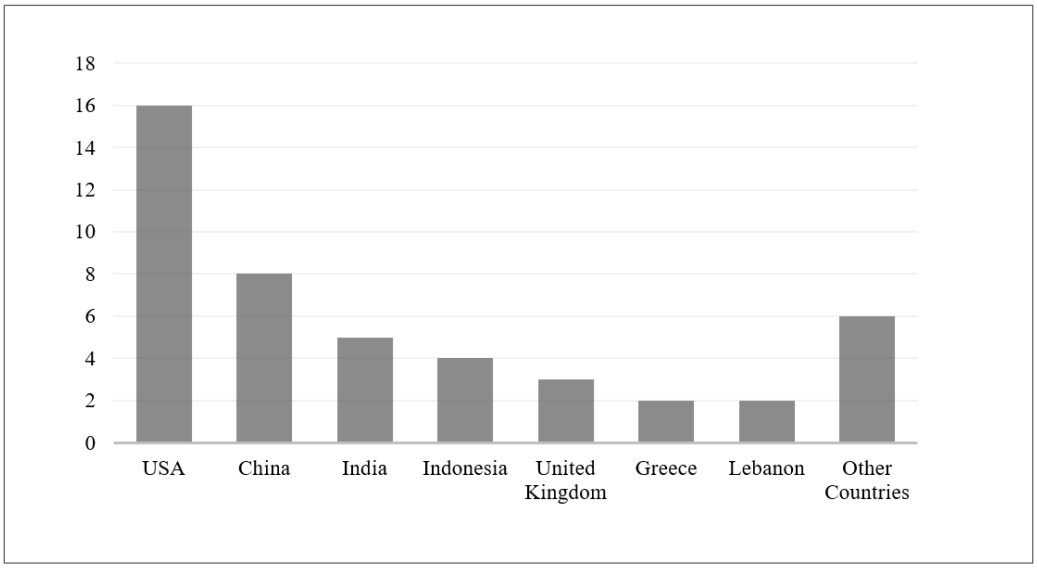


Table 8
Lotka's Law's Applying

No. of papers	No. of authors	% Authors	% Lotka (c=2)
1	44	95.65%	60.79
2	2	4.35%	15.19
Total	46	100.00%	

Source: Biblioshiny

Table 9
Main Aspects of the Analyzed Papers

No.	Reference	Summary
1	Agustina and Clara (2021)	In Indonesia, the market moment and the issuing company's corporate social responsibility have a positive impact on underpricing at the IPO occasion. In turn, the underwriter's reputation does not have a similar influence, contradicting the signaling theory.
2	Arugaslan et al. (2004)	According to a study with American companies, company size has a positive impact on underpricing, corroborating the informational asymmetry theory. However, the size of the offering has no effect on underpricing, if the company makes its information available to the market.
3	Chahine and Tohmé (2009)	In the Arabian capital market, corporate governance, company's size and age negatively influence underpricing. This is the expected effect, based on the informational asymmetry and agency theories. Nonetheless, contrary to what these theories predict, the underwriter's reputation negatively impacts underpricing.
4	Cliff and Denis (2004)	For US companies, a reputable underwriter has a significant and positive influence on companies' underpricing at the IPO time, confirming the agency theory.
5	Darmadi and Gunawan (2013)	The independence of the board of directors negatively impacts underpricing, corroborating the information asymmetry theory. The concentration of the company's decision-making power does not have a similar influence for companies in Indonesia.
6	Dhamija and Arora (2017)	The offering size, the market moment and the underwriter's reputation positively impact underpricing at the IPO time for small and medium-sized Indian companies, corroborating the informational asymmetry theory.
7	Francis et al. (2010)	Foreign companies go public in the United States through the issuance of American Depositary Receipts (ADRs). For them, the underwriter's reputation has a positive impact on underpricing at the IPO time, if they operate in an environment integrated with the financial market. Such behavior confirms the signaling theory.
8	Fu et al. (2015)	For US companies, the participation of executives and directors does not have any influence on underpricing at their IPO time, contrary to the informational asymmetry theory.
9	Gao and Hou (2019)	For high-tech companies in Thailand, the market moment, the issuing size and the executives' participation positively impact underpricing at theIPO time, as predicted by the informational asymmetry theory.
10	Habib and Ljungqvist (2001)	In the United States, the underwriter's reputation positively impacts underpricing, whereas the issuer's effective participation reduces underpricing at the IPO time, ratifying the informational asymmetry theory.
11	Hearn (2011)	Unlike other studies, in West African countries, corporate governance positively impacts underpricing at the IPO time, contradicting the theories of agency and informational asymmetry.

