Underpricing Phenomenon of Public Offering of Shares: A Theoretical and Empirical Review [1]

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Abstract

This study aims to review the extant literature on underpricing of initial public offerings and its determining factors using systematic review by selecting quality papers from the Web of Science, Scopus and Google Scholar databases. The study investigates major theories and the past empirical works undertaken across global markets. The study shows that the level of underpricing of IPOs is the lowest in the developed markets, moderate in the emerging markets, and it is the highest in the Middle East countries. In case of Nepal, very limited empirical literature has been documented, where IPOs are highly underpriced and largely oversubscribed. The review also indicates that no single effort of identifying the 'hot issue' market is made in the academic community. Additionally, the analysis of sectoral and year-wise underpricing is totally ignored in the Nepali studies. Prior studies of Nepal are yet to identify the important factors that influence deeper initial underpricing of IPOs. In essence, they failed to test the theoretical explanations of IPO underpricing in the Nepali context. Thus, this review suggests that there is an urgent need of undertaking studies considering common methodologies to test the existing theories that could be beneficial to investors, policy makers, issuing firms, and market intermediaries. Besides, future researchers can conduct review of underpricing phenomenon employing sophisticated research designs like bibliometric analysis and meta-analysis to explore niche area of research in this field.

***Keywords*:** Hot issue market, information asymmetry, offer price, subscription rates

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Introduction

Returns from public offering of shares for the first-day trading are referred to as initial returns. It is well-defined as the percentage change of the closing price of initial public offering (IPO) on the first-day trading in the secondary market relative to the offer price (Du, 2014), and is widely known to be an underpricing. The degree of underpricing is termed as "issue price discount", signifying that firms leave a substantial amount of money on the table (Wong & Chiang, 1986). Rock (1984) further contended that the offering firm must price the shares at a discount to confirm that uninformed investors buy the shares issued. Mauer and Senbet (1992) stated differently that underpricing characterizes the difference between the secondary market price and the equivalent primary market price. Thus, Loughran et al. (1994) precisely argued that underpricing generally occurs in virtually all of the IPO markets around the world.

A seminal work by Reilly and Hatfield (1969) recommended various possible reasons for viewing underpricing of new issues as 1) underwriters are incapable to assess how investors will gauge new equity offerings because these issues lack a prior trading history; 2) underwriters deliberately set the offering price low to increase the likelihood of the issue's success; 3) as underwriters have inadequate capital relative to the volume of underwriting, they favor to sell the securities quickly; 4) underwriters are allowed to take stabilizing actions during periods of high market volatility; and 5) underwriters gain directly from a successful offering, either through fees paid in stock or by having the option to buy a large number of shares at or lower the offering price. Further, Lowry and Schwert (2002) claimed that periods of high underpricing are naturally followed by high IPO volume, and is generally known as the "hot issue" market.

Benveniste and Spindt (1989) advocated that the underpricing is a means to encourage informed investors to reveal private information about the demand of shares in the pre-selling phase. Uninformed investors cannot distinguish between good and bad issues, therefore, they face a "winner's curse" problem because of the adverse selection externalities. However, the issue price discount and/or underpricing is profit to the IPO investors, while it is a wealth loss to the original shareholders of issuing firms.

Ritter (1991) presented three anomalies of IPO pricing: (i) new issue underpricing, (ii) cycles in the extent of underpricing, and (iii) long-run underperformance. The anomaly first asserts that the underpricing of IPOs is a global

phenomenon (Wong & Chiang, 1986). The second anomaly emphasizes on cycles in the level of underpricing indicating some stocks issues have risen from their offering prices to higher than the average price in the aftermarket. The third anomaly states that the returns from IPO decrease in the long-run. Decreasing trends and even negative earnings by the investors in the long-run from IPO shares is regarded as long-run underperformance. It occurs due to listing day overpricing that gradually turns to a reasonable corrections (Perera, 2014).

Given this context, the present study is mainly associated with the first anomaly i.e., understanding of IPO underpricing phenomenon. As it is rarely found a systematic review of previous works with respect to underpricing of IPOs, this paper tries to extract the various facets concerning the topic at hand. Thus the paper sets three major objectives: first, to provide theoretical insights of underpricing, second, to discuss major empirical works documented in IPO underpricing and third, to identify research gaps and suggest future research agenda on underpricing of new issues.

The rest of the paper follows the methods of the study tracked by theoretical review and search of study trends along with synthesizing the study results, and it ends with conclusions containing research gaps and agenda for future research.

