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"Critical Review of the Literature Regarding IPO Underpricing"

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Abstract: *The paper deals with a critical review of one of the three characteristics of the Initial Public Offerings (IPOs): the initial underpricing of the stocks offered to the public, that is the pricing of the offered stocks at a lower price than their value. We will present and critically examine previous studies regarding the initial underpricing in different countries and in various economic sectors and we will make comparison of their findings. In this paper, we will also review the existing literature concerning the main reasons that lead the companies going public to offer their shares at a lower price.*

Keywords*: IPOs, initial underpricing*

INTRODUCTION

During the past decades there has been an increase in the number of companies willing to have their shares traded in a stock exchange due to the financial and stock market evolution and the need of the companies to raise funds. As a result, there has been an increase in the Initial Public Offerings (IPOs), which is the procedure followed by the companies in order to have their shares listed in a stock exchange. In an attempt to present the process of the IPOs and its characteristics, many studies have been conducted the past four decades regarding different countries, different stock exchanges and different time periods. These studies indicate three characteristics of every IPO: the initial underpricing of the shares offered to the public, the existence of hot and cold periods for IPOs and the long-run underperformance of the IPOs. This paper deals only with one of the three IPO characteristics, the underpricing of the shares that is the pricing of the shares offered to the public at a lower price than their value, which leads to high initial performance at their first days of trading.

The paper is organized as follows. Section 2 analyses the existing literature regarding the main reasons that cause the underpricing of the IPOs and section 3 presents the empirical evidence concerning the IPO underpricing in different countries and different sectors of the economy.

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REASONS FOR IPO UNDERPRICING

Numerous studies have been conducted regarding the initial underpricing of IPOs since the 70's. Akkerlof (1970), Reilly (1973) and Ibbotson (1975) were the first ones to observe this phenomenon and, as they unsuccessfully tried to explain it, they concluded that it is a mystery. Since then the existing literature is vast and covers different time periods and stock exchanges, and most of the findings indicate nine main reasons for IPO underpricing which are briefly presented below.

Baron (1982) supports the hypothesis that there is information asymmetry between the issuer and the underwriter. The issuer allows the underwriter to offer the shares slightly underpriced so as to reward the latter for his better knowledge and for his reputation, elements that will increase the demand for the shares. However, Muscarella and Vetsuypens (1989) reject this hypothesis as they examine the case in which the issuer and the underwriter is the same company and find levels of underpricing similar to those of any other company that goes public. Beatty and Welch (1996) also observe high levels of underpricing even when large and reputable companies underwrite the offering[1].

The winner's curse hypothesis. This theory is based on the assumption that there is information asymmetry among investors. Ritter (1984, 1998), Parsons and Raviv (1985), Rock (1986), Welch (1992), Aggarwal *et al.* (2002) and Ljungqvist (2005) support the existence of two types of investors, the well-informed and the less informed. The most famous model applied on this hypothesis is the model of Rock (1986) which is based on the assumption that the issuer is not able to obtain information from the well-informed investors and that all investors should be involved in the market, as the well-informed investors only cannot absorb the offering shares. The well informed investors will want the good shares and therefore these shares will be distributed among them. The less-informed investors will get all the shares they had requested only if the well-informed investors did not want those shares. Thus, the less-informed investors will only buy the shares if these are offered in a lower price, so as to compensate them from future negative returns. Hanley and Wilhelm (1995) on the other hand find that the institutional investors, who are supposed to be the well-informed investors, get the same percentage of undervalued and overvalued shares.

Market feedback hypothesis. This theory assumes that the institutional investors have better knowledge of the market, the industry, the competitors and the demand of the offered shares or the expected returns than the issuers and the underwriters. Booth and Smith (1986), Smith (1986) and Benveniste and Spindt (1989) examine the relation between underpricing and extracting information from specific investors and find that there is selective underpricing and allocation of shares. Cornelli and Goldreich (2001) also support this hypothesis as they examine the pricing policy of an investment bank and find that there is a preference for the institutional investors. Benveniste and Wilhelm (1990) observe reduced revenues from the IPO and increased

future risks when all investors are treated equal at the pricing and the allocation of shares. However, Jenkinson and Jones (2004) examine 27 European IPOs with different underwriters and find that there isn't any selective pricing or allocation for the institutional investors, though the most frequent investors seem to be favored.