Table 9

Main Aspects of the Analyzed Papers (Continued)

No.	Reference	Summary
12	Hopp and Dreher (2013)	In accordance with the informational asymmetry theory, the institutional and regulatory factors - as well as corporate governance - negatively impact underpricing at the IPO time, for companies belonging to 24 European countries.
13	Hunt-McCool et al. (1996)	For companies in USA, the market moment positively impacts underpricing at the IPO time, corroborating the informational asymmetry theory.
14	Jamaani and Ahmed (2020)	For companies belonging to 22 countries on all continents - developed, developing or emerging - the underwriter's reputation has a positive effect on underpricing at the IPO time, in line with the signaling theory.
15	Kaur and Singh (2019)	Corporate governance reduces the underpricing effect at the IPO time - in line with the informational asymmetry theory - for Indian companies.
16	Kenourgios et al. (2007)	In the Greek capital market, the underwriter's reputation and the excess of participants generate a positive effect on underpricing at the IPO time, confirming the informational asymmetry theory.
17	Li et al. (2019)	For – small-sized and growing – technology companies in China, transparency and confidence in the information presented by the company reduce underpricing, confirming the theory of informational asymmetry.
18	Roosenboom (2012)	The underwriter applies a discount to the share base price at the IPO time, evidencing underpricing. Investor's demand, in turn, generates a positive effect, partially detaining the intended discount. This phenomenon is verified in French companies, confirming the informational asymmetry theory.
19	Sahoo (2017)	The anchor investors' participation signals greater credibility, increases liquidity and reduces IPOs volatility, negatively impacting underpricing. Such events take place in companies in India, confirming the informational asymmetry theory.
20	Wang and Song (2021)	In Chinese countries, IPO underwriter's reputation has a positive impact on underpricing, confirming the theory of informational asymmetry.
21	Xu et al. (2017)	For Chinese companies, the directive body's functional heterogeneity negatively impacts underpricing at the IPO time, confirming the signaling theory.

The analysis of the categories listed in Table 3 begins with Figure 6. In Category 1, deliberate underpricing (B) is present in sixteen (52%) of the analyzed subcategories. This means that researchers are more interested in studying the underpricing phenomenon as a commercial strategy of the underwriter or issuer (Cliff & Denis, 2004; Roosenboom, 2012; Wang & Song, 2021). The second topic of greatest interest has nine papers (29%) addressing IPO underpricing determinants (A) and highlighting the underwriter's reputation or strategies, as listed in Category 4 and shown in Figure 9. Finally, the valuation aspect (C) is the least analyzed, found in only six (19%) of the subcategories. This indicates that there is an opportunity to analyze the reasons for a company´s possible misjudgment that culminated in its underpricing.

Figure 7 indicates theories related to the hypotheses of the studies in Category 2. There is a predominance of informational asymmetry (A), totaling in seventeen (56%) of the sum of the subcategories (Hunt-McCool et al., 1996; Darmadi & Gunawan, 2013; Li et al., 2019). Other theories appear less frequently, dropping from five (16%) for agency (C); to three (10%) for signaling (B); and two (6%) for market timing (D). An investigation of the hypoth-

 DOI: 10.5709/ce.1897-9254.509

Figure 6

Category 1 – Main Topics

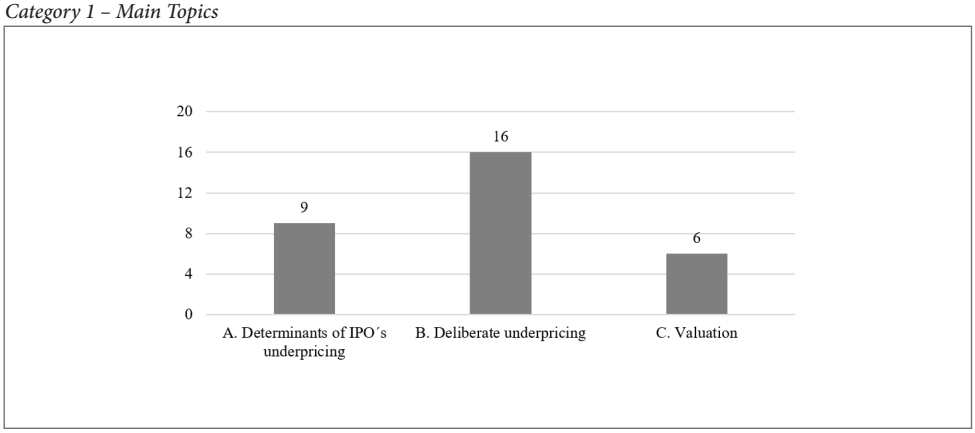


Figure 7

Category 2 - Theories

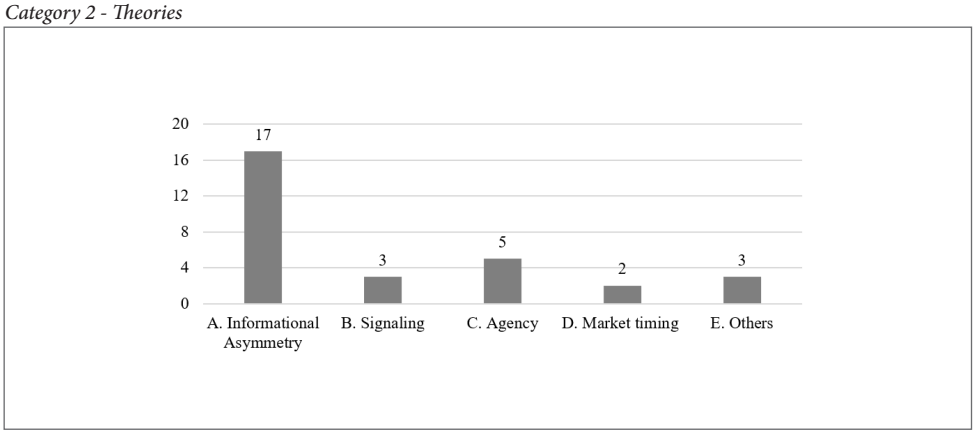
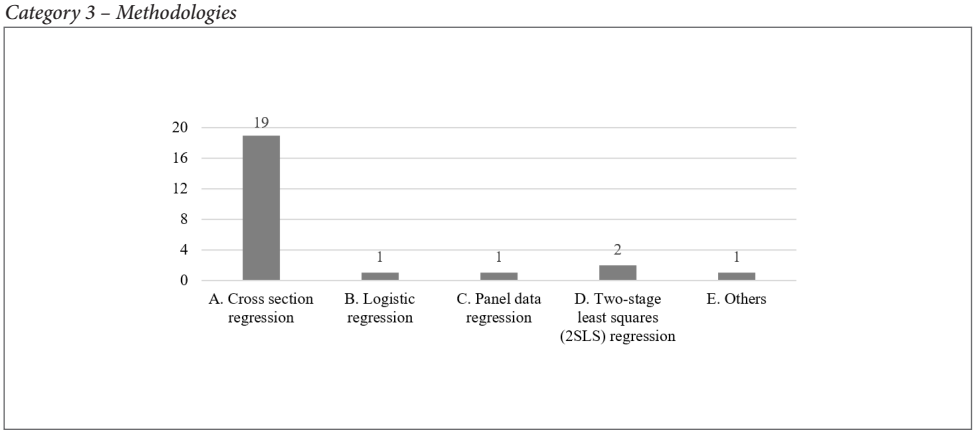


Figure 8

Category 3 – Methodologies



eses supported by such theories may shed light on the corporate misjudgment issue that leads to underpricing, for example.

As shown in Figure 8, Category 3 on Methodologies has a predominance of cross-sectional regression (A), corresponding to nineteen (79%) of the subcategories (Chahine & Tohmé, 2009; Gao & Hou, 2019; Agustina & Clara, 2021). The other applied methodologies are diluted among the subcategories, with a pair of two-stage least squares regression (D) at 8%; and single entries of logistic regression (B) and panel data regression (C) both at 4%. This is because IPO timing is unique and cannot be analyzed over time for the same company. There is, thus is a gap in the use of alternative methodologies, such as the use of structural or simultaneous equations, case studies, and others, for investigations of IPO underpricing phenomena.

Figure 9 shows the independent variables investigated in the 21 papers in the Category 4 sample. The subcategory of underwriter reputation or strategies (A) was found in ten (23%) of the subcategories (Cliff & Denis, 2004; Francis et al., 2010; Jamaani & Ahmed, 2020). The highlighted subcategories are corporate governance mechanisms (B) with seven (16%); intrinsic characteristics of the offering (F) and, issuing company characteristics (G) with six (14%), institutional environment (D) and market hot/cold periods (E) with five (11%); and shareholders (C) with three (7%). There is thus an opportunity to analyze variables indicating the presence or ownership concentration of specific types of shareholders.

Category 5 – Data Origin and Category 6 – Analysis Period are shown in Figures 10 and 11, respectively. There is a predominance of studies related to developing nation subcategories (B) with twelve (57%); and with data obtained for six to ten years (C) with nine (42%) (Chahine & Tohmé, 2009; Hearn, 2011; Li et al., 2019). There is thus a direction for future studies comparing companies in developing and developed nations (C), as well as short-term analyses (A).

According to Category 7 – Results, shown in Figure 10, nine (12.43%) of the studies address new aspects (A). Noteworthy among them are corruption (Wang & Song, 2021), and the heterogeneity of C-suite educational levels (Xu et al., 2017). Both positively impact underpricing. Another seven (33%) reach conclusions similar to other studies (B). For example, Francis et al. (2010) confirms the signaling theory in integrated markets. For them, the share- issuing underwriter's reputation negatively impacts IPO underpricing. Gao and Hou (2019) find that the market moment also has a negative relationship with underpricing. Finally, five (24%) of the studies point to new conclusions (C). For Dhamija and Arora (2017), in small and medium-sized Indian businesses, there is less underpricing than in larger corporations. In turn, Sahoo (2017) finds less underpricing when there an anchor investor. The diversity of these results suggests that analyses of this topic should continue.

Figure 13 illustrates Category 8 – Conclusions. Here, eighteen (86%) of the papers in the final sample confirm the main hypotheses of their studies (A). For the three (14%) that do not confirm their hypotheses (B), there is a possibility of further investigation. Among them is the fact that the underwriter's reputation and the engagement of senior management have no impact on underpricing, in contrast to the signaling and informational asymmetry theories, respectively (Fu et al., 2015; Agustina & Clara, 2021). Moreover, corporate governance (consisting mostly of independent audits and remuneration committees monitoring directors and other insiders) seems to affect underpricing positively, as opposed to agency and informational asymmetry theories (Hearn, 2011).

Figure 14 presents directions for future studies in Category 9., identified by the authors of the papers. For the total subcategory classifications, the use of alternative metrics for IPO determinants (A) occurs in eight (33%) of them, particularly fairness in book building) and setting share prices in the analyses (Kaur & Singh, 2019), as well as considering the effects of anchor investors on post-IPO share prices (Li et al., 2017). Long-term performance analyses (B) occurred in three (13%) of the classifications, with IPO valuation methods analyses (C) mentioned in only one paper (4%). Noteworthy among the suggested methods, are identification of issuing bank participation and the influence of the analyst pricing the share for the IPO (Cliff & Denis, 2004).

Figure 9

Category 4 – Independent Variables

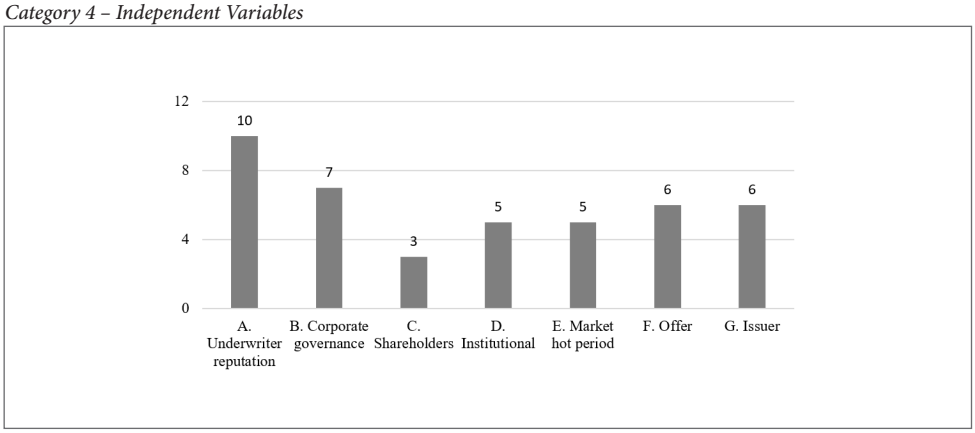


Figure 10

Category 5 – Data Origin

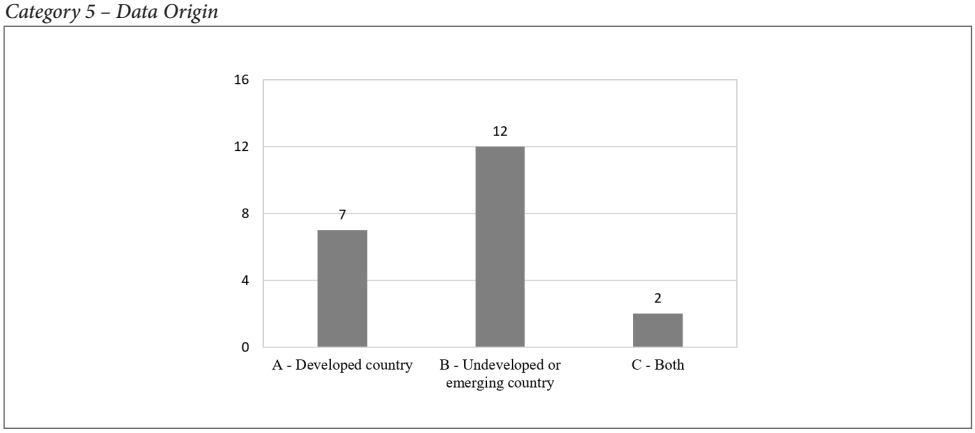


Figure 11

Category 6 – Analysis Period

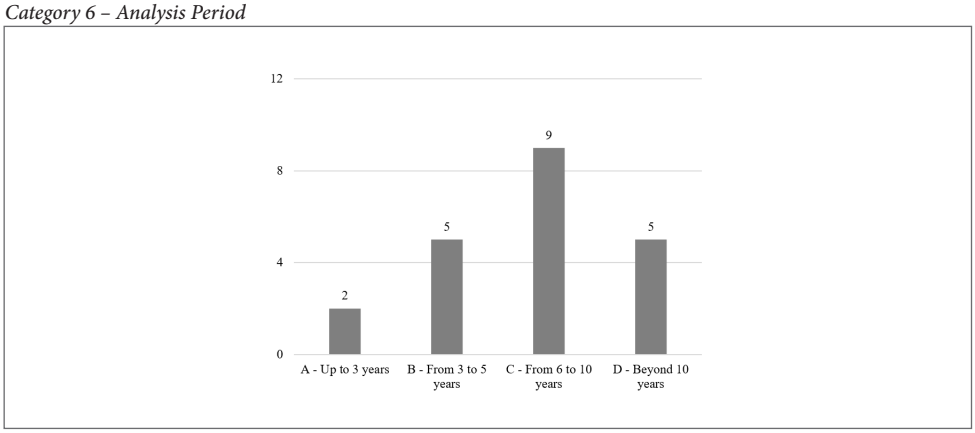


Figure 12

Category 7 – Results

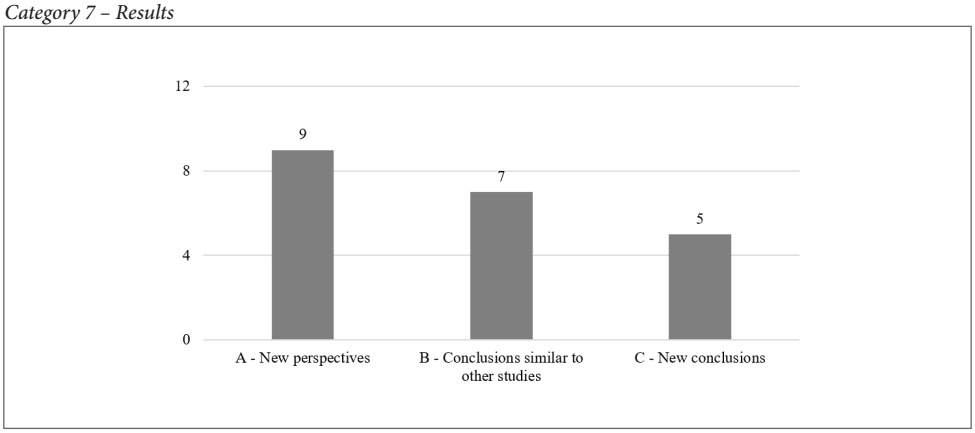


Figure 13

Category 8 - Conclusions

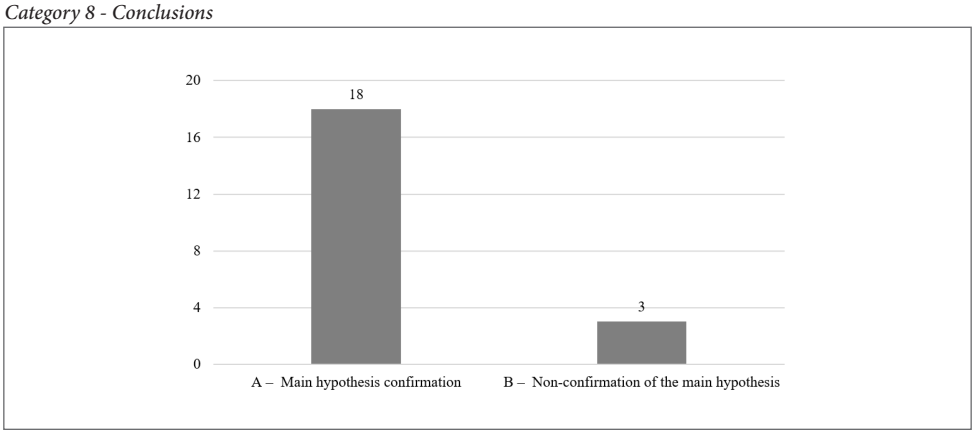
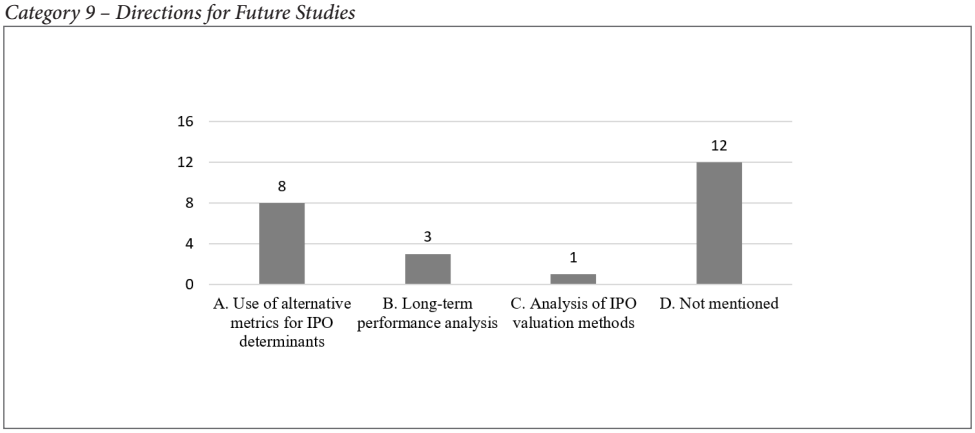


Figure 14

Category 9 – Directions for Future Studies



However, in twelve (50%) of the studies, the authors do not suggest future research paths, which encourages an analysis of this issue in greater depth. Furthermore, these results corroborate those addressed in Category 3 – Methodologies and Category 7 – Results. They highlight the need to use different cross-sectional regression methods (A) and low levels of new conclusions (C), respectively.

5. Conclusions

Striving to identify IPO underpricing determinants, this paper reports on structured research conducted through the WoS database, from which 21 papers were selected as the final sample. The study of these papers employs the bibliometric analysis and systematic review methodologies.

As a result, the main theories related to underpricing are found to be informational asymmetry, agency, and signaling, with the former appearing more frequently. These theories are tested mainly through cross-sectional regression models. The main underpricing determinants include the reputations of the underwriter and share issuer, as well as corporate governance and offering size. Looking at data origin, there are studies on companies in developed countries (USA, France, Denmark, and Greece) and in developing nations (India, Indonesia, China, North and West Africa and the Middle East). However, there is a lack of specific studies on companies in Latin American countries or comparing IPOs worldwide.

Another research opportunity is related to the use of a behavioral approach to underpricing analysis. The aim is to consider factors such as retail investor motivations and the tone of news coverage during the run-up to the IPO. Additionally, analyses of knowledge gaps related to the presence of institutional investors (private equity and venture capital funds) as IPO inducers are suggested. The purpose is to explore how underpricing impacts the results of these funds and how their presence influences underpricing through simultaneity analyses. This gap is shown in Figure 9, which reveals that the least studied IPO determinant category is variables linked to shareholder characteristics.

Given the above, this study stands out from others for mapping the most relevant academic publications on the topic, helping identify major aspects related to IPO underpricing events. Among these aspects, the theories and methodologies used the most widely to prove the significance of the determinants of this phenomenon are highlighted. Furthermore, the characteristics of the samples used in these studies are described in detail, identifying data origins, analysis periods, results and conclusions, and directions for future research.

The limitations of this survey include using a single database (WoS) and papers written only in English. Finally, in addition to the above-mentioned aspects for the development of this topic, IPO underpricing investigations are suggested for listed companies with few trades outside major global business hubs.

Acknowledgment

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

References

Aggarwal, R. K., Krigman, L., & Womack, K. L. (2002). Strategic IPO underpricing, information momentum, and lockup expiration selling. *Journal of Financial Economics, 66*(1), 105-137. https://doi.org/10.1016/S0304-405X(02)00152-6.

Agustina, L., & Clara, A. (2021). An investigation of IPOs initial performance in Indonesian market. *Global Business Review,* 1-19. https://doi.org/10.1177/0972150920976640

Arugaslan, O., Cook, D. O., & Kieschnick, R. (2004). Monitoring as a motivation for IPO *underpricing*. *Journal of Finance, 59*(5), 2403-2420. https://doi.org/10.1111/j.1540-6261.2004.00703.x

Baron, D. P. (1982). A model of the demand for investment banking advising and distribution services for new issues. *Journal of Finance, 37*(4), 955-976. https://doi.org/10.2307/2327760

Beatty, R. P., & Welch, I. (1996). Issuer expenses and legal liability in initial public offerings. *Journal of Law & Economics, 39*(2), 545-602. https://www.jstor.org/stable/725716

Booth, A. D. (1967). A "law" of occurrences for words of low frequency. *Information and Control*, *10*(4), 386-393. https://doi.org/10.1016/S0019-9958(67)90201-X

Bradford, S. C. (1934). Sources of information

on scientific subjects. *Engineering: An Illustrated Weekly Journal*, *137*, 85-86. https://doi.org/10.1177/016555158501000407

Brazilian Securities and Exchange Commission (BSEC). (2003). *Normative Instruction nº 400/2003.* http://conteudo.cvm.gov.br/legislacao/instrucoes/inst400.html

Brazilian Securities and Exchange Commission (BSEC). (2009). *Normative Instruction nº 476/2009*. http://conteudo.cvm.gov.br/legislacao/instrucoes/inst476.html

Carter, R., & Manaster, S. (1990). Initial public offerings and underwriter reputation. *Journal of Finance, 45*(4), 1045-1067. https://doi.org/10.1111/j.1540-6261.1990.tb02426.x.

Chahine, S., & Tohmé, N. S. (2009). Is CEO duality always negative? An exploration of CEO duality and ownership structure in the Arab IPO context. *Corporate Governance: An International Review, 17*(2), 123-141. https://doi.org/10.1111/j.1467-8683.2008.00724.x

Chung, K.H., & Cox, R. A. K. (1990). Patterns of productivity in the finance literature: A study of the bibliometric distributions. *Journal of Finance, (45)*1, 301-309. https://doi.org/10.1111/j.1540-6261.1990.tb05095.x

Cliff, M. L. I., & Denis, D. J. (2004). Do initial public offering firms purchase analyst coverage with *underpricing*? *Journal of Finance, 59*(6), 2871-2901. https://doi.org/10.1111/j.1540-6261.2004.00719.x

Damardi, S., & Gunawan, R. (2013). Underpricing, board structure, and ownership an empirical examination of Indonesian IPO firms. *Managerial Finance, 39*(2), 181-200. https://doi.org/10.1108/03074351311294016

Dhamija, S., & Arora, R.K. (2017). Initial and aftermarket performance of SME IPOs in India. *Global Business Review 18*(6), 1536-1551. https://doi.org/10.1177/0972150917713081

Francis, B. B., Hasan, I., Lothian, J. R., & Sun, X. (2010). The signaling hypothesis revisited: Evidence from foreign IPOs. *Journal of Financial and Quantitative Analysis, 45*(1), 81-106. https://doi.org/10.1017/S0022109010000037

Fu, X. D., Lian, Q., Tang, T., & Wang, Q. (2015). An empirical study of executive option grants around initial public offerings. *Quarterly Review of Economics and Finance*, *57*, 207-221. https://doi.org/10.1016/j.qref.2015.02.002

Gao, S., & Hou, T. C. T. (2019). An empirical examination of IPO *underpricing* between high-technology and non-high-technology firms in Taiwan. *Journal of Emerging Market Finance, 18*(1), 23-51. https://doi.org/10.1177/0972652719831535

Habib, M. A., & Ljungqvist, A. P. (2001). Underpricing and entrepreneurial wealth losses in IPOs: Theory and evidence. *Review of Financial Studies, 14*(2), 433–458. https://doi.org/10.1093/rfs/14.2.433

Hearn, B. (2011). The impact of corporate governance measures on the performance of West African IPO firms. *Emerging Markets Review 12*(2), 130-151. https://doi.org/10.1016/j.ememar.2011.02.004

Hopp, C., & Dreher, A. (2013). Do differences in institutional and legal environments explain cross-country variations in IPO underpricing? *Applied Economics, 45*(4), 435-454. https://doi.org/10.1080/00036846.2011.605760

Huyghebaert, N., & Hulle, C. V. (2006). Structuring the IPO: Empirical evidence on the portions of primary and secondary shares. *Journal of Corporate Finance, 12*(2), 296-320. https://doi.org/10.1016/j.jcorpfin.2005.01.001.

Hunt-McCool, J., Koh, S.C., & Francis, B. B. (1996). Testing for deliberate underpricing in the IPO premarket: A stochastic frontier approach. *Review of Financial Studies, 9*(4), 1251-1269. https://doi.org/10.1093/rfs/9.4.1251

Ibbotson, R. G. (1975). Price performance of common stock new issues. *Journal of Financial Economics, 2*(3), 235-272. https://doi.org/10.1016/0304-405X(75)90015-X.

Jamaani, F., & Ahmed, A. D. (2020). Simultaneous effects of clustering and endogeneity on the underpricing difference of IPO firms: A global evidence. *Research In International Business and Finance, 54,* 1-26. https://doi.org/10.1016/j.ribaf.2020.101250

Kaur, A., & Singh, B. (2019). Edifying role of corporate reputation in new issue market: Indian evidence. *Asia-Pacific Journal of Business Administration, 11*(2), 159-170. https://doi.org/10.1108/APJBA-06-2018-0098

Kenourgios, D. F., Papathanasiou, S., & Melas, E. R. (2007). Initial performance of Greek IPOs, underwriter's reputation and oversubscription. *Managerial Finance, 33*(5), 332-343. https://doi.org/10.1108/03074350710739614

La Rocca, T. (2021). Do prestigious underwriters shape IPO pricing? A meta-analytic review. *Review of Managerial Science, 15*, 573–609. https://doi.org/10.1007/s11846-019-00356-1

Li, X. R., Wang, S. S., & Wang, X. (2019). Trust and IPO underpricing. *Journal of Corporate Finance, 56*, 224-248. https://doi.org/10.1016/j.jcorpfin.2019.02.006

Lin, H. L, Pukthuanthong, K. & Walker, T. J. (2013). An international look at the lawsuit avoidance hypothesis of IPO underpricing. *Journal of Corporate Finance, 19*, 56-77. https://doi.org/10.1016/j.jcorpfin.2012.10.003

Liu, X., & Ritter, J. R. (2011). Local underwriter oligopolies and IPO underpricing. *Journal of Financial Economics, 102*, 579-601. https://doi.org/10.1016/j.jfineco.2011.01.009

Ljungqvist, A., Wilhelm, W. J. (2003). IPO pricing in the dot.com bubble. *Journal of Finance, 58*(2), 723-752. https://doi.org/10.1111/1540-6261.00543

Lotka, A. J. (1926). The frequency distribution of scientific productivity. *Journal of the Washington Academy of Sciences, 16*(12), 317-323. https://www.jstor.org/stable/2452920

Loughran, T., & Ritter, J. R. (2002). Why don´t issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies, 15*(2), 413-444. https://doi.org/10.1093/rfs/15.2.413

Ong, C. Z., Mohd-Rashid, R., & Taufil-Mohd, K. N. (2020). Do institutional investors drive the IPO valuation? *Borsa Istanbul Review, 20*(4), 307-321. https://doi.org/10.1016/j.bir.2020.05.003

Paleari, S., Signori, A., & Vismara S. (2014). How do underwriters select peers when valuing IPOs? *Financial Management, 43*(4), 731-755. https://doi.org/10.1111/fima.12060

Pao, M. L. (1978). Automatic text analysis based on transition phenomena of word occurrences. *Journal of the American Society for Information Science, 29*(3), 121-124, https://doi.org/10.1002/asi.4630290303

Rathnayake, D. N., Louembé, P. A., Kassi, D. F., Sun, G., & Ning, D. (2019). Are IPOs underpriced or overpriced? Evidence from an emerging market. *Research in International Business and Finance, 50*, 171–190. https://doi.org/10.1016/j.ribaf.2019.04.013

Ritter, J. R., & Welch, I. (2002). A review of IPO activity, pricing, and allocations. *Journal of Finance, 57*(4), 1795-1828. https://doi.org/10.1111/1540-6261.00478

Rock, K. (1986). Why new issues are underpriced. *Journal of Financial Economics 15*, 187-212. https://doi.org/10.1016/0304-405X(86)90054-1.

Roosenboom, P. (2012). Valuing and pricing IPOs. *Journal of Banking and Finance*, 36(6), 1653–1664. https://doi.org/10.1016/j.jbankfin.2012.01.009

Sahoo, S. (2017). Do anchor investors create value for initial public offerings? An empirical investigation. *IIMB Management Review, 29*(4), 259-275. https://doi.org/10.1016/j.iimb.2017.11.004

Sohail, M. K., Raheman, A., Zakaria, M., & Farhat, R. (2018). *IPO underpricing phenomenon on the Karachi Stock Exchange*. *Argumenta Oeconomica, 2*, 225-255. http://dx.doi.org/10.15611/aoe.2018.2.10.

Sono, C. H. (2022). Information quality and IPO underpricing: The role of underwriter pricing and allocation powers. *Pacific-Basin Finance Journal, 75*, 101853. https://doi.org/10.1016/j.pacfin.2022.101853

Sosnowski, T. (2017). Earnings management and the floatation structure: Empirical evidence from Polish IPOs. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 12*(4), 693–709. https://doi.org/10.24136/eq.v12i4.36

Vismara, S., Signori, A., & Paleari, S. (2015). Changes in underwriters' selection of comparable firms pre and post IPO: Same bank, same company, different peers. *Journal of Corporate Finance, 34*, 235-250. http://dx.doi.org/10.1016/j.jcorpfin.2015.07.010.

Wang, X., Song, D., (2021). Does local corruption affect IPO *underpricing*? Evidence from China. *International Review of Economics & Finance, 73*, 127-138. https://doi.org/10.1016/j.iref.2021.01.007

Welch, I. (1989). Seasoned offerings, imitation costs, and the *underpricing* of initial public offerings. *Journal of Finance, (44)*2, 421-449. https://doi.org/10.1111/j.1540-6261.1989.tb05064.x.

World Bank (2021). *New World Bank country classifications by income level*: *2021-2022*. https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022

Xu, Z. J., Wang, L., & Long, J. (2017). The impact of director's heterogeneity on IPO underpricing. *Chinese Management Studies 11*(2), 230-247. https://doi.org/10.1108/CMS-05-2016-0095

Zipf, G. K. (1949). *Human behavior and the principle of least effort: An introduction to human ecology*. Addison-Wesley Press