Methods of the study

A quantitative approach to identify the trends and developments of studies on IPO underpricing has been employed in this study. In the first step of a systematic review, there is a search for reliable major keywords related to the study - IPO underpricing, initial return, and first-day return. Thus, all possible keywords were used in the study to ensure its comprehensiveness.

Secondly, the databases for searching scholarly works are chosen based on their importance and relevance. Web of Science, Scopus, and Google Scholar which provide a detail works associated with this area are taken into account. The works searched using Web of Science and Scopus databases provide a high-quality research papers with comprehensive coverage (Singh et al., 2021). From each database, the researcher searched papers using the selected keywords. Research works searched using Google Scholar is easily accessible elsewhere, while the research papers of Web of Science and Scopus databases have been collected from Ratan Tata Library, Delhi School of Economic, University of Delhi.

Finally, the collected papers (data) were screened and sorted based on eligibility, and aloof the reproductions. The final data was employed for the analysis. Data analysis begins with identification of the major theories which explains the underpricing of IPOs followed by presentation of empirical works in tabular forms dividing it into three phases such as a) empirical evidence on IPO underpricing prior to 2000; b) empirical evidence from 2000 to 2014; and c) empirical evidence from 2015 onwards. Further, data associated with cross-sectional regressions of major variables explaining underpricing are tabulated along with major findings of the studies. Then the results are discussed and synthesized, research gaps are identified and suggested agenda for future research.

Theoretical review and synthesizing study results

A theoretical explanation for the underpricing phenomenon is linked to uncertainty and information asymmetry among the issuer, the underwriter, and the investor(Perera, 2014). Ljungqvist (2004) categorized the most influential theories into three main categories: asymmetric information, institutional explanations, and behavioral explanations.

Explanations based on information asymmetry theories

Information asymmetry is one of the primary reasons for IPO underpricing. Rock (1986) advocated the informed investors, especially institutional investors, subscribe only to “good issues,” and stay away when “bad issues” come to the market. This will lead to most of the allocations of 'bad issue' garners by the uninformed investors in the IPO process. This often happens because of the information asymmetry and rationing may lead to Akerlof's (1970)lemons problem. Uninformed investors would suffer from the *"winner's curse"* when trading with informed investors (Perera, 2014). Further, Baron (1982) assumes that the issuer (principal) is less informed than the investment banker(agent), often known to be an *'agency problem'* (Loughran & Ritter, 2002). It is argued that the underwriters are well informed by employing their greater market knowledge, and take benefit of this superior information by inducing the degree of underpricing to lessen their distribution efforts. Beatty and Ritter (1986) contended that if uncertainty about the value of the new issue is high, underpricing of that new issue is also high. In this regard, Ritter (2004) introduced the *changing risk composition hypothesis*, assuming riskier IPOs will be highly underpriced than less risky IPOs. Proxies like firm age, issue size, use of IPO proceeds, and type of IPO firm (Jenkinson & Ljungqvist, 2001) have been used to text the *uncertainty hypothesis.*

Welch (1989) stated that high-quality firms consciously choose an offer price below the intrinsic value to signal their quality to investors. The underpricing, as such, is motivated by the likelihood of achieving a higher offer price in the successive seasoned issues. Therefore, underpricing is a kind of appetizer for subsequent issues in the aftermarket supporting to*Signaling hypothesis*. Habib and Ljungqvist (2001) argued that by incurring information production costs, IPO issuers can reduce the information asymmetry appointing reputable underwriters to decrease underpricing. Because of the higher reputational capital, such underwriters can lessen the information asymmetry leading to decreasing underpricing. Therefore, the *wealth losses* of issuers, due to underpricing, are minimized (Habib & Ljungqvist, 2001).

Explanations based on institutional theories

The institutional explanations for IPO underpricing were developed in the US stock market. Tinic (1988) proposes the *lawsuit avoidance hypothesis* because of the existence of litigious characteristics of American investors. The likelihood of a linkage between IPO underpricing and litigation risk goes back to Logue (1973), Ibbotson (1975), and Tinic (1988), who propose that US IPO issuers deliberately under price the value of their shares at the time of offering to avoid probable litigation risk arising from dissatisfied investors due to poor post-IPO performance. Underpricing, thus, can be understood as a form of insurance against legal liability and likely reputational damages (Coste, 2020). The empirical validity of the lawsuit avoidance hypothesis is a US-centric model while the phenomenon of IPO underpricing is global.

The *price stabilization theory* envisages that the price support service of underwriters offer for the post-IPO price stabilization. The price support service by underwriters interferes in the aftermarket to reduce potential price drops for a few days or weeks. However, the statistical validity of this theory is proved in the US market on the empirical work carried out by Ruud (1993) and Ellis et al. (2000). The *tax argument hypothesis* arises as a third institutional-based explanation for IPO underpricing, which is mainly inspired by the trade-off between tax benefits and underpricing of IPO firms. Rydqvist (1997) empirically explores this tax benefit-based rationale in the Swedish IPO market. Similarly, Guenther and Willenborg (1999) documented similar evidence in the US IPO market.

Explanations based on behavioral finance

This section presents the *informational cascades* as a behavioral explanation where the major argument is that the IPO market is prone to irrational investors who bid up the price of IPO shares beyond their true value. Welch (1992) presents an equilibrium model arguing the IPO market is subject to 'cascades.' According to Welch (1992), "if an investor sees that no one else wants to buy, he may decide not to buy even when he has favorable information" (p. 997). Thus, they will imitate the purchasing decisions of their predecessors, which is also known to be herding behavior or a bandwagon effect (Ritter, 1998). Hence, the presence of informational cascades among IPO investors can explain IPO underpricing.

Prospect theory assumes that people focus on change in wealth rather than the level of wealth (Kahneman & Tversky, 1979). Ritter (2003b) suggested that it is easy to understand why underwriters would like to leave money on the table, regardless of the fact that issuers do not get disappointed about leaving money. Loughran and Ritter (2002b) described that the majority of the IPOs leave comparatively little money on the table, and some IPOs leave a large sum of money on the table. By assimilating loss and gain, issuers are blissful to leave money on the table. Further, they argued that leaving money on the table is an indirect compensation to the underwriter and an indirect cost to the issuing firm. They concluded that the results of prospect theory can be used to explain the hot issue market phenomenon, known as extraordinarily high underpricing and IPO volume (Helwege & Liang, 2001).

Empirical works on underpricing and synthesizing the results

This section analyzes the review of empirical works on underpricing or initial returns, which is categorized into four groups as:a) empirical evidence prior to 2000; b) empirical evidence from 2000 to 2015; c) empirical evidence on underpricing after 2015; and emprical evidence on hot and cold issue markets. Table 1 presents the empirical evidence of IPO underpricing prior to 2000.

Table 1

Empirical Evidence on Underpricing Phenomenon prior to 2000

Country	Author/s (Year)	Sample size	Study period	Underpricing (%)
United States	Reilly & Hatfield (1969)	53	1963-1965	9.90
	Ibbotson et al. (1994)	8668	1960-1987	16.37
United	Davis & Yeomans (1976)	174	1965-1971	8.50
Kingdom	Levis (1993)	712	1980-1988	14.30

Hong Kong	Dawson (1987)	21	1978-1983	13.80
Singapore	Lee et al. (1996)	132	1973-1992	31.39
France	Jenkinson & Mayer (1988)	11	1986-1987	5.10
Malaysia	Dawson (1987)	21	1978-1983	166.67
Korea	Dhatt et al. (1998)	477	1980-1996	74.30
China	Su & Fleisher (1999)	308	1987-1995	948.59
Canada	Jog & Riding (1987)	100	1971-1983	11.00
Brazil	Aggarwal et al. (1993)	62	1980-1990	78.50
Germany	Wasserfallen & Wittleder (1994)	92	1961-1987	17.58
Japan	Dawson & Hiraki (1985)	106	1979-1985	51.90
Switzerland	Kunz & Aggarwal (1994)	42	1983-1989	35.80
Netherlands	Wessels (1989)	46	1982-1987	5.10
Greece	Kazantzis & Levis (1995)	79	1987-1991	8.50
Australia	Finn & Higham (1988)	93	1966-1978	29.20
Thailand	Wethyavivorn & Koo-Smith (1991)	32	1988-1989	56.70
India	Madhusoodanan & Thiripalraju (1997)	1922	1992-1995	294.80

Source: Review of literature.

Several studies on the pricing of IPOs are available in the IPO markets like developed, emerging and underdeveloped markets. However, Table 1 reported the degree of underpricing of developed capital markets, which is generally lower than that of emerging and underdeveloped capital markets. A seminal work by Reilly and Hatfield (1969) documented the performance of 53 new equity issues with an average underpricing of 9.90 percent in US. Similarly, another study by Ibbotson (1975) found that mean initial performance is positive of 11.4 percent while the systematic risks of new issues are greater than the systematic risk of the market. Furhter, Levis (1993) documented a 14.30 percent underpricing for the period of 1980 to 1988. They indicate that IPO underpricing was higher in US markets than in UK.

An average underpricing of 78.50 percent (Brazil), 2.80 percent (Mexico), and 16.70 percent (Chile) were found during 1980s and early 1990s (Aggarwal et al., 1993). Dawson and Hiraki (1985) reported a 51.90 percent underpricing of 106 new issues in Japan during 1979 to 1985.However, Su and Fleisher (1999) found an initial return of 948.59 percent for A-share offerings in Chinese market, which is extremely higher. They reported that this has happened due to the privatization of state-owned enterprises in china during 1990s.In Indian market, the annual average underpricing of IPOs was as high as 294.80 percent (Madhusoodanan & Thiripalraju, 1997).

The above evidence undoubtedly revealed that the underpricing of IPOs in developed markets is lower than that of the underpricing in emerging markets. However, the underpricing results indicate that there is excellent investment opportunity and very good returns in the first-day trading of new issues in almost all the the markets.

Table 2

Empirical Evidence on Underpricing Phenomenon during 2000 to 2014

Country	Author/s (Year)	Sample size	Study period	Underpricing (%)
United States	Habib & Ljungqvist (2001)	1376	1991-1995	13.80
	Butler et al. (2014)	5573	1981-2007	20.10
United Kingdom	Chambers & Dimson (2009)	NA	1989-2007	19.00
Australia	Steen et al. (2001)	177	1989-1998	29.20
Austria	Aussenegg (2007)	67	1984-1996	6.50
Netherland	Van Frederikslust & Vandar Geest (2003)	106	1985-1987	16.00
Poland	Jelic & Briston (2003)	140	1991-1998	27.40
Egypt	Omran (2003)	53	1994-1998	8.40
Portugal	Borges (2007)	57	1988-2004	11.12
South Africa	Heerden & Alagidede (2012)	138	2006-2010	108.33
Mauritius	Agathee et al. (2012)	44	1989-2010	13.14
Singapore	Reber & Fong (2006)	100	1998-2000	18.00
Malaysia	Low & Yong (2011)	368	2000-2007	30.83
China	Ma (2005)	1177	1991-2003	175.25
	Song et al. (2014)	948	2006-2011	66.30
Hong Kong	Lin & Hsu (2008)	171	1999-2004	6.09
Taiwan	Lin & Hsu (2008)	103	1999-2004	2.57
Iran	Karami et al. (2014)	91	2001-2011	11.17
India	Singh & Mittal (2000)	500	1992-1996	82.22
Pakistan	Sohail & Raheman (2010)	73	2000-2009	42.17
Bangladesh	Hasan & Quayes (2008)	43	1991-1997	108.00
Sri Lanka	Samarakoon (2010)	105	1987-2008	34.00
Nepal	Dahal (2007)	107	1994-2006	53.25

Source: Review of Literature.

One of the studies undertaken by Habib and Ljungqvist (2001) on underpricing and entrepreneurial wealth losses in IPOs documented a 13.80 percent underpricing of new issues in US markets. They concluded that the reason for higher degree of

underpricing is about to less care of owners and fewer expend of resources to minimize it. Table 2 further presents the study by Daugherty and Jithendranathan (2012) who documented an underpricing of IPOs of US family-controlled businesses and found an 20.03 percent of new issue returns, which is less than non-family-controlled businesses. In United Kingdom, the level of underpricing was recorded an average of 19.00 percent during (Chambers & Dimson, 2009), which is similar to US markets. Similarly, the mean underpricing of Australian market was documented to 29.20 percent (Steen et al., 2001). This indicates that the IPO initial returns of Australian market is higher than that of US and UK markets, while it is only 6.50 percent in austrian market (Aussenegg, 2007).

Ma (2005) examined the causes of the high first-day returns of Chinese firms and found that an average underpricing of 175.21 percent, which is larger than those of other markets. The extremely high first-day returns of China's IPOs are mainly generated from on-market overpricing. Heerden and Alagidede (2012) found an average underpricing of 108.33 percent for the period 2006-2010 in South Africa. Likewise, underpricing of 108.00 percent and 99.25 percent were recorded in Bangladeshi (Hasan & Quayes, 2008) and Malaysian market (Jelic et al. 2001) respectively. The average underpricing of IPOs for the later periods reduced relatively such as 66.30 percent in China (Song et al. 2014), and 46.55 percent in India (Sahoo & Rajib, 2010), 42.17 percent in Pakistan (Sohail & Raheman, 2010), and 34.00 percent in Sri Lankan market (Samarakoon, 2010). Samarakoon also found that small issues are more underpriced than that of large issues, while the privatization issues are more underpriced than conventional issues in Sri Lankan market. Dahal (2007) reported an average annual market-adjusted return is 53.25 percent for 107 IPOs.

These empirical evidence indicate that the degree of IPO underpricing in emerging market have gradually decreasing, however, it is comparatively higher in emerging markets than that of developed markets.

Table 3

Empirical Evidence on Underpricing Phenomenon from 2015 Onwards

Country	Author/s (Year)	Sample size	Study period	Underpricing (%)
United States	Croes (2017)	294	2010-2017	19.81
Canada	Killins (2018)	73	2010-2017	1.45
Central& Eastern Europe	Zasepa (2015)	401	2000-2012	11.00

Australia	Ferdous et al. (2021)	211	2011-2015	17.34
Spain	Ramirez et al. (2018)	567	2002-2009	18.81
Italy	Bajo & Raimondo (2017)	2814	1995-2013	27.00
Brazil	Afik & Svetlana (2021)	1141	2001-2018	26.32
Egypt	Ahmed et al. (2022)	710	2013-2017	78.00
New Zealand	Dang (2023)	99	1991-2017	3.4 to 3.8
Bahrain	Alanazi & Al-Zoubi (2015)	7	2003-2010	24.40
Kuwait	Alanazi & Al-Zoubi (2015)	9	2003-2010	182.60
Oman	Alanazi & Al-Zoubi (2015)	11	2003-2010	49.60
Qatar	Alanazi & Al-Zoubi (2015)	12	2003-2010	215.10
United Arab Emirates	Alanazi & Al-Zoubi (2015)	24	2003-2010	270.10
Saudi Arabia	Alanazi & Al-Zoubi (2015)	76	2003-2010	265.50
China	Dong & Gu (2018)	1156	2006-2014	55.28
Malaysia	Khin et al. (2017)	313	2008-2016	9.40
Thailand	Komenkul & Siriwattanakul (2016)	246	2001-2012	25.40
India	Bantwa & Bhatt (2021)	350	2007-2015	16.30
Pakistan	Mehmood et al. (2020)	85	2000-2017	33.23
Sri Lanka	Rathnayake et al. (2019)	148	1991-2017	47.10
Nepal	Pradhan and Shrestha (2016)	61	2005-2011	200.16
	Gurung (2020)	63	2010-2019	276.87

Source: Review of Literature.

Table 3 presents the major findings of IPO underpricing from 2015 onwards. In this regard, Croes (2017) documented an approximately mean underpricing of 20.00 percent for the period of 2010-2017, while the Canadian IPO market has shown as one of the least underpriced in the world markets (Killins, 2018) having only 1.45 percent. Alanazi and Al-Zoubi (2015) undertaken a study on IPO underpricing in emerging economies, Gulf Cooperation Council (GCC) region, consisting of Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates (UAE) and Oman for the period between 2003 and 2010. The U.A.E. and Saudi Arabia has the highest adjusted underpricing at 270.10 percent and 266.50 percent respectively. Kuwait and Qatar also show similar results, with significant underpricing of 182.60 and 215.10 percent. In contrast, Oman and Bahrain reveal only moderate degrees of underpricing of about 50.00 percent and 24.40 percent respectively. For the whole sample of 139 IPOs in the GCC, IPOs are underpriced by 227.40 percent during the period. However, IPO underpricing is as low in Malaysian

market with 28.90 percent (Tajuddin et al., 2015) and only 9.40 percent (Khin et al., 2017). Similarly, Komenkul and Siriwattanakul (2016) reported 25.40 percent level of underpricing in Thai market.

Hawaldar et al. (2018) found an average underpricing of 28.85 percent for the both book-built and fixed-price, that went public between 2001 and 2015. The study also revealed that compared to fixed-price IPOs, book-built IPOs are underpriced by lesser magnitude in Indian IPO market. Rathnayake et al. (2019) reported an average underpricing of 47.10 percent and only 32 IPOs were overpriced by approximately 17-18 percent over the period under study. The result indicates that the degree of IPO underpricing in higher in Sri Lankan market. In regard to Nepal, Pradhan and Shrestha (2016) and Gurung (2020) documented an underpricing of 200.16 percent for 61 IPOs and 276.87 percent for 63 IPOs.

The level of IPO underpricing or first-day returns varies even across South Asian market that it is lower in India and Pakistan, moderately higher in Sri Lankan market, while it is extremely high in Nepali IPO market. The highest level of underpricing signifies a large sum of money Nepali IPOs left on the table compared to other markets when firms go public and it also indicates the market is inefficient in their pricing.

Table 4

Empirical Evidence on Hot and Cold Issue Markets

Country	Author/s (Year)	Sample size	Total study period	Average Underpricing (%)	Hot period Or market	Extraordinary Underpricing (%)	No. of IPO firms (Hot period)	Sector
United States	Ritter (1984)	1075	1977-1982	16.30	Jan 1980-Mar 1981	48.40	-	Natural resource issues (gas/oil)
Italy	Arosia et al. (2000)	-	-	-	Jan 1 1999 – May 1 2000	76.43	86	High-tech issues (Internet)
United States	Ljungqvist & Wilhelm (2003)	2178	1996-2000	-	1999-2000	89.00		High-tech issues: Dot-com Bubble
South Africa	Neneh & Smit (2013)	360	1996-2011	62.90	1996 **1997-1999** 2000-2005	11.29 **87.92** 8.17	-	Cold market **Hot market** Cold market

						2006-2007	**113.01**		**Hot market**
						2008-2011	-1.04		Cold market
India	Singh & Dhanda (2021)		373	2017-2020	-	**2017-2018**	-	**170**	**Hot market**
						2018-2019	-	**106**	**Hot market**
						2019-2020	-	7	Cold market
						2020	-	16	Cold market

Source: Review of Literature.

IPO market that follow a 'boom' or 'bust' cyclical pattern in the market is known as hot and cold markets (Ibbotson & Jaffe, 1975). Helwege and Liang (2005) stated that a hot IPO market is characterized by an unusually high volume of offerings, extremely high underpricing, frequent oversubscription of offerings, and, at times, concentrations in particular industries. Table 4 shows some major study findings with respect to hot and cold issue markets.

Empirical evidence showed that the hot IPO markets have been defined based on underpricing (Ritter, 1984), which was 48.4 percent on IPO common stock for the 15 months period starting in January 1980 through March 1981.Ritter concluded that high-risk IPOs are underpriced more than low-risk offerings, and the high average underpricing can be attributed almost entirely to just particular industry, i.e. natural resource issues -oil and gas. Further, Arosia et al. (2000) found an average IPO underpricing equal to 76.43 percent for 86 internet-stock IPOs listed on the EASDAQ and EURO-NM markets during January 1, 1999 to May 1, 2000. Mainly internet-stock IPOs had remarkably high underpricing in Europe, and the amount of money left on the table by internet-stock IPOs is more than 4.6 billion euros. Similarly, Ljungqvist and Wilhelm (2003) reported that internet IPO underpricing reached at extremely high levels with an average of 89.00 percent during 1999 and 2000, which is widely pronounced as the "dot-com bubble". The reason is the changes in ownership structure and insider selling behavior over the period that reduced decision-makers incentives caused higher underpricing.

Neneh and Smit (2013) documented two hot markets (with 87.92 percent and 113.01 percent underpricing) and three cold markets in the Johannesburg Stock Exchange. Additionally, based on the IPO volume, Singh and Dhanda (2021) found two 'hot issue' periods (2017/18 and 2018/19) and two 'cold issue'periods (2019/20 and 2020/21) in Indian markets during 2017-2020. Thus, the hot market can be categorized based on unusually high volume of offerings and the extraordinary high underpricing

leaving a considerable amount of money on the table. There is no even single empirical evidence on hot issue and cold issue markets in the Nepali context.

Cross-section of IPO underpricing

This section discusses about the cross-section of IPO underpricing over a period of time. In this regard, Rock (1986) observed that the equilibrium offering price includes a finite discount to guarantee the uninformed investors purchase the issue and rationing occurs when there is oversubscription. Rock, therefore, argued that the discount is a natural consequence which integrates asymmetric information and rationing. Another major study by Carter and Manaster (1990) found that the prestigious underwriters are associated with IPOs that have lower returns. They argued that prestigious underwriters are associated with lower risk offerings so as to less incentives to acquire information. Carter et al. (1998) documented that firm age has a negative effect on the underpricing leading to support ex-ante uncertainty hypothesis. Engelen and Essen (2010) documented that younger firms generate more ex-ante uncertainty about the firm's value; in turn, investors demand higher underpricing for newer firms.

Table 5

Major Study Findings on Factors Affecting IPO Underpricing

Author/s (Year)	Nature of the study	Major findings
Rock (1986)	Underpricing and subscription	The equilibrium offer price includes a finite discount to attract uninformed investors and rationing occurs if there is oversubscription occurs.
Carter & Manaster (1990)	IPOs and underwriter reputation	Prestigious underwriters are associated with IPOs that have lower returns.
Carter et al. (1998)	Underwriter reputation and initial returns	Underwriter reputation, gross proceeds or issue size, and the age of the firm have revealed a significant negative effect on market-adjusted initial returns of IPOs.
Omran (2003)	Initial and aftermarket performance of share issue	Ex-ante uncertainty proxied by standard deviation of daily returns of one year following official listing, and times offer subscribed in shares have a significant positive impact on the initial excess returns.
Aussenegg (2007)	Underpricing and aftermarket performance of	The relation between ex-ante uncertainty (volatility) as well as Vienna Stock Exchange Share Index (market index) with that of underpricing is significantly positive in Austrian market.

	IPOs	
Samarakoon (2010)	Short-run underpricing of Sri Lankan stock market	Underpricing decreases with issue size. Investor sentiment proxied by cumulative market return for the 3-month period ending the day before the first day of trading, privatization of IPOs, hot issue markets, size of underwriter, and the plantation industry have a significant positive effect on underpricing.
Agathee et al. (2012)	Underpricing of IPOs in Mauritius stock exchange	Firms will underprice less if they are financially stronger (Altman Z-score). Similarly, age of the firm is statistically significant at 10 percent level. There is a positive and marginally significant relationship between underpricing and the aftermarket risk level of the IPOs in the Mauritian market.
Pradhan & Shrestha (2016)	Performance of the initial public offering (IPO) in the Nepalese stock market	Firm size, reputation of issue manager, market condition, and subscription rates have positive and significant relationship with underpricing, while the issue size is negatively related.
Croes (2017)	IPO underpricing and information asymmetry	Market capitalization, venture capital backing, positive price revision and negative price revision have a positive significant relationship with the first-day returns of US IPOs.
Sundarsen (2018)	Signaling variables and initial returns	The signaling variables like underwriters' reputation, auditors' reputation, and ownership retention and firm size have significant positive relation with underpricing of IPOs. Only the variable market condition proxied by Stock Exchange index positively related to the underpricing in OECD countries.
Rathnayake et al. (2019)	Are IPOs underpriced or overpriced?	There is a positive and significant relationship between listing delay, investor sentiment, privatization issues, hot period issues and plantation dummy and average underpricing of IPOs, while gross proceeds and hotel dummy have a significant negative relation with average underpricing of IPOs in Sri Lankan markt.
Gurung (2020)	Assessing initial stock returns in Nepal	There is a significant positive relationship between subscription rates and underpricing returns while a weak relationship exists among size of the firm, age of the firm, issue size of IPOs, and market return with underpricing of IPOs.
Teti & Montefusco (2021)	Corporate governance and IPO underpricing	Size of the board of directors negatively related with underpricing, while the ownership of institutional investors and board members has positive relation on the degree of underpricing.
Sahoo &	Does syndicate	The subscription rate and book running lead managers has a

Sahoo (2022)	structure create value for IPOs?	positive relation with underpricing while syndicate size, offer size, age of the IPO firm, and cobook running lead managers have negative significant relation with underpricing of IPOs in India.

Source: Review of Literature.

Ma (2005) investigated the first-day returns of China's A-shares IPOs that have been ever listed on Shanghai and Shenzhen stock exchanges found that the government intervention proxied by the IPO offer price is negatively and the time elapse between offering and listing is positively related to the first-day return. Aussenegg (2007) reported a significant and positive relation between ex-ante uncertainty (volatility) and IPO underpricing implying that a higher ex-ante uncertainty leads a higher underpricing of IPOs. This finding indicates that Austrian IPO issued after upswing in the market experienced a higher underpricing than IPOs following a falling market.

Agathee et al. (2012) found that firms will underprice less if they are financially stronger. There is a positive and marginally significant relationship between underpricing and the aftermarket risk level of the IPOs in the Mauritian market. Using 948 IPOs of Chinese firms, Song et al. (2014) found that value of value of uncertainty, underwriter's reputation, and existence of pricing regulation, are positively related to underpricing. Investor sentiment has a positive effect on overvaluation but has no effect or a negative effect on underpricing. Moreover, earnings per share, age of the firm, and issue size are found negative and significantly related to the underpricing of Chinese market.

Pradhan and Shrestha (2016) documented that firm size, reputation of issue manager, market condition, and subscription rates have positive and significant relationship with underpricing, while the issue size is negatively related.Croes (2017) found that market capitalization, venture capital backing, and positive price revision have a positive significant relationship with the first-day returns. Therefore, these results indicate that information asymmetry affects the level of underpricing in US IPOs. Sundarsen (2018) found that signaling variables like underwriters' reputation, auditors' reputation, and ownership retention and firm size have significant positive relation with underpricing of IPOs. Only the variable market condition proxied by Stock Exchange index positively related to the underpricing in OECD countries. Gurung (2020) documented a significant positive relationship between subscription rates and underpricing returns while a weak relationship exists among size of the firm, age of the firm, issue size of IPOs, and market return with underpricing of IPOs. Teti and Montefusco (2021) found that size of the board of directors negatively related with

underpricing, while the ownership of institutional investors and board members has positive relation on the degree of underpricing. Sahoo and Sahoo (2022) found a negative relation of offer size, age of the firm, cobook running lead managers i.e., number of co-managers managing the issue with underpricing in India.

Thus, empirical evidence like subscription rates has associated positively with underpricing of IPOs (Rock, 1986; Omran, 2003; Pradhan & Shrestha, 2016; Gurung, 2020; Sahoo & Sahoo, 2022) leads to corroborate with winner's curse and information cascades theories, which state that uninformed investors lack special knowledge about the firm consequently they may participate in bad issues depending on the the market rumor. Further, the findings related to negative association between prestigious underwriters underpricing (Carter & Manaster, 1990; Carter et al. 1998) is aligned not with the principal-agent theory. However, the findings of Song et al. (2014), Pradhan and Shrestha (2016), and Sundarsen (2018) showed a positive relation between underwriter reputation and underpricing leading to support the theory and it also captures the problem of information asymmetry between IPO issuers and underwriters.

Conclusions

The foregoing section discusses theories of underpricing, empirical evidence on underpricing along with associated factors determining underpricing of IPOs at a greater details. Relying on this extensive discussion, this paper apparently identified the research gaps in the area of IPO underpricing in Nepal and further suggests some directions for the future works.

The extant literature described underpricing as a deliberate and conscious choice of the company to compensate investors who are not in access of information, and also indicate a signal to the quality of the firm especially in the context of developed stock markets. However, there is ongoing debate as to whether observed underpricing is on account of companies' deliberate undervaluing at the offer price or are the listing gains on account of investor sentiment in emerging economies like India, China and other markets. There are very limited studies in this area, which revealed a very high degree of underpricing of IPOs in the context of Nepal. Additionally, the systematic studies on sector- and year-wise measure of underpricing of IPOs have been totally ignored to date. So far studies do not raise the subject of how much money IPO firms left when they go public due to underpricing, an indirect cost of firm's going public. Besides, the identification of 'hot issue' and 'cold issue' markets and its debate are yet to come in the

academia in Nepal. Investors along with market participants are still not familiar with these issues though the market has a long history in the IPO trading. The analysis of factors influencing IPO underpricing documented to date are not so influential, where the study findings are highly inconclusive and also failed to validate with theories discussed above in Nepalese context. Thus the future research can be conducted to address all these research gaps in a broader perspective

Agenda for future research. Considering more sophisticated research designs like meta-analysis, PRISM, and bibliometric analysis these issues might be explored in more systematic and broader perspectives. They are popular methods widely adopted in writing review papers, which can give richer insights synthesizing the prior works extracting from the widely accepted databases of literature. Additionally, future researchers can carry investigation on the research gaps articulated in the previous section. In this regard, it is suggested that the study needs to test empirically at country-specific environment such as both micro- and macro-economic factors, and legal framework like issuance and listing regulations of Nepal. Thus, the future research help explore new knowledge in the area of IPO underpricing such as level of underpricing, hot and cold issue markets, money left on the table when firms go public, and sector- and year-wise analysis and their results and influential factors that determine underpricing. In essence, it could be a significant contribution in the Nepali IPO literature.

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