



Waterford Institute of Technology

Initial and Aftermarket Performance of IPOs in Emerging Markets: Evidence from China, India, and Brazil

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Abstract

Research issue. The study investigates initial and aftermarket performance of IPOs in China, India, and Brazil in 2007-2010. It examines the first day mispricing of IPOs, aftermarket performance of these IPOs, and the possible reasons explaining IPO mispricing. Based on the previous research and traditional theories of IPO mispricing (based on EMH), four variables that potentially influence the level of mispricing have been identified: (i) size of the company, (ii) operating history, (iii) reputation of the employed underwriter, and (iv) privatization through an IPO. The research is empirical in nature and uses quantitative techniques.

Research findings. The study suggests that the performance IPOs in emerging markets is changing. The levels of mispricing were found to be 64 per cent for China, 14 per cent for India, and 0.35 per cent for Brazil which is significantly different to previous studies. The research also indicates that there is a large number of IPOs that are on average overpriced on the first day of trading. The findings on the aftermarket performance of IPOs are also different to the results of previous studies. In China, both overpriced and underpriced IPO outperform the market by the end of the first year following the IPO. The observed abnormal first day returns (underpricing) of IPOs in India fail to continue in the long run. In Brazil, both overpriced and underpriced IPOs underperform the market. The statistical techniques measuring the relationship between the identified variables and the levels of mispricing indicate statistically insignificant relationship, i.e. identified factors do not explain IPO mispricing.

Theoretical implications. The research states that the different levels of market efficiency do not explain the extent of the difference between the levels of mispricing in China, Indian, and Brazil. It also argues that traditional theories of IPO mispricing fail to provide explanations for the levels of IPO mispricing in China, India, and Brazil. Instead, it suggests that mispricing of IPOs is influenced by the behavioural aspect of investors' decision-making process.

Dedication

To my husband, David Michael Doherty, who believed in me even when I did not.

Everything I have achieved I owe it to you...

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Declaration of Authenticity

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List of Abbreviations

BHAR	-	Buy-and-Hold Abnormal Returns
BM&F BOVESPA	-	Bolsa de Valores, Mercadorias e Futuros (‘BOVESPA’)
BRIC	-	Brazil, Russia, India, China
BSE	-	Bombay Stock Exchange
CAR	-	Cumulative Abnormal Returns
CCI	-	Controller of Capital Issue
CSRC	-	China Securities Regulatory Commission
CSRS	-	Chinese Securities Regulatory Commission
CVM	-	Comissão de Valores Mobiliários
EMH	-	Efficient Market Hypothesis
GDP	-	Gross Domestic Product
IBOV-BR	-	Benchmark index for Bovespa Stock Exchange
IPO	-	Initial Public Offering
M&A	-	Mergers and Acquisitions
MCSI	-	Morgan Stanley Capital International
NRI	-	Non-residents Indians, Indians living abroad
SDPC	-	State Development and Planning Commission
SEBI	-	Securities and Exchange Board of India

SEC	-	Securities and Exchange Commission
SENSEX-BY	-	Benchmark index of the Bombay Stock Exchange
SEO	-	Seasoned Equity Offering
SHGIDX-SH	-	Shanghai Composite Index
SOE	-	State-Owned Enterprise
SSE	-	Shanghai Stock Exchange

Chapter 1

INTRODUCTION

The study investigates the initial and aftermarkets performance of IPOs in China, India, and Brazil. The objective of the first chapter is to provide the background and motivation for the undertaking the research, explain the research objective and questions, and provide an overview of the adopted methodology, research structure and limitations of the study.

1.1 Research Context

In recent years the most interesting regions in the world in regards to economic growth have been emerging markets. It is widely perceived that over the next few decades the growth generated by the largest developing countries could become a much more significant force in the world economy. The growth rate of emerging market economies in recent years was 8.3 per cent compared to only 2.7 per cent in developed economies. China has become the manufacturing workshop of the world with workforce that is highly skilled and wage costs that are relatively low. India is currently one of the top countries that contribute most into global growth. The turnover of the Indian equity market has grown to over five times the 2002 daily figure. Brazil is the fifth largest country in the world with 12 per cent of the world's fresh water and abundant natural resources; it is a large producer of agricultural crops and livestock. The country meets most of the population's energy requirements using hydropower. The inherent strength of these countries emanates from strong domestic demand-based economies of India and Brazil and the significant outward linkages of China. (The BRICS report, 2012).

Even though emerging markets are deemed more volatile, in the past 10 years they have seen a level of volatility similar to developed markets, but have provided far higher returns. In the past decade the MSCI Emerging Markets Index¹ has greatly outperformed its developed market counterpart (Baldwin, 2012).

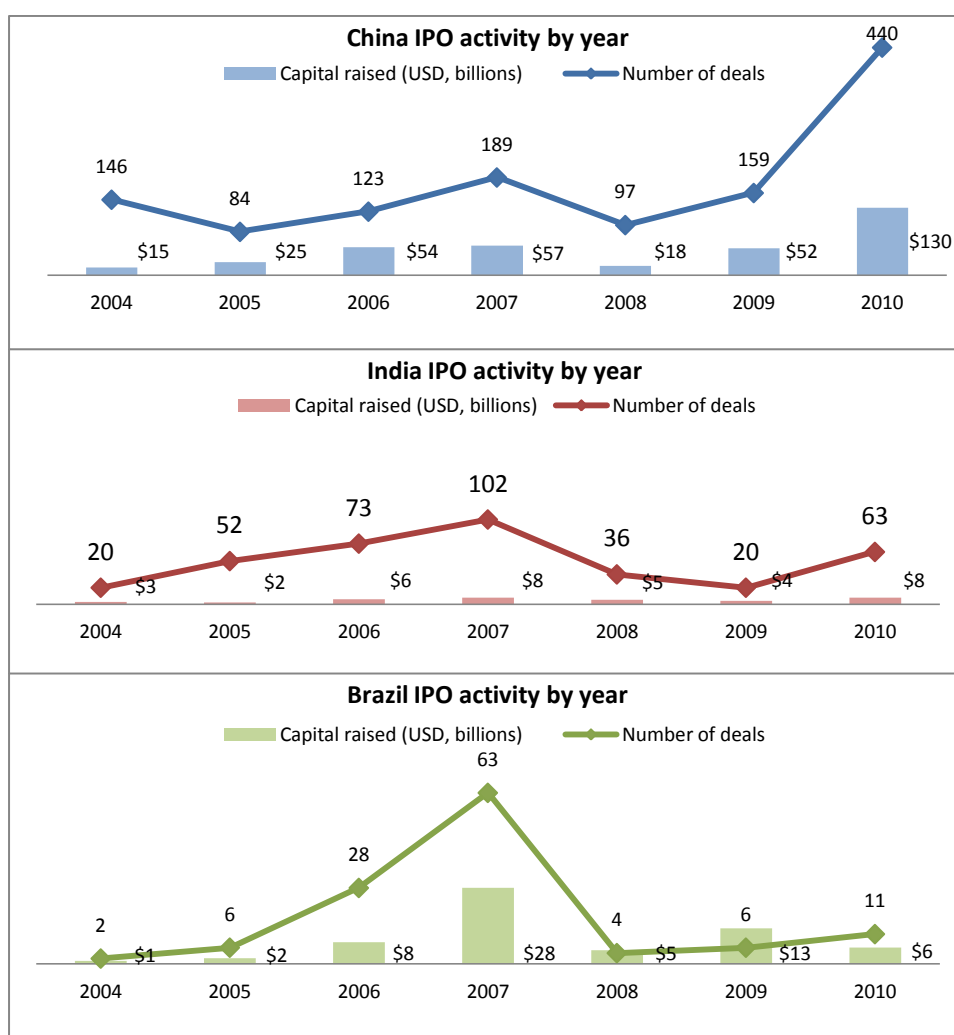
The dynamic macroeconomic growth and the development of capital markets in emerging countries in recent years, has influenced IPO activity on their stock exchanges (Li, 2004). According to *Ernst & Young Report* (2011), for a number of years Asian firms have been at the head of the global IPO activity. The performance of IPOs in emerging markets have been far better during and after the financial crisis compared to their counterparts in mature markets. China has been leading the global IPO market for the last five years. According to 2010 figures, Chinese IPO market has the highest number of deals in the world and represents 46 per cent of global funds raised (Ernst & Young, 2011).

¹ Morgan Stanley Capital International (MSCI) index designed to measure the performance of equity market in global emerging markets.

Ambitious government privatization program and infrastructure modernization investment plan in India led to many new listings in the energy and power sector, natural resources sector and building and construction sector (Ernst & Young, 2011).

Brazil's IPO market growth has been facilitated by its five per cent Gross Domestic Product (GDP) growth rate and inflows of foreign capital. Domestic-oriented sectors, such as real estate, consumer products, banking and finance, have dominated the market driven by higher domestic consumption levels of Brazil's lower and middle classes (Ernst & Young, 2011). Figure 1.1 provides an overview of the IPOs market in China, India, and Brazil in recent years in presented in

Figure 1. 1: IPO activity in China, India, and Brazil



(Source: Global IPO trends, *Ernst & Young Report*, 2011)

1.2 Research rationale

Initial Public Offerings in emerging markets of China, India, and Brazil provide a direct channel for foreign investment opportunities for institutional and individual investors. Considering the heightened interest in these emerging markets fuelled by the unprecedented growth of their economies, studying performance of IPOs in these countries becomes both necessary and interesting.