Signaling hypothesis. Allen and Faulhaber (1989), Grinblatt and Hwang (1989), Welch (1989) and Jegadeesh *et al.* (1993a and 1993b) support this hypothesis that the companies underprice their shares so as to stand out as good investments as underpricing means less revenues from the IPO and only the good companies can afford that. Aggarwal *et al.* (1992) and Chemmanur (1993) explain that underpricing leads to high future returns as it causes high initial returns attracting the attention among investors and analysts and therefore increases the demand for the specific shares.

The lawsuit avoidance hypothesis. Logue (1973) and Ibbotson (1975) support the hypothesis that the initial underpricing reduces the likelihood of future litigation by the investors. Tinic (1988) finds that the level of underpricing has increased after imposing the publication of financial statements of the companies who want to go public. Lowry and Shu (2002) and Booth and Booth (2003) also agree that higher underpricing is associated with high risk of future legal actions. On the other hand, the empirical studies of Hughes and Thakor (1992), Drake and Vetsuypens (1993), Ljungqvist (2005) and Gajewski and Gresse (2006) in countries where litigation risk is low and regulations are strict also show high levels of underpricing.

Ownership dispersion. This theory assumes that underpricing will attract many small investors which will lead to greater dispersion of the owned shares. According to Brennan and Franks (1997) and Smart and Zutter (2003), the oversubscription caused by the underpricing allows managers to allocate the shares as they wish and thus retain control of the company, as they will distribute the shares to small investors who won't claim the company's management[2]. Stoughton and Zechner (1998) argue that underpicing is linked to the desire of the large investors to increase their power in the company, as they allocate the shares only to small investors. Conversely, Field and Sheehan (2994) and Aruçaslan *et al.* (2004) find no relation between the level of underpricing and the capital structure of the company. Moreover, Zingales (1995), Booth and Chua (1996) and Mello and Parsons (1998) support that ownership dispersion is desired by the shareholders as it will increase the liquidity in the secondary market. Field and Karpoff (2002) reject this secondary market liquidity hypothesis although they are consistent with Brennan and Franks (1998) in that underpricing is an incentive for retaining control in the company.

The bandwagon hypothesis. This theory is based on the assumption that an investor will not buy shares of a specific company if nobody else does so. In this case, according to Ritter (1998), the issuer underprices the shares offered to the public so as to urge some investors to buy some of these shares and thus the other investors will follow them. Welch (1992) and Amihud *et al.* (2003) also support that less informed

investors copy the well-informed investors, who will probably buy the underpriced share.

The investment banker's monopsony power hypothesis. Ritter is the first to support this hypothesis, which is based on the assumption that the large investment banks don't underwrite the shares of a small or new company that goes public. In case they do so, they exploit their superior position and underprice the shares of the company so as to sell them to their large customers. In this way they reduce their marketing costs. Chalk and Peavy (1987) support that the underwriters allocate the underpriced shares to those investors with whom they have frequent transactions and thus increase their revenues from commissions. However, Tinic (1988) argues that there isn't any empirical evidence to support this hypothesis as he finds no relation between the commissions paid to the underwriters by the institutional investors and the allocation of shares.

Titman and Trueman (1986) and Balvers *et al.* (1989) find that underpricing is negatively related to the reputation of the underwriter, as the investors' uncertainty is lower when the underwriter is famous and reputable. Beatty and Welch (1996) also find lower underpricing when the parties related to the IPO (underwriter, lawyer and auditors) are considered reputable. Carter and Manaster (1990), Megginson and Weiss (1991) and Carter *et al.* (1998) also agree and explain that the level of underpricing is lower when the underwriter is reputable, as there is less need to obtain information from investors.

MEASURES OF UNDERPRICING

Underpricing of initial public offering is measured as the percentage of price change at the end of the first day of trading.

$$IR_{i,t} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}} \tag{1}$$

where:

$IR_{i,t}$ = the initial return of the stock i at period t

$P_{i,0}$ = the IPO offer price of the stock i as stated in the IPO prospectus

$P_{i,1}$ = the closing price of the stock i at the end of the first day of trading

The formula above does not take into account any changes in the market conditions or in the stock exchanges which may affect the initial returns. For that reason, many researchers alternatively use the following formula, where the returns are adjusted to the market changes.

$$MAIR_{i,t} = \left[\frac{P_{i,1} - P_{i,0}}{P_{i,0}} - \frac{MI_{i,1} - MI_{i,0}}{MI_{i,0}} \right] \tag{2}$$

where:

$MAIR_{i,t}$ = the initial return of the stock i adjusted to the market effect of the corresponding stock exchange for period t

$MI_{i,0}$ = the closing price of the general market index of the stock exchange where stock i is listed at the offering day of the stock

$MI_{i,1}$ = the closing price of the general market index of the stock exchange where stock i is listed at the end of the first day of trading

Most of the studies use the simple initial returns as a measure of underpicing, though the adjusted initial returns is a better measure of underpricing in cases where time interval between the offering day and the first day of trading is quite long.

EMPIRICAL STUDIES REGARDING IPO UNDERPRICING IN DIFFERENT COUNTRIES

For the 40-year period between 1969 and 2010 there have been conducted more than 150 empirical studies regarding the underpricing of the IPOs. In these studies underpricing is measured as the percentage difference between the offer price and the closing price at the first day of trading. The empirical studies provide evidence concerning the underpricing for IPOs that took place in 35 countries and covers a 90 year period, from 1918 until 2008.

Figure 1 distinguishes the studies that deal with IPO underpricing by country. It is obvious that most empirical studies aiming at the analysis of the initial underpricing examine companies listed in US stock exchanges, a total number of 47 studies (31.13% of a total number of 151 empirical studies) [3] for 97,077 IPOs completed in the United States between 1960 and 2005. This can be explained by the fact that the US market is the most active market in the world by number of companies going public and by the capital raised from the IPO. Although there are only ten empirical studies regarding initial underpricing for companies that went public in the London stock exchange, one of the largest stock exchanges worldwide, however they provide evidence for 7,633 IPOs between 1917 and 2007[4]. Additional empirical evidence concerning European IPOs is provided through 33 other studies for a total of 4,192 IPOs that took place in other European stock exchanges in the period from 1961 until 2006.

The figure shows the empirical evidence in different countries regarding the underpricing of IPOs, calculated as the number of empirical studies that have been conducted for each specific country. Source: author's calculations.

The empirical literature for the Asian-Pacific IPOs is also vast with 33 empirical studies for 14,495 IPOs completed in one of the Asian-Pacific stock exchanges between 1966 and 2008. Nine empirical studies for the Malaysian IPOs, eight for the Japanese and the Singaporean IPOs and seven for the Chinese, provide evidence for 7,459 IPOs that took place in one of the above stock exchanges between 1971 and 2004.

Figure 1: Empirical Studies by Country

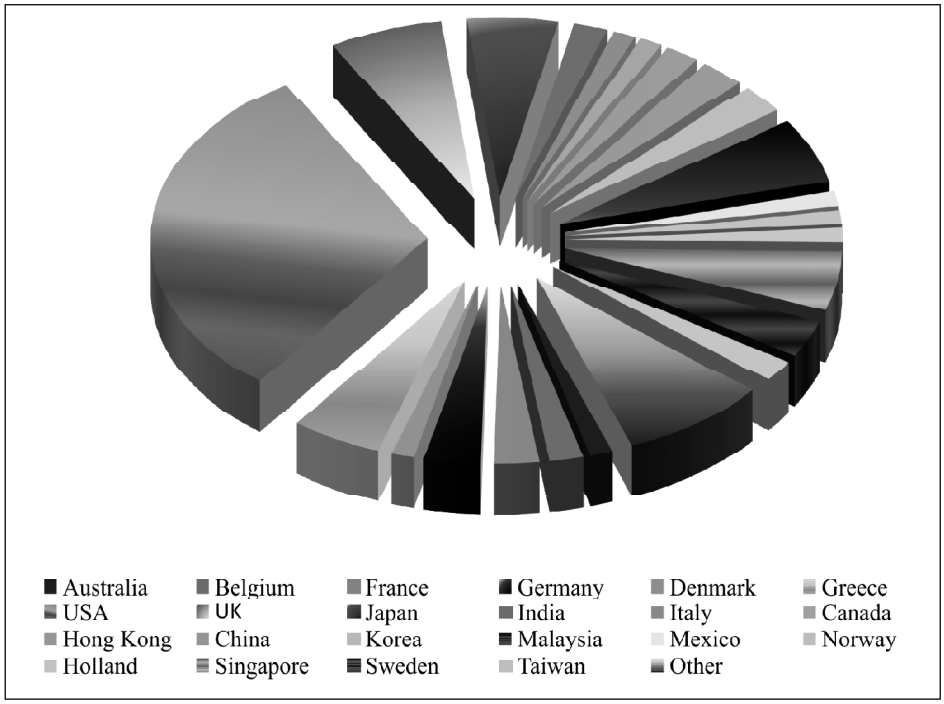
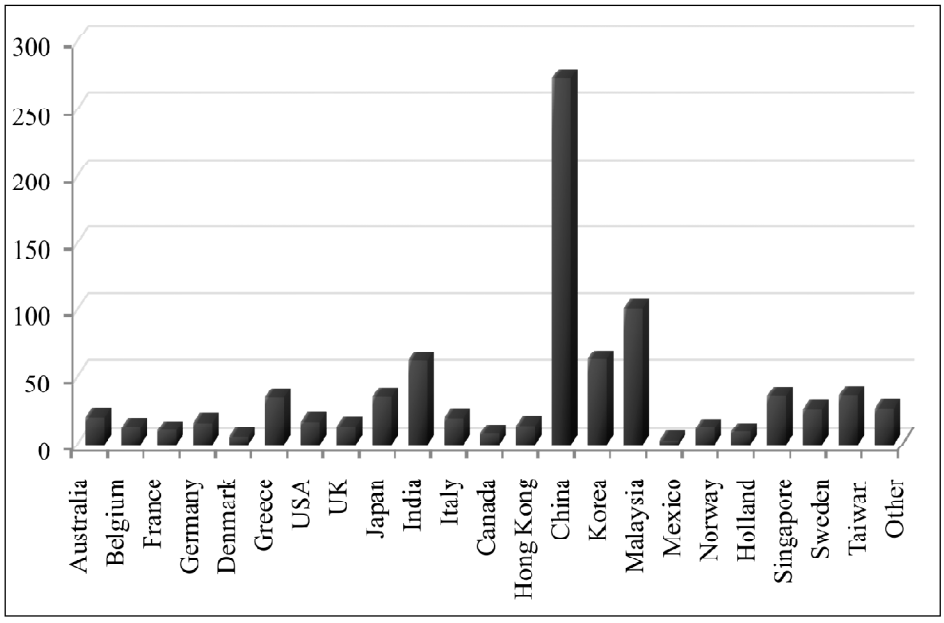


Figure 2: Initial Underpricing by Country



The figure reports average initial underpricing in % for 22 countries, calculated as the price change at the end of the first day of trading. Data was collected from previous empirical studies. The figure shows IPO underpricing by country of listing. According to previous empirical studies, between 1918 and 2008, 123,850 IPOs were completed in the 22 countries shown in the figure, as follows: 97,077 in US stock exchanges, 7,673 in London stock exchange, 4,192 in other European stock exchanges, 14,495 in Asian-Pacific stock exchanges, 358 in Canadian stock exchange and 95 in Mexican stock exchange. Source: author's calculations.

Figure 2 shows the empirical evidence regarding IPO underpricing in various countries. The figure reports average initial underpricing for US, Canada, Mexico, ten European and nine Asia-Pacific countries, a total of 22 countries over the period 1918-2008. Obviously, the level of underpricing varies from country to country. Average initial undrepricing is higher in Asia than in other countries worldwide while in China only average underpricing of 272% is reported. Underpricing is markedly higher in Greece (34.68%) and in Sweden (26.22%) than in other European countries, where underpricing ranges between 5% and 20%. Average initial underpricing in US (17.38%) is slightly higher than in UK (14.12%) whereas in Mexico it is only 3.12%. These cross country differences may be related to differences in the institutional framework of IPOs.

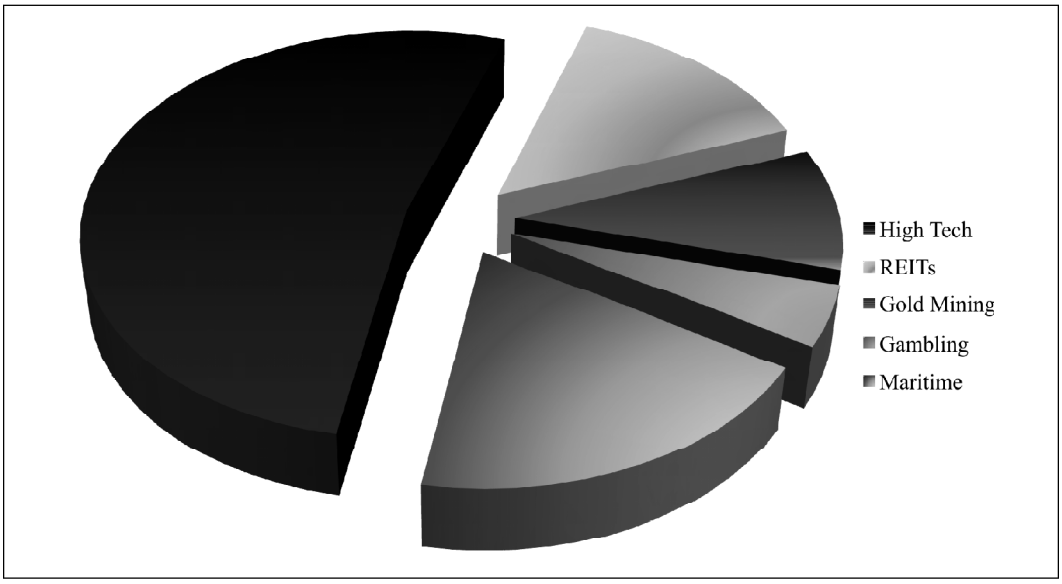
EMPIRICAL STUDIES REGARDING IPO UNDERPRICING IN DIFFERENT SECTORS OF THE ECONOMY

As shown above, numerous empirical studies have been conducted in different countries regarding IPO underpricing thus facilitating the comparison of initial underpricing between countries or stock markets. Apart from these comparisons between stock exchanges there have been some efforts to determine the underpricing phenomenon and its level in different sectors of the economy. We could say that the existing literature is limited concerning the existence of the IPO characteristics and especially the initial underpricing in particular sectors of the economy, a fact that causes difficulties in comparing different sectors and lack of conclusions. In this paper we refer to empirical studies focusing on the initial underpricing of shares of companies that belong to the same economical sector and to their findings.

Figure 3 reports the empirical studies that examine the initial underpricing in specific sectors of economy. It is obvious that most of the studies refer to the high-tech and internet sector, probably due to this industry's boom at the late 90s, where many high-tech and internet firms were incorporated and went public. This means that there is data available for this sector. All of the eleven studies that deal exclusively with the high-tech sector observe high initial underpricing. We mention, in particular, the study of Ljungqvist and Wilhelm (2003) in which we observe an initial underpricing of 35.70% for 2,178 high-tech IPOs completed in US stock exchanges between 1996 and 2000. Abdou and Dicle (2006) also find initial underpricing of

48.45% for 518 internet firms that completed their IPO in a US stock exchange at the same period.

Figure 3: Empirical Studies by Sector



This figure reports the empirical evidence regarding the IPO underpricing in particular sectors of the economy. Data was collected from previous empirical studies. Source: author's calculations.

The initial underpricing in the maritime sector has also been tested. The four studies that examine a total number of 208 maritime IPOs completed in international stock exchanges between 1984 and 2007 find average initial underpricing of 15%[5].

There has been interest for the Real Estate Investment Trusts (known as REITs) with four empirical studies that observe average initial underpricing of 1.05% for IPOs completed in the US stock exchanges, the Japanese stock exchange, the London stock exchange, the Stockholm stock exchange and the Paris stock exchange[6].

There is also evidence for the gold mining sector through the studies of How (2000) and Dimowski and Brooks (2008). While both these studies examine the gold mining firms that went public in Australia, their findings are very different (119.51% and 13.3% respectively) as they examine different time periods and How (2000) includes in her sample a very hot period for IPOs (1985-1987).

The gaming sector has also been of interest. Atkinson and LeBruno (1995) examine the IPOs completed in New York Stock Exchange in 1992-1993 of 14 casinos and find initial underpricing of 30.63%.

CONCLUSION

Many theoretical studies have been conducted regarding the reasons that explain IPO underpricing and some of these theories have been tested empirically. In general, most of the theories converge to some factors that affect underpricing. These factors can be summarized to the following: the information asymmetry between investors, between issuers and underwriters or between underwriters and institutional investors; the desire to stand out as high quality investment; the likelihood of future litigation; the desire of the owners or the managers to achieve ownership dispersion and to retain control; and other behavioral explanations that make the shares attractive.

Empirical evidence on IPOs shows that initial underpricing is observed in all countries but the level of underpricing varies from country to country over time. According to Gajewski and Gresse (2006) and Ljungqvist (2005), this is a result of the different legal frameworks, the different periods of examination, the different characteristics of the various sectors and the different IPO mechanisms (underpricing is lower when using the auctions or the fixed-price offering instead of the book-building method).

Empirical studies on particular sectors of the economy report that most of the studies focus on high-tech IPOs. Their findings indicate that most new technology companies are underpriced. Empirical evidence on underpricing in other sectors of the economy is less clear, as there are very few empirical studies in worldwide literature, fact that reveals the need for future IPO empirical research in specific sectors of the economy.

Notes

1. According to Loughran and Ritter (2004) this happens because they want to serve their large customers.
2. This theory is known as the reduced monitoring hypothesis.
3. We mention suggestively some of the studies conducted the last 15 years for US IPOs: Ritter (1998), Habib and Ljungqvist (1999), Aggarwal (2000), Koop and Li (2001), Ritter and Welch (2002), Benveniste et al. (2003), Binay and Pirinsky (2003), Booth and Booth (2003), Ljungqvist and Wilhelm (2003), Smart and Zutter (2003), Field and Sheehan (2004), Abdou and Dicle (2006), Lowry and Murphy (2007).
4. We mention in particular the study of Chambers and Dimson (2009) for 4,540 IPOs that were completed in the London Stock Exchange between 1917 and 2007.
5. These four studies consist the studies of Grammenos and Marcoulis (1996), Grammenos and Arcoulis (1999) and Merikas et al. (2009 and 2010).
6. Wang *et al.* (1992) and Ling and Ryngaert (1997) examine the US REIT IPOs whereas Kutsuna *et al.* (2008) examine the Japanese REIT IPOs and Brounen and Eichholtz (2005) examine the REIT IPOs that took place in the stock exchanges of London, Stockholm and Paris.

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