Chinese, Indian, and Brazilian IPOs have similar characteristics but show significantly different results in the short-term returns and long-term market performance. Empirical evidence of these three markets provides mixed and inconclusive results. For example, level of underpricing for Chinese A-shares in 1987-1995 was 948.6 per cent with the underpricing of an individual offering reaching 38,300 per cent (Dimovski and Brooks, 2004). Krishnamurthy and Kumar (2002) report 35.3 per cent of IPO underpricing level in India in 1992-1993. In Brazil underpricing reached 78.5 per cent in 1979-1990.

In general, IPO underpricing is defined as the difference between the offer price and the closing price on the first trading day. It can be interpreted as the amount of money that firms leave on the table to entice investors to buy the firms' shares. Numerous attempts have been made to explain the underpricing of IPOs but, despite the attention of many researchers, it still remains a puzzle that is yet to be solved. Existing explanations of IPO underpricing in most cases can be applied to only one market or a particular issue (Jenkinson and Ljungqvist, 2001; Ritter, 2003).

Most of the studies on the IPO performance in emerging countries focus on a single market or present a comparative analysis of an emerging market and a developed market. The purpose of this study is to investigate the performance of IPOs in China, India, and Brazil in conjunction and by focusing on each country individually. The specified time frame (Initial Public Offerings during the period of 2007-2010) provides the most recent results and offers some insights into the performance of the IPOs in China, India, and Brazil following the recent financial crisis.

1.3 Research objective, research questions and research methodology

The objective of the study is to examine initial and aftermarket performance of IPOs in China, India, and Brazil during the period of 2007-2010. To address this objective three research questions are examined.

1. What is the level of IPO underpricing in China, India, and Brazil?

Recent empirical evidence suggests that levels of underpricing differ between developed and emerging markets. They also differ between the emerging markets themselves. With time underpricing becomes less as more information becomes available and the share price adjusts to the market valuation (Aggarwal et al., 1993; Kiymaz, 2000; Samarakoon, 2010; Ritter, 2011). To analyse this, levels of underpricing are calculated for three different emerging markets that are often grouped together in financial and economic reports. To examine how underpricing changes with time the levels of underpricing are calculated for the first, fifth, 10th and 30th day of trade. The findings for the three countries are then compared to the previous research.

2. What is the aftermarkets performance of IPOs in China, India, and Brazil?

Studies of the aftermarket performance of IPOs provide inconclusive results. Ritter (1991), McGuinness (1993) and Gu (2003) state that underpriced IPOs underperform the market. However, Aggarwal et al. (1993) and Chan et al. (2004) report IPO outperformance. To examine this, IPOs are divided into two groups: underpriced IPOs and overpriced IPOs. The aftermarket performance then is analysed through calculating Cumulative Abnormal Returns (CAR) and Buy-and-Hold Abnormal Returns (BHAR) for the underpriced IPOs and overpriced IPOs for each country at the end of 12 months. These returns are compared to the initial level of underpricing and overpricing for each country.

3. What is the relationship between potential factors that influence IPO underpricing and the level of underpricing in China, India, and Brazil?

There are different theories that attempt to explain underpricing. Generally the level of underpricing is linked to the level of ex-ante uncertainty that surrounds the IPOs (Ritter, 2003). Attempts have been made to measure the ex-ante uncertainty through indentifying factors that potentially influence the

level of underpricing (Kiymaz, 2000; Chen, Firth and Kim, 2003; Guo and Brooks, 2008; Samarakoon, 2010). For the purpose of this study four factors that potentially influence ex-ante uncertainty and underpricing have been identified: (i) size of the firm (VALUE variable), (ii) operating history (AGE variable), (iii) reputation of the employed underwriter (UW rank variable), and (iv) privatization through an IPO (PRIV variable). The relationship between these factors and IPO underpricing is examined through a regression analysis.

A quantitative approach is adopted to address the research questions. Descriptive statistics, independent samples test, univariate analysis and multiple regression are used to address the relevant research question.

1.4 Research contribution

The contribution of this study is set at academic and practical levels.

From an academic perspective this study adds to the existing evidence on IPO performance. Although numerous studies have been conducted on IPO underpricing in different countries, few studies have been conducted on emerging markets. Fewer still compare IPO performance across emerging markets. Also, most studies used one model to calculate long-term returns. The current study includes two models to measure after-market returns, thus eliminating the need for arguing the choice of a model and ensuring better explanatory power of the findings.

From a practical perspective, research provides an insight into the financial environment and workings of the stock exchanges in the three emerging countries (China, India, and Brazil). The performance of IPOs in these markets can be used as bases for investment decisions and choice of investment strategies. An open invitation for Irish enterprises to invest in emerging countries (China, in particular) makes the study of the underpricing and after-market performance of the Initial Public Offerings a necessary pre-requisite of investing abroad.

1.5 Research limitations

Five limitations exist in this study.

First, a number of IPOs in the datasets for China, India, and Brazil were excluded due to the limited availability of information.

Second, the use of proxies for underwriter's reputation in the regression model was limited to underwriters' ranking based on the number of IPOs underwritten by a particular bank in the specified period and country. Prior studies have used underwriters' reputation based on the underwriters' size and/or underwriters' reputation based on international ranking of the underwriter. However, internationally accepted underwriters' rankings are available only for the two of the three countries (China and Brazil), and using the underwriters' size as a proxy for underwriters' reputation is not feasible due to the limited financial data available for all the three countries.

Third, there are some country-specific factors that have no identified proxies to include in a regression model. For example, in China the high levels of underpricing may be potentially driven by the government restrictions and control of the IPO process, but there is no officially accepted measure of government's involvement in the IPOs process. Also, some unofficial information (i.e. corruption in allocation of shares in India) that is often a part of business and financial environment in emerging countries cannot be included in the study.

Fourth, there are more than three emerging markets in the world; however, as this study is limited to the three countries in the after-crisis period (2007-2010) all the findings are time and region specific.

Fifth, another factor affecting the findings is the apparent relatively new tendency of having an IPO in a foreign market. It has been observed both in emerging and developed markets. Often domestic companies in an emerging country have their initial listing on a stock exchange of a developed market. Similarly, companies in the developed world choose to have an IPO on a stock exchange of an emerging country. IPOs of domestic companies in foreign markets have been deliberately excluded from

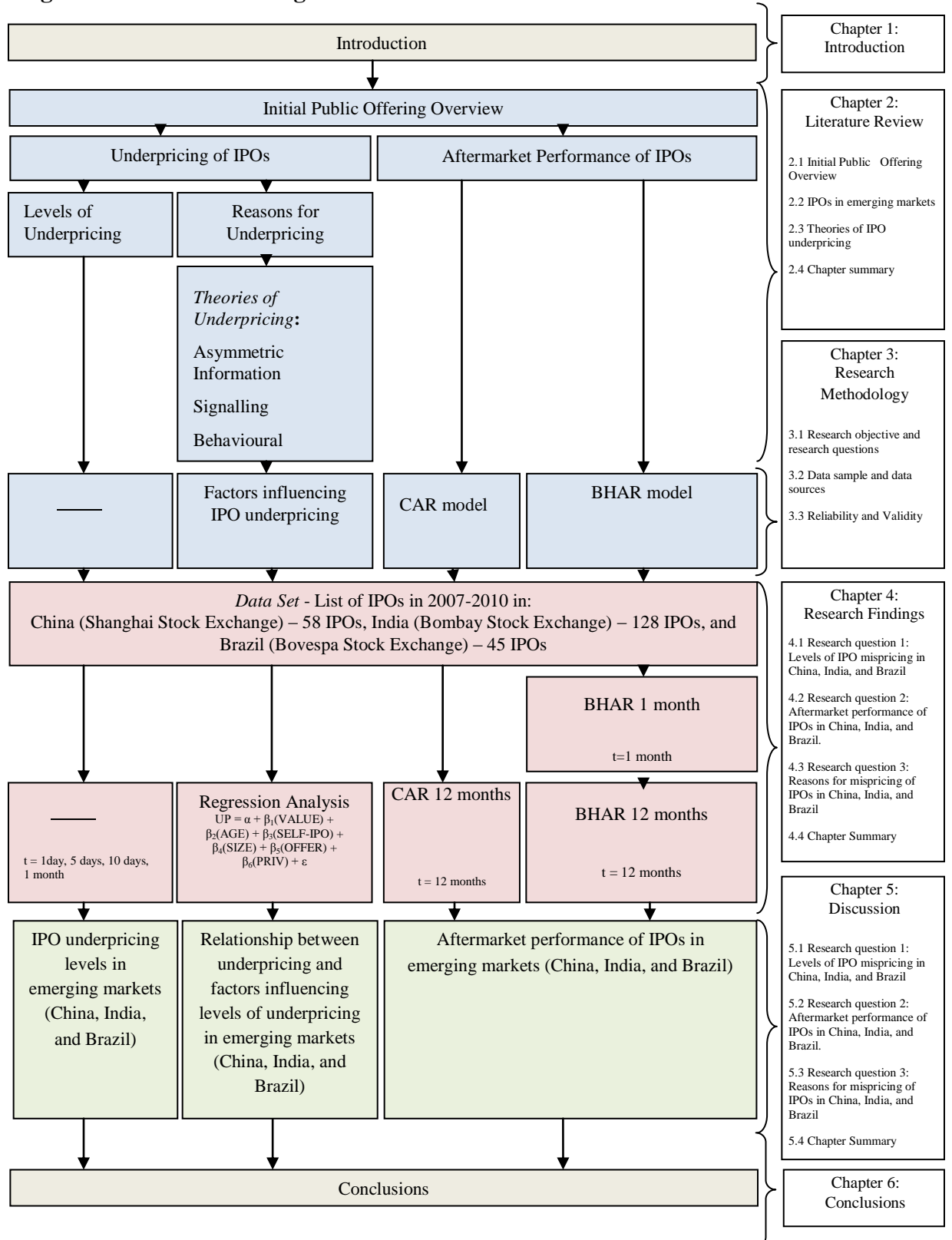
the sample due to the limited data and difficulties associated with measuring performance of such IPOs.

Finally, behavioural theories on underpricing have been brought forward to explain the behaviours of market participants, i.e. IPO issuers and investors. Generally, investigation of these theories involves qualitative analysis. Research of behavioural theories would provide a more complex and detailed understanding of the IPO process, underpricing and after-market performance.

1.6 Research process

Figure 1.2 provides an overview of the research design and structure. It outlines the different steps of the research process, adopted methods, and provides an overview of each chapter in relation to the research design and stage.

Figure 1. 2: Research Design and Structure



Chapter 2

LITERATURE REVIEW

The chapter presents an overview of the Initial Public Offering (IPO). The chapter begins with the overview of the IPO process, followed by a summary of the previous studies on initial and aftermarket performance of IPOs. The last section provides a synopsis of the existing literature on the theories explaining IPO underpricing.

2.1 Initial Public Offering (IPO) Overview

The overall objective of the research is to analyse Initial Public Offerings in emerging markets. The first step in achieving this objective is to understand the motivations for going public, the stages of the process, and the price setting for the new issue.

2.1.1 Initial Public Offering and motivations for IPOs.

An Initial Public Offering (IPO) refers to the first time offer of a firm's shares to the public. This process is known also as a public offering, or "going public" (Atrill, 2009). As argued by Ritter and Welch (2002), the motivation to go public is stronger in some situations than in others. It is often a result of the firm's need to increase equity financing combined with the intention to develop a market where shareholders can exchange their paper wealth for cash at a later date. The main reasons for initiating an IPO are summarised in the table 2.1.

Table 2. 1: Motivations for going public (Eversheds, 2003)

Primary reasons for going public	Percentage of respondents
Raise funds to growing the business	71%
Increased profile and credibility	11%
An exit for venture capitalists	11%
Shares use for future M&As	5%
Share options for managers and employees	5%

Academic literature identifies two perspectives that explain motivations to go public: (a) Life Cycle argument and (b) Market-Timing argument. According to life-cycle argument, early in its life cycle a firm is privately-owned, but once it grows sufficiently large it becomes optimal for the firm to go public. IPOs are also often used as exit strategies by entrepreneurs. Market-timing perspective argues that IPOs are initiated by firms in accordance with the bull and bear market trends (see Glossary) (Ritter and Welch, 2002). Table 2.2 summarizes the main arguments of the two perspectives.

Table 2. 2: Academic perspectives on motivations for IPOs

Argument	Description
<i>Life Cycle Argument</i>	<p>Entrepreneurs use IPOs to facilitate the acquisition of their firm for a higher value than what they would get from an ordinary sale (Zingales, 1995).</p> <p>IPOs are used as exit strategies for venture capitalists and for entrepreneurs (Black and Gilson, 1998).</p> <p>IPOs allow more dispersion of ownership. Initial ‘angel’ investors hold undiversified portfolios and are not willing to pay as high prices as diversified investors. Therefore, early in life cycle a firm is private and if (when) it grows sufficiently large going public becomes optimal (Chemmanur and Fulghieri, 1999).</p> <p>Public trading in itself can increase status and credibility of the firm for investors, customers, creditors, suppliers. It has the potential to add value to the firm (Maksimovic and Pichler, 2001).</p>
<i>Market-Timing Argument</i>	<p>Managers postpone the equity issue if they believe that their firm is currently undervalued (Lucas and McDonald, 1990).</p> <p>Managers avoid having an IPO in the period where few other good-quality firms have initial issue (Choe, Masulis and Nanda, 1993).</p> <p>Entrepreneurs respond to the growth opportunities signaled through the information provided by the markets, such as higher prices (Subrahmanyam and Titman, 1999).</p> <p>Entrepreneurs adjust their valuation with a lag as their sense of enterprise value is derived from their day-to-day involvement with the business and internal perspective rather than from the markets (Ritter and Welch, 2002).</p>

In general, decisions to go public are primarily based on the actual capital requirements and growth plans of a firm. However, timing of the offer is determined by the macroeconomic environment, business cycles, and stock market phases (Atrill, 2009).

Although public listing results in many indirect advantages, such as the raised capital, different shareholder structure, increased publicity of the firm, there are costs associated with these benefits. Ljungqvist (2006) points out that as companies become public they face increased responsibilities concerning transparency and disclosure obligations. Investors require information concerning the business operations and management on a regular basis. Ritter (2003) highlights legal, auditing and

underwriting fees as direct costs of the IPO process. Indirect costs include the managers' time and efforts required to organise the initial listing, and the expense of underpricing (Ritter, 2003).

IPOs carry potential risks for both issuers and investors. Issuers may miscalculate the value of the firms and the optimal timing of the offer. The amount of capital raised through the IPO may be less than expected. The ownership control may be diluted through the different post - IPO shareholding structures of the firms. Investors, on the other hand, have limited access to historical data on the firms and may also incorrectly assess their values (Atrill, 2009). Moreover, the majority of IPOs are firms going through a transitioning stage and there is high uncertainty about their future value. On the other hand, stock markets pre- and post-IPO can be very erratic and volatile, which in short period of time may lead to either unexpected profits or unexpected losses (Ritter, 2003).

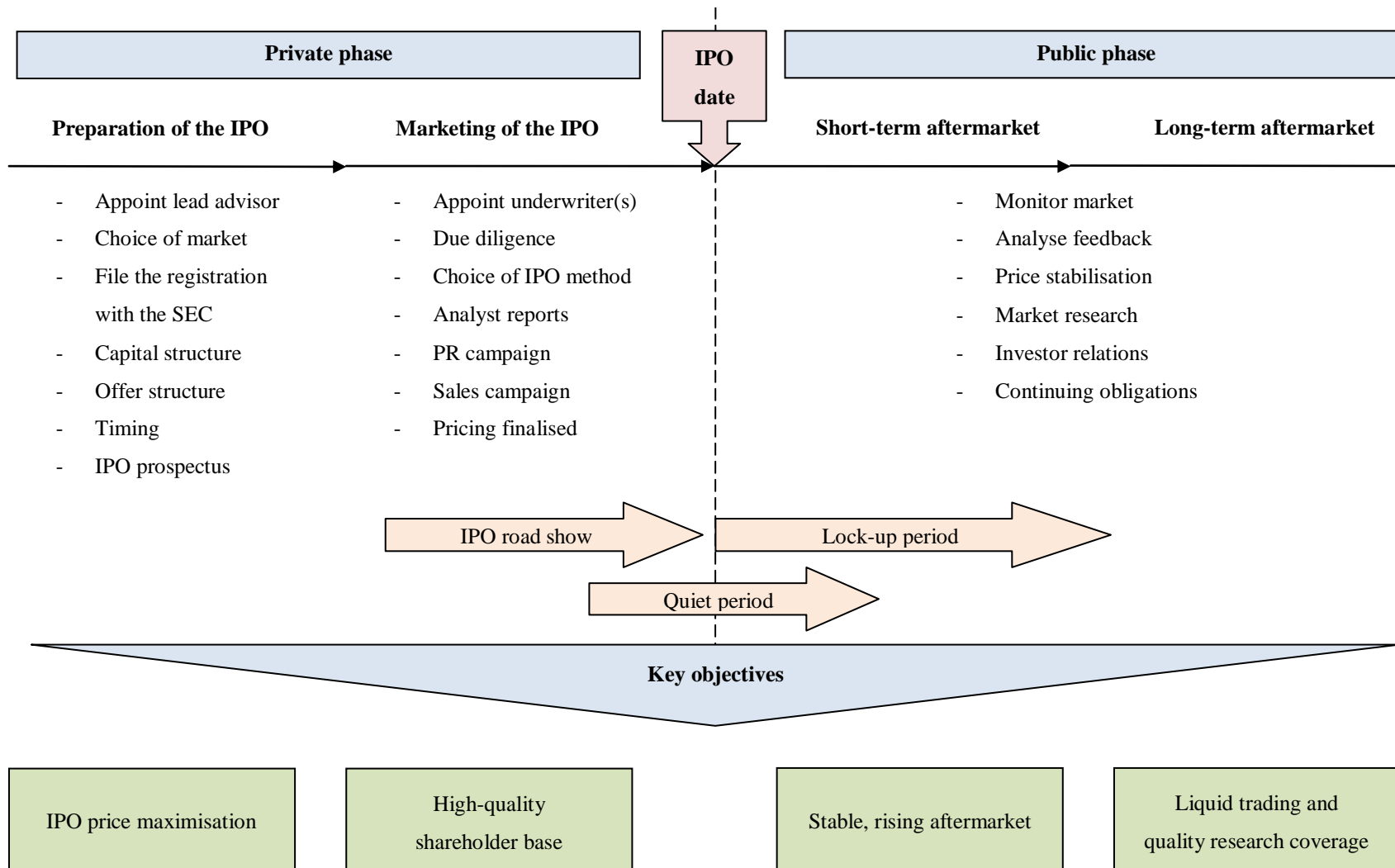
2.1.2 Overview of the IPO process.

Issuance of publicly traded stock is a milestone for any firm. While motivations for an initial public offering are straightforward, the mechanism of doing so is complex (Atrill, 2009). Figure 2.1 presents the overview of the different stages of the IPO process.

The IPO starts when the firm files a registration statement with the Securities and Exchange Commission (SEC) (see Glossary).

IPOs can be self-administered or involve a syndicate of investment banks referred to as 'underwriters' who enter a contract with the issuer. The underwriters alleviate some of the risks of undersubscription, and secure the distribution of the new shares for a premium (QFinance, 2011). The selection process relies on the underwriters' general reputation and expertise, as well as on the quality of its research coverage in the firm's specific industry.

Figure 2. 1: Overview of the IPO process



IPOs can be managed by a single underwriter or by a syndicate of underwriters. When there are multiple underwriters, one investment bank is selected as the lead underwriter or book-running manager. The most common type of underwriting arrangement involved with large issues is the ‘firm commitment’ underwriting (*see Glossary*) (Brau and Fawcett, 2006).

The underwriter leads the preparation of the IPO, carries out the due diligence and prepares an IPO prospectus (*see Glossary*). With the help of underwriters companies choose between different methods of going public (Atrill, 2009). There are four general IPO methods: (i) fixed-price offer, (ii) book-building method, (iii) Dutch auction, and (iv) hybrid method. Table 2.3 presents their overview.

Table 2. 3: IPO methods

IPO Method	Description
<i>Fixed-price Offer</i>	The issuer sells shares at a pre-determined price based on the value of the firm. However, fixed pricing has a potential of undervaluing the issuing firm (Pilbeam, 2010).
<i>Book-building Method</i>	The issuer sets a price range within which the investors are allowed to bid for the shares (Atrill, 2009).
<i>Dutch Auction</i>	The firm announces the maximum amount of shares being sold and sometimes a potential offer price. Investors then state the number of shares they are prepared to buy and at what price. Once the minimum clearing price is determined, investors who bid at least that price are awarded shares. If there are more bids than shares available, allotment is made on a pro-rata basis (QFinance, 2011).
<i>Hybrid Method</i>	A combination of any two of the three methods. The book building/fixed price offer combination is the most commonly used. The former is used for price-setting and allocation of shares to institutional and foreign investors, while the latter is reserved for local retail investors that do not participate in the price-setting process (Pilbeam, 2010).

The next stage of the IPO process is marketing of the IPO. Often the Red Herring prospectus (*see Glossary*) is sent to individual and institutional investors. Using the preliminary prospectus as a selling tool, companies engage in a ‘road show’. The

process is used to advertise the firm to potential investors. It is often followed by a question and answer period (QFinance, 2011).

Throughout the entire IPO preparation period underwriters evaluate investors' interest and response to the intended offer. Based on that information, they determine the final number of shares and share price. At that stage a 'quiet period' is introduced to give investors enough time for due diligence and allow uninfluenced stock valuation through market forces (*see Glossary*) (Pilbeam, 2010).

Once the price and offering size have been finalised and the regulatory review completed the final prospectus is filed and the selling and distribution of shares begins. Prior to the IPO date underwriters sign lockup agreements (*see Glossary*) with managers, employees, and venture capitalists for the duration of lockup period (*see Glossary*) (Atrill, 2009).

Once the shares start trading on the market the firm becomes a publicly traded company. The final stage of the IPO begins at the expiration of the quiet period and lasts until the expiration of the lock-up period (QFinance, 2011).

The performance of IPO after the effective date is referred to as after-market performance. The underwriter has several additional responsibilities during this period. After-market price support requires the underwriter to support the stock by buying shares if order imbalances arise. The underwriter is also responsible for the provision of analyst recommendations and for 'making a market in the stock'. By making a market in the stock, the underwriter essentially guarantees liquidity to the investors, and, thus, again increases demand for the shares (Aggarwal, Krigman and Womack, 2002).

2.1.3 Pricing of a new issue

Pricing the stock of a firm making its initial public offering is a difficult task. The final offer price must be attractive to investors, provide the required capital, ensure that the offer is fully subscribed and there is little or no 'money left on the table' (Pilbeam, 2010).

The preliminary ranges for the offer price are submitted to the SEC with the initial prospectus. The ‘road show’ is used to build a book of orders for the new issue and get a better understanding of the actual demand for the IPO. According to the feedback from the road show, the offer price is adjusted either below (in case of low demand) or above (in case of high demand) the initial range (Thornton, Adams and Baker, 2009).

One well established feature of an IPO is the first day price increase, known as underpricing. For a variety of reasons, both rational and irrational, IPO stocks are consistently underpriced. Investors who sell the newly issued stock on the first day of trading typically experience a large gain (Ritter and Welch, 2002; Loughran and Ritter, 2004; Ritter, 2011). From the firm’s perspective such underpricing “leaves money on the table” meaning that the firm is not getting the full value for its shares. However, the underpricing is preferable for the firm if it guarantees the success of the issue.

For example, Ritter (2011) reports that initial underpricing of IPOs in USA for 1960-2011 average level was 16.8 per cent, in UK in 1959-2010 the levels were at 16.2 per cent, and France had 10.5 per cent on average for 1983-2010.

Most studies of IPO underpricing argue that underpricing occurs due to information asymmetries (Rock, 1986; Benveniste and Sprint, 1989). The detailed overview of the theories of underpricing is presented in the section 2.3.

2.2 IPOs in emerging markets.

As the overall objective of the research is to analyse Initial Public Offerings in China, India, and Brazil, it is important to look at the financial systems of emerging markets and examine the IPO process in the regions.

2.2.1 Overview of financial systems in emerging markets

In many emerging markets the term “going public” may seem confusing. In countries that did not have free market economies government ownership was dominant over private ownership. Most companies that launched their IPOs in these countries were in fact privatized, because they were sold by the government to private investors through the stock market. Hence, due to the change of ownership through the IPO process they were in fact ‘going private’ rather than ‘going public’ (Li, 2004).

A problem in the financial systems of emerging markets is that many small, young private firms that have good investment opportunities can show little evidence of past business and financial performance. They face serious problems when they want to attract external finance for new ventures. Furthermore, in many emerging markets the legal and regulatory environment is rather weak, and financial intermediaries tend to give priority to large companies that have a relevant track record and own a certain value of physical assets which can be used as collateral for loans. There is also a danger that intermediaries may favour firms controlled by politicians (Li, 2004). In emerging markets, the development of public equity markets has been found to be beneficial for the financial systems. It is believed that public capital markets are more immune to the influence of politicians and other lobbying groups (Uddin, 2008).

The development of capital markets in emerging market countries, combined with their dynamic macroeconomic growth in recent years, has triggered IPO activity on their stock exchanges (Li, 2004). In many emerging markets the limited availability of capital has been a major problem. Even though the economic growth of emerging countries in recent years has helped in the accumulation of capital from domestic sources, much of the capital invested in IPOs has its origin in developed countries. An important role here is played by venture capitalists, who often use IPOs as their exit strategies (QFinance, 2011).

A typical IPO process in an emerging market starts when a firm enters a high growth phase and the management decides that there is a momentum in the firm’s life during which a relatively large amount of new capital can be raised for further expansion. Other typical reasons include easier access to capital in the future, increased share liquidity, and, last but not least, visibility and prestige (Uddin, 2008; QFinance, 2011).

2.2.2 Stock markets in China, India, and Brazil

Stock markets in China, India, and Brazil have common features of an emerging market but also some country-specific characteristics. This section provides an overview of each stock market.

In China, the vast majority of IPOs are partial privatization, and the government often attempts to achieve multiple objectives via privatization, such as expansion of private share ownership, enhanced government reputation, control of the national economy. The government also plays an important role in the development of the stock market. The State Development and Planning Commission (SDPC) and the China Securities Regulatory Commission (CSRC) are two official institutions that control offer prices, timings of IPOs, number of firms, and number of new shares allowed to go public. Stock companies in China normally have six different types of shares. First three types (state shares, employee shares, and public institution shares) are non-tradable. A, B, and H shares are tradable. A-shares can be traded only by Chinese citizens on the Shanghai and Shenzhen stock exchanges. B-shares are also listed in Shanghai and Shenzhen, but are traded in foreign currency (US dollars in Shanghai and Hong Kong dollars in Shenzhen). Up till March 2001 B-shares could be traded by foreign investors only. H shares are listed in Hong Kong Stock Exchange and other foreign markets and are traded in foreign currency.

The offering mechanism adopted by most Chinese firms is also very different to other countries. The offer price is set in advance before market trading starts, and there is no feedback mechanism about the market demand that allows adjustment of the offer price (Su and Fleisher, 1999). As a result of the serious imbalance of supply and demand, A-shares are distributed through a lottery system (*see Glossary*). In order to solve the problems in the existing IPO offering mechanism, the CSRC temporarily suspended new IPO issuing in 2004 until it has formulated new rules for IPO share pricing (Chi and Padgett, 2002).

Initially underwriters in China were not responsible for the aftermarket performance of IPOs. As a result, they were predominately concerned with the commission fees rather than the quality and aftermarket performance of the issue. In 2004 the CSRC replaced the quota system by introducing the recommendation and warranty system.

The fundamental purpose of introducing the new system was to improve the overall quality of IPOs and minimize the potential corruption. Under the new system the underwriter is obliged to monitor the aftermarket performance of the underwritten IPOs (Chang, Wang, and Wei, 2004).

An important characteristic of Indian stock market is the large number of stock exchanges. The main stock exchange is the Bombay Stock Exchange (BSE). The number of listed companies in India is similar to that of United States. Another feature of Indian IPO market is the high number of individual investors including NRIs (non-residents Indians, Indians living abroad). Indian investors consider investing in primary markets rewarding only when their expected rate of return exceeds that of secondary markets (Krishnamurti and Kumar, 2002).

Indian stock market has undergone many changes that improved its transparency and efficiency. Prior to 1990 government agency, Controller of Capital Issue (CCI), determined the number of IPOs and the offer price. The result was extreme underpricing and heavy oversubscription that ultimately deferred firms from going public. In 1990 a liberalization programme was initiated. A regulatory agency, the Securities and Exchanges Board of India (SEBI), was set up to govern the financial markets. The IPO pricing process was also deregulated. The initial years of liberalization witnessed a boom in the Indian IPO market. However, the 'free pricing' was a learning curve for the underwriters and some public issues were overpriced during that period. In 2002 SEBI tightened the norms for public issues in an attempt to boost up investor confidence. The main changes were made around financial reporting norms, allotment norms, and transparency in the book-building procedure (Krishnamurti and Kumar, 2002).

Brazilian capital market is the most important financial market in Latin America. It is regulated by the CVM (Comissão de Valores Mobiliários), similar to the SEC. Compared to Chinese and Indian financial markets, Brazilian market is freer from government intervention. In Brazil firms have two types of shares: preferred and common. Voting rights belong to common shareholders. Preferred shareholders do not vote, but have preferential right to receive dividends before common shareholders. They also benefit from a 10 per cent dividend surplus not offered to common shareholders. Preferred shares do not have fixed dividends (like in the U.S. for

example); they share profits in the same way as common shares. Preferred shares often make up to 50 per cent of the total shares issued. Most daily trade volume in Bovespa consists of preferred stocks trades (The BRICS report, 2012). This is due to the fact that common shares are generally held by controlling owners that try to preserve their control over the firms and rarely sell their shares. Great majority of Brazilian publicly traded firms have a well defined controlling group or family. Foreign investors represent an important part of trading volume at Bovespa. In July 2012 foreign investor participation in stock offerings, including IPOs, represented 61.4 per cent of the total transactions (BM&F Bovespa, 2012).

2.2.3 Evidence of IPO performance in emerging markets

Performance of IPOs has been studied from two perspectives: short-term performance (often referred to as underpricing) and long-term performance.

The existence of underpricing in developed markets is well documented in the literature. The highest levels of underpricing were found in emerging markets (Dimovski and Brooks, 2004). Loughran and Ritter (1995) provide a study of IPOs in 25 countries, including IPOs from seven Asian countries. The research finds high initial underpricing in these countries. It also suggest that the move by East Asian countries to reduce regulatory interference in the setting of offer prices results in less underpricing of IPOs (Loughran and Ritter, 1995). Ritter (2003) reports the extent of under-pricing in 38 countries, including 11 Asian countries with an average initial returns ranging between 256.9 per cent for China and 15.1 per cent for Indonesia. In general, Ritter reports that the average initial returns of Asian IPOs are significantly higher than the average initial return of U.S. IPOs.

A recent report by Ritter (2011) documents that underpricing in China reached 137.4 per cent in the period of 1990-2010, in India in 1990-2007 it was 92.7 per cent, and in Brazil in 1979-2011 underpricing level reached 33.1 per cent.

Table 2.4 summarises the empirical evidence of IPO underpricing in different emerging markets. Research on China, India, and Brazil is presented first, followed by research on other countries.

Table 2. 4: Empirical evidence of IPO underpricing in emerging markets

Country	Author(s)	Sample size	Time Period	Average initial returns
CHINA	Su and Fleisher (1999)	308	1987-1995	948.6%
	Mok and Hui (1998)	101	1990-1993	289.2%
	Zhang and Tsui (2003)	240	1997-1998	124.9%
	Datar and Mao (1998)	226	1990-1996	388%
	Yu and Tse (2003)	343	1995-1998	123.6%
	Chan, Wei and Wang (2004)	570	1993-1998	178%
	Chi and Padgett (2000)	668	1996-2000	129.2%
	Liu and Li (2000)	781	1991-1999	139.4%
INDIA	Gu (2003)	68	1994	214.2%
	Li, Foster and Naughton (2004)	314	1999-2001	123.6%
	Guo and Brooks (2008)	286	2001-2005	93.5%
	Ajay Shah (1995)	2056	1991-1995	105.6%
	Krishnamurthy and Kumar (2002)	98	1992-1993	35.3%
	Uma (1993)	495	1991-1993	127.1%
	Ajay Pandey	1243	1992-1994	69.8%
	Madhusoondan and Thiripalraju (1997)	1922	1992-1995	75.21%
	Narasimhan and Ramana (1995)	103	1993-1994	92.2%
	Jaitly and Sharma (2004)	39	1993-1994	72%
	Baral and Obaidullah (1998)	433	1994-1995	153.2%
BRAZIL	Aggarwal, Leal and Hernandez (1993)	62	1979-1990	78.5%
Bangladesh	Islam (1999)	84	1994-1998	116%
Chile	Aggarwal, Leal and Hernandez (1993)	19	1982-1990	16.3%
Hong Kong	McGuinness (1992)		1980-1990	17%
Hong Kong	Agarwal, Liu, Rhee	256	1993-1997	20.8%
Korea	Dhatt, Kim and Lim (1993)	347	1980-1990	78.1%
Turkey	Kiymaz (2000)	163	1990-1996	13.1%
Sri Lanka	Samarakoon (2010)	105	1987-2008	34%
Taiwan	Chen D., Bin, Puclick and Chen T. (2011)	8 REIT IPOs*	2005-2009	0.75%
*REIT IPOs – Real Estate Investment Trust IPOs				

The previous research on the aftermarket performance of IPOs states that on average IPOs underperform the market. Ritter (1991) shows that IPOs in U.S. underperform other firms of the same size by 3.8 per cent during the five years after the IPO and reports negative 27.39 per cent three-years average abnormal buy-and-hold returns.

Loughran and Ritter (1995) report that the average buy-and-hold three-year and five-year returns for the U.S. IPOs are -8.4 per cent and -15.7 per cent respectively.

The long-term underperformance is not unique to developed markets. McGuinness (1993) reports market-adjusted returns of -18.26 per cent between the first and the 500th day of trading for IPOs in 1980-1990. Cai and Wei (1997) report five-year holding period returns of 62.1 per cent for IPOs and 101.4 per cent for matched firms in Japan in 1991-1992.

Loughran and Ritter (1995), however, provide evidence of positive aftermarket returns of IPOs. They find that high average raw returns during the 3 years after going public were earned in Japan (109.6 per cent), Korea (58.0 per cent) and Singapore (22.5 per cent). This finding is supported by Kim, Krinsky and Lee (1995) who find that in Korea, IPOs outperform seasoned firms with similar characteristics. Sullivan and Unite (2001) report 48.3 per cent raw returns for 104 IPOs in Philippines in 1987-1997.

A number of studies focus on aftermarket performance of Chinese IPOs specifically. They are summarised in the table 2.5.

Table 2. 5: Empirical evidence of aftermarket performance of IPOs in China

Author(s)	Sample size	Time Period	Long-term returns
Gu (2003)	68	1994	-53% (3 years) -57% (5 years)
Chi and Padgett (2002)	749	1996-1997	10.3% (3 years)
Zhang and Tsui (2003)	240	1997-1998	25% (3 years)
Chan et al. (2004)	570	1993-1998	25% (3 years) 27.4% (6 months)

There is a number of theories that investigate reasons for the long-run underperformance of IPOs.

According to Krigman, Shaw, and Womack (1999), there is a link between the initial trading volume and the long-term performance. They show that ‘initial returns predict subsequent long-term (one-year) excess returns. Hot IPOs outperform in the first year, cold IPOs underperform, and extra-hot IPOs² provide the lowest future returns (Krigman et al., 1999). The authors conclude that flipping (*see Glossary*) is a rational response to underwriters mispricing. They demonstrate that heavily flipped IPOs significantly underperform IPOs with less flipping over future holding periods.

Other researchers find that the theory predicts a negative relationship between volume of IPOs and long-term returns (Loughran and Ritter, 2002; Kooli and Suret, 2004).

Overall, short-term underpricing and long-term underperformance suggest that since individuals are likely to be influenced by fads, rumours spread during IPO, and misleading or incomplete information, investor sentiment may constitute a possible explanation for the underperformance of IPOs in long-term (Kooli and Suret, 2004).

2.3 Theories of IPO underpricing

Several theories have been proposed to explain the IPO underpricing. Baron (1982) argues that underpricing is caused by the information asymmetry between the underwriters and the issuers. Betty and Ritter (1986) explain the level of underpricing by the level of ex-ante uncertainty that surrounds the value of an IPO. To reduce that uncertainty issuers and underwriters use ‘signalling mechanisms’ to communicate with investors. According to the behavioural argument, over-enthusiastic investors drive the price of an IPO beyond its true fundamental value on the listing day (Welch and Ritter, 2002). The three sections below provide the overview of the asymmetric information theories, signalling theories and behavioural theories of underpricing.

Asymmetric information theories and signalling theories are traditional theories of IPO underpricing. They are based on the assumptions of market efficiency (*see Glossary*) (Ritter, 2003).

² ‘Hot’ IPOs have first-day return of 30 per cent or more; ‘Cold’ IPOs have first-day closing price at or below offer price; ‘Extra-hot’ IPOs have first-day returns over 60 per cent.

2.3.1 Asymmetric information theories of IPO underpricing

Asymmetric information theories include two types of information asymmetry: (i) information asymmetry between issuers and investors (Adverse Selection theory), and (ii) information asymmetry between issuers and underwriters (Agency-based theory).

One of the first theories of underpricing, the Adverse Selection Theory, was introduced by Rock (1986). According to the theory, investors are divided into a group of (i) informed and (ii) uninformed investors. The informed investors know the true value of the stock and the uninformed investors invest randomly without much knowledge of the firm. The theory assumes that the prices fluctuate according to the changes in the demand for stock (Rock, 1986). It is argued, therefore, that companies intentionally underprice IPOs as a rational behaviour in order to increase the demand for the issue and induce the uninformed investors to participate in the market. Companies of high value underprice less as the demand for their shares is already large (Karlis, 2000). Hence, pricing mechanism suggested by Rock implies that IPO underpricing varies directly with uncertainty about the firm and indirectly with the true value of the issuing firm. Therefore, it can be assumed that the level of underpricing depends on the firm size: larger companies have lesser underpricing and smaller companies have higher underpricing (Rock, 1986; Karlis, 2000).

According to Baron (1982), underpricing can be explained through the agency-based theory that assumes the agency-principal relationship (*see Glossary*) between issuers and underwriters. The theory states that the issuing firm does not know its own true value and must rely on the auditing of outside companies and the underwriters to report accurate information. The issuing firm leaves some money for the underwriter acting as an agent to make sure they act in the firm's best interest, disclose all the information accurately, and put in the necessary effort to market the shares (Baron, 1982).

However, Welch and Ritter (2002) argue that Baron's (1982) hypothesis is neither proved nor discredited as underwriters may be induced to underprice their own offerings to support their argument for it as a necessary cost of going public.

Hence, initial first-day returns of the IPO reflect the uncertainty with respect to the underwriter's information that the issuer faces. However, Baron's model does not take

into account competition in the investment banking business which would automatically ensure a certain amount of agent loyalty. The theory also does not take into consideration the fact that the underwriters are concerned with supporting their own reputation and, therefore, have additional incentive to produce truthful information about the firm's value (Welch and Ritter, 2002).

Therefore, as the size and reputation of the underwriter increases, the incentive to protect its reputation also increases and the underwriter is more motivated to produce truthful information. Consequently, higher underwriter's reputation decreases the uncertainty of the information provided and leads to lower IPO underpricing (Kiymaz, 2000; Welch and Ritter, 2002).

2.3.2 Signalling theory of IPO underpricing

Signalling theory includes a number of models that are based on the assumption that the IPO firm has perfect information about its own value and investors are the uninformed entities. The investors then, value the firm based on several different signalling mechanisms used by issuers, such as for example, number of shares issued for the IPO or the reputation of the underwriter (Karlis, 2000).

Willenborg (1999) presents a theory that explains demand for IPO shares as a function of several signalling mechanisms which relate to the size and status of the issuing firm and the size and status of the auditing firm and/or the underwriter. The theory distinguishes *informational signalling* and *insurance signalling* effects.

For example, if a firm hires a more reputable underwriter, the signal to the investors is that the firm will stand to benefit from having its financial statements more accurately analysed. This is the informational signalling effect. The reputation of underwriter also acts as an insurance signalling against possible overpricing of an IPO and future securities litigations. Also, size of the firm and the years of operation are often used as indicators or information signals of the quality of the IPO. Both information signalling and insurance signalling increase the demand for the IPO (Willenborg, 1999; Karlis, 2000).

Table 2.6 summarises the models of the signalling theory.

Table 2. 6: The models of the Signalling theory of underpricing

Model	Description
<i>Information momentum model</i>	Underpricing the issue attracts attention of more investors through enhanced coverage generated by research analysts and media and increases the demand for the stock (Aggarwal, Krigman and Womack, 2002; Bradley, Jordan and Ritter, 2003; Kennedy, Sivakumar and Vertzal, 2006)
<i>Entrepreneurial losses model</i>	When engaging in Initial Public Offering managers face a trade-off between underpricing the shares and marketing the IPO through expensive mechanisms. The extent to which issuers are concerned about underpricing depends on the amount of shares they sell at IPO, therefore, underpricing decreases with increased promotion costs and increases with higher insider retention (Habib and Ljungqvist, 2001).
<i>Market feedback model</i>	Issuers choose the value of IPO and the offer price to generate higher coverage by informed investors (such as analysts). This increased coverage is then subsequently used to conduct a seasoned equity offering (SEO) (Van Bommel , 2002). The model predicts positive relationship between initial underpricing and intended SEO (Kennedy et al., 2006).
<i>Legal liabilities model</i>	Threat of legal actions by investors in case of an overly inflated price of an issue is sometimes used as an argument for underpricing. As lawsuits are time-consuming, very costly, and have a negative impact on reputation, issuers may choose to underprice in order to reduce their legal liability (Hughes et al., 1992).
<i>Tax model</i>	Investors are compensated for paying taxes via a reduced offer price. Magnitude of IPO underpricing depends on short-term capital tax regime. IPO underpricing and long-term capital gains tax rate exhibit a negative relationship (Hughes et al., 1992).

In general, signalling theory assumes that the underwriters take the signalling effects into account when agreeing to an IPO contract. The underwriters lower the share price to reduce downside risk of either damaging their reputation by having an undersubscribed and overpriced offering or by drawing securities litigation from investors in a high-risk firm. The uncertainty about the firm making the issue and the motive to maintain and improve the firm's credibility is the catalyst behind the underwriters' incentive to reduce the price of the offering (Kennedy et al., 2006). The most important determinants of the uncertainty according to signalling theory are the size and status of the firm and the size and status of the underwriter. Therefore,

signalling theory predicts that as the size and status of the firm (and/or the underwriter) increases, the degree of underpricing will decrease (Kiymaz, 2000).

2.3.3 Behavioural theories of IPO underpricing

Many researchers argue that traditional theories of underpricing are not powerful enough to explain existing inefficiencies (Lowry and Schwert, 2002). An emergent view on IPO underpricing is based on the behavioural finance theories (*see Glossary*) of decision-making and irrationality of market players. The three principal behavioural explanations of IPO underpricing include: (i) cascades or herding model, (ii) investor sentiment model, and (iii) prospect theory and mental accounting model.

The brief overview of the theories is presented in the Table 2.7.

From the point of view of information cascades and herding model (*see Glossary*), issuing firms use underpricing to prevent development of a negative information cascade (Welch and Ritter 2002). This theoretical model has been tested by Amihud, Hauser and Kirsh (2003) who argue that underwriters have an underlying motivation to form a positive cascade as the responsibility for unsold shares lies with them. As demand is boosted through the cascades the chance of leftover unwanted stock is greatly reduced. Therefore, underwriters underprice to form a positive cascade, and as better informed investors enter the market or new information becomes available, the IPO underpricing decreases (leading to perceiving IPOs as underperforming in the long run) (Amihud *et al.*, 2003).

Investor sentiment model, based on overconfidence and overreaction heuristics (*see Glossary*), argues that presence of sentiment investors increases the chances of poorly informed rational investor receiving shares at a discounted price. Therefore, it can be argued that attracting sentiment investors through underpricing of a new issue can protect uninformed investors from making losses and exiting the market (Leite, 2005). Therefore, firms involved in IPO can (and often do) exploit investor sentiment through carefully selecting the timing of the IPO issue (it coincides with the times of high investor confidence/over-optimism) and level of underpricing (to generate higher

demand that boosts investor confidence levels) (Cornelli, Goldreich and Ljungqvist, 2006).

Prospect theory and mental accounting model (*see Glossary*) looks at the behavioural measure of issuer's satisfaction with the underwriter's performance. It states that IPO firms are less likely to switch underwriters when they are highly satisfied with the underwriter's performance. Underwriters also extract higher fees for subsequent transactions involving satisfied decision-makers (Ljungqvist and Wilhelm, 2005).

Table 2. 7: Behavioural theories of IPO underpricing

Model	Description
<i>Cascades / Herding model</i>	Information cascades are formed as later investors monitor the performance of an IPO and gather information from earlier investors. If a successful initial sales effort of an earlier investor is perceived to be due to favourable information that the investor had about the IPO, later investors will be more inclined to participate in the IPO. Herding occurs for two reasons: as a result of information shortages and out of fear on behalf of investors to adopt a different strategy. These investors often ignore private information out of conformity to the general tendency (Anderson and Holt, 1997; Welch and Ritter, 2002; Hirshleifer and Teoh, 2009).
<i>Investor sentiment model</i>	The model states that many firms with poorer performance time their initial float on the stock market to coincide with periods of high investor sentiment (Lowry and Schwert, 2002) or when irrational investors are highly confident. The level of investor sentiment can be deduced from the grey market prices ³ . High demand for the newly issued shares indicates investor confidence in the future performance of the issuing firm and is often associated with market participants being over-optimistic (Ljungqvist and Wilhelm, 2005).
<i>Prospect Theory / Mental Accounting model</i>	Issuers treat the opportunity cost of leaving money on the table as less important than the direct fees. They don't get upset about the severe underpricing because of their loss-averse preferences: they gain a lot on their shares. Such 'irrational' behaviour of CEOs benefits the underwriter that is rehired to manage future equity issues for higher fees. Switching of underwriters occurs when issuers are dissatisfied with the underwriter's performance during the IPO (Loughran and Ritter, 2002).

³ Grey market is the market just before the IPO takes place. It consists of small investors who sell stock on a forward basis i.e. the buyer receives the stock when the IPO is complete.

2.4 Chapter summary

There is a big difference in the performance of IPO markets even within the emerging countries.

The existing empirical evidence on IPO performance is mixed and inconclusive. There is a significant difference in the levels of IPO underpricing between emerging markets. The empirical findings on the levels of underpricing also indicate high variations according to the time periods. The general argument is that as the markets develop and become more efficient the IPOs become less underpriced.

The evidence of the aftermarket performance of IPOs is also quite diverse. The previously identified trend for aftermarket underperformance of IPOs does not find sufficient empirical support in the studies of emerging countries.

The underpricing of IPOs is explained by a number of theories. Generally, size and status of the issuing firm, underwriter's reputation, size of the deal are used as mechanisms to reduce information asymmetry and signal the quality of IPOs to outside investors. These factors are found to influence the level of initial underpricing of IPOs. One of the emerging trends in explaining underpricing is analyses of behavioural aspects of investors' decision-making process.

Chapter 3

RESEARCH METHODOLOGY

The chapter provides an outline of the research methodology. It commences with an overview of the research objective, research questions, and methods used to address them. It proceeds with a description of data collection and data sources. The last section of the chapter discusses issues of reliability and validity.

3.1 Research objective and research questions

The objective of this study is to investigate initial and aftermarket performance of IPOs in China, India, and Brazil. To address this research objective, three research questions are examined:

- (1) What is the level of IPO underpricing in China, India, and Brazil?
- (2) What is the aftermarket performance of IPOs in China, India, and Brazil?
- (3) What is the relationship between potential factors that influence IPO underpricing and the level of underpricing in China, India, and Brazil?

3.1.1 Research question 1: Levels of IPO underpricing in China, India, and Brazil

Research question one examines the levels of IPO underpricing in China, Indian, and Brazil. According to the literature review, the difference in the levels of underpricing between emerging markets is quite significant (Ritter, 2011). To analyse this, levels IPO underpricing is measured for each country.

Underpricing of IPO refers to difference between offer price and the closing price on the first day of trading (Booth, 2011). The level of underpricing is calculated according to the following formula:

$$\text{Underpricing} = \frac{P_o - P_{tc}}{P_o}$$

where, P_{tc} = the closing price at the end of the period, and P_o = the offer price.

There is a high volatility in the share price during the first month of trading. This is due to the information asymmetry that surrounds the IPOs. As more information becomes available the price adjusts to market valuation of the IPO (Loughran and Ritter, 2002). Previous findings suggest that levels of underpricing at the end of the first trading month are lower than the first day underpricing (Guo and Brooks, 2008).

For that reason the levels of underpricing are measured for the day one, day five, day ten, and for the first trading month⁴.

3.1.2 Research question 2: Aftermarket performance of IPOs in China, India, and Brazil

Research questions two examines the aftermarket performance of IPOs in China, India, and Brazil. Aftermarket performance of IPOs refers to the price behaviour of the IPOs beyond the listing day. Findings of the previous research provide inconclusive results indicating that in some countries underpriced IPOs on average underperform the markets (Ritter, 1991) and in other countries underpriced IPOs outperform the market (Cai and Wei, 1997; Loughran and Ritter, 1995).

International practice documents use of different methods for evaluation of aftermarket performance of IPOs, i.e. Cumulative Abnormal Returns (Barber and Lyon, 1997; Bhabra and Pettway, 2003) and Buy-and Hold Abnormal Returns (Choi and SangKoo, 2006; Sohail and Nasr, 2007).

Barber and Lyon (1997) state that investor's investment experience is more precisely reflected in the BHAR model as it presents compound returns. They support this finding by using an illustration of a 12-months CAR model against a 12-months BHAR model for a random sample of 200,000 observations. However, Mitchell and Stafford (2000) argue that BHAR approach is faulty as not all investors are interested in measuring their returns against an investment strategy based on a buy-and-hold investment.

To get a better understanding of the aftermarket performance of IPOs and to eliminate the need for the argument both measures of IPO returns (CAR and BHAR) were adopted for the purpose of this study.

⁴ First trading month is taken as a calendar month or 30 calendar days.

The CAR return is calculated according to the following formula:

where CAR_{IPOt} = Cumulative abnormal returns of an IPO in period t, AR_{IPOt} = abnormal returns of an IPO in period t, R_{IPOt} = IPO returns in period t, R_{mt} = market returns in period t.

The BHAR return is calculated as:

where, $BHAR_{IPOt}$ = buy-and-hold abnormal returns of an IPO in period t, $BHAR_{mt}$ = buy-and-hold abnormal returns for market in period t.

The market returns are measured using the regional market indices: (i) SHGIDX-SH, Shanghai composite index for Shanghai Stock Exchange (China), (ii) SENSEX-BY, benchmark index for Bombay Stock exchange (India), (iii) IBOV-BR, benchmark index for Bovespa Stock Exchange (Brazil).

According to the literature review, the biggest adjustment of IPO underpricing takes place in the first year (Guo and Brooks, 2008). For that reason the timeframe for measuring long-term returns is set at a 12 months period from the IPO date (a calendar year). To reflect the change in IPO performance BHAR is also calculated for the first month (30 calendar days) following the IPO date. First month BHAR is

calculated according to the formula specified above using the offer price and the closing share price on the 30th day after the IPO date.

3.1.3 Research question 3: Reasons for IPO underpricing

The third question of the research examines possible factors that potentially influence the level of underpricing.

Generally, the literature relates the underpricing to ex-ante uncertainty that surrounds the IPO (Rock, 1986; Beatty and Ritter, 1986; Kiymaz, 2000; Chen, Firth and Kim, 2003; Zouari, Boudgriga and TakTak, 2009; Samarakoon, 2010). Since it is not possible to measure ex-ante uncertainty directly, four variables that potentially influence the ex-ante uncertainty and the level of underpricing are identified. In line with previous studies, these variables are used as proxies for ex-ante uncertainty. They include: (i) firm size (VALUE variable), (ii) operating history (AGE variable), (iii) reputation of the employed underwriter (UWrank), and (iv) privatization through an IPO (PRIV variable).

- (i) Firm size (VALUE): Karlis (2000) and Kiymaz (2000) argue that IPOs issued by larger firms carry less ex-ante uncertainty. They are generally better known to the public and benefit from a higher demand for their shares compared to smaller firms (Kiymaz, 2000). Therefore, larger firms need to underprice less compared to smaller firms.
- (ii) Operating history (AGE): Previous research states that older firms are surrounded by less ex-ante uncertainty than younger firms as more information is available to the public about these firms (Karlis, 2000; Kiymaz, 2000; Chen *et al.*, 2004). Therefore, older firms are expected to have lower ex-ante uncertainty compared to the younger firms and carry lower underpricing.
- (iii) Reputation of the employed underwriter (UWrank): Research states that firms prefer to hire a more reputable underwriter to reduce the ex-ante uncertainty surrounding the IPO. As the ranking of the underwriter increases, the incentive to protect the reputation also increases so the

underwriting agent is more motivated to produce truthful information leading to reduced ex-ante uncertainty and lesser underpricing (Kiymaz, 2000; Chen et al., 2004; Zouari et al., 2009; Samarakoon, 2010). Therefore, increase in underwriter's reputation is associated with reduced information uncertainty leading to lower IPO underpricing.

- (iv) Privatization through an IPO (PRIV): Previous research states that privatization IPOs are considered more risky and, therefore, carry more ex-ante uncertainty (Kiymaz, 2000; Guo and Brooks, 2008). Samarakoon (2010) attributes high uncertainty regarding the value of privatization IPOs to several factors. He argues that the valuations of the state-owned firms are often of questionable quality and the information about the financial performance and projections provided by the government is incomplete or inaccurate. Furthermore, in most cases government retains some ownership stake in the firm being privatized. This could potentially lead to continued government and political influence on the firm (i.e. appointment of the top manager and the board of directors). These factors cause higher ex-ante uncertainty and higher underpricing is expected (Samarakoon, 2010). On the other hand, public enterprises are generally poorly managed and the main purpose of privatization is to increase the productivity of these firms. Hence, investors may expect better firm performance after the privatization process, which may imply lower underpricing (Kiymaz, 2000).

Table 3.1 summarises the indentified variables and hypothesis.

To provide a test of the ability of these factors to explain variation in IPO underpricing a regression analyses⁵ have been carried out. Prior to running a regression test each variable has been tested through the independent sample t-test to

⁵ Regression analysis allows researchers to analyze relationships between independent and dependent variables. The key benefits of using regression analysis include the ability to identify if independent variables have a significant relationship with a dependent variable, indicate the relative strength of different independent variables' effects on a dependent variable, and make predictions (Mooi and Sarstedt, 2011).

identify statistical significance of each variable. The regression model is specified as follows:


$$UP = \alpha + \beta_1(VALUE) + \beta_2(AGE) + \beta_3(UwSIZE) + \beta_4(PRIV) + \varepsilon$$

Table 3. 1: Summary of variables and hypotheses

Independent Variable	Measurement of independent variable	Expected relationship with dependent variable	Hypothesis
<i>Firm size (VALUE)</i>	Total assets of the firm at the end of the year preceding the IPO.	Prior studies identify a negative relationship, i.e. larger firms underprice less (Kiymaz, 2000; Chen et al., 2004; Zouari et al. 2009).	H ₂ : Larger firms have lower levels of underpricing
<i>Operating history (AGE)</i>	Total years of operation from the foundation date to the IPO date.	Previous studies identify a negative relationship, i.e. older firms underprice less (Karlis, 2000; Kiymaz, 2000; Chen et al., 2004).	H ₂ : Older firms have lower levels of underpricing
<i>Reputation of the employed underwriter (UWrank)</i>	The ratio of the number of IPOs underwritten by the underwriter to the total number of IPOs in the country during the specified period	Previous studies identify a negative relationship, i.e. hiring a more reputable underwriter reduces the level of underpricing (McDonald and Fisher, 1972; Guner, Onder, and Rhoades, 1999).	H ₃ : Use of underwriter with a higher ranking leads to lower underpricing
<i>Privatization through an IPO (PRIV)</i>	For state-owned companies the variable takes value of one if the IPO is taking place under the privatization program, and zero otherwise.	Prior studies provide mixed results: (i) state-owned firms underprice less (Kiymaz (2000); (ii) state-owned firms underprice more (Samarakoon, 2010). No pre-expectation	H ₄ : IPO through privatization have higher level of underpricing

The summary of the research questions and research methods used to address them is provided in the Table 3.2.

Table 3. 2: Summary of the research questions and research methods

Research Question (RQ)	Method	Prior Studies
<i>RQ1 What is the level of IPO Underpricing in China, India, and Brazil</i>		
What is the level of IPO Underpricing in: <ul style="list-style-type: none"> - China - India - Brazil at the end of: <ul style="list-style-type: none"> - Day 1 - Day 5 - Day 10 - Day 30 	<div style="text-align: center;">  </div> t = Day 1 Day 5 Day 10 Day 30	Booth (2011) Loughran and Ritter (2002) Kiymaz (2000) Aggarwal et al. (1993)
<i>RQ2 What is the Aftermarket Performance of IPOs in China, India, and Brazil</i>		
How do IPOs perform in the long run (end of 1 year) in: <ul style="list-style-type: none"> - China - India - Brazil 		Barber and Lyon (1997) Bhabra and Pettway (2003) Bessler and Thies (2007)
<i>RQ3 What is the relationship between the identified factors and IPO Underpricing levels in China, India, and Brazil</i>		
What is the relationship between the identified factors and IPO Underpricing levels in: <ul style="list-style-type: none"> - China - India - Brazil 	Regression Analysis: $UP = \alpha + \beta_1(VALUE) + \beta_2(AGE) + \beta_3(UwSIZE) + \beta_4(PRIV) + \varepsilon$	Kiymaz (2000) Chen et al. (2004) Samarakoon (2010)

3.2 Data sample and data source

The data sample for China consists of 59 firms listed on the Shanghai Stock Exchange (SSE) in the period of 2007-2010. The list of IPOs was obtained from the annual fact books issued by the Shanghai Stock Exchange. The fact books are available online on the SSE website (www.sse.com). From this, one IPO was excluded due to inadequate data resulting in 23 IPOs in 2007, six IPOs for 2008, seven IPOs in 2009, and 22 IPOs in 2010. Appendix B provides the list of IPOs for Chinese sample.

Indian sample consists of 169 firms listed on Bombay Stock Exchange in the period of 2007-2010. The list of IPOs was obtained from the Bombay Stock Exchange website (www.bseindia.com). From this sample 49 IPOs were excluded due to limited data resulting in 47 IPOs in 2007, 17 IPOs in 2008, 14 IPOs in 2009, and 50 IPOs in 2010. The list of IPOs is provided in Appendix C.

Brazilian sample consist of 58 firms listed on BM&FBovespa Stock Exchange in the period of 2007-2010. The list of IPOs was obtained from the BM&FBovespa Stock Exchange website (www.bmfbovespa.com.br). From this, 13 IPOs were excluded due to inadequate data resulting in 37 IPOs in 2007, one IPO in 2008, four IPOs in 2009, and three IPOs in 2010. The list of IPOs is provided in Appendix D.

The characteristics of IPOs were sourced using Thomson One (www.thomsonone.com). These characteristics include listing date, sector, offer price, first day closing price, firm's value at the end of the year preceding the IPO, use of underwriter, and underwriter's name. Daily closing prices for the shares and daily closing price for the relevant regional benchmark index for the first 12 calendar months following the IPO date were also sourced through Thomson One. The benchmark indices used in this study are SHGIDX-SH for China, SENSEX-BY for India, and IBOV-BR for Brazil. The foundation date of the firm and information on the privatization through the IPO process was gathered from the firms' annual reports and publications.

3.3 Reliability and validity

To ensure validity of the findings every method used to calculate the measures of this study is based on previous research and previous empirical analysis. The sample data and characteristics of each observation are gathered from the reliable sources only (i.e stock exchanges, Thomson One, firms' reports and publications). The dataset is ensured to be sufficiently large and include as many observations in the sample as possible. Outliers that significantly distorted findings were excluded from the dataset where necessary. The independent variables of the regression model were chosen based on the previous research and theoretical assumptions. The use of proxies for measuring the concept was also based on previous research and empirical studies.

The data is analysed using the Excel and SPSS packages. Excel is used to calculate the levels of underpricing, CAR returns, and BHAR returns. The SPSS is used for univariate tests and regression analyses.

To ensure the reliability of the findings each variable is tested for the normality of distribution through the one-sample statistics test and results are reported at the 95 per cent level of significance. Where results are not statistically significant (i.e for Brazil sample) it has been explicitly stated. Prior to running a regression each variable is tested for statistical significance through the independent samples test and the results are reported at the 95 per cent confidence level. The independent variables are also tested for the multicollinearity issues through the correlation matrix. The data is also checked for the assumption of a linear relationship between the independent and dependent variables and homoscedasticity by using the plot of standardized residuals.

Chapter 4

RESEARCH FINDINGS

The chapter presents the findings of the research on the initial and aftermarket performance of IPOs in China, India, and Brazil in the period of 2007-2010. The layout of the chapter follows the research objective and questions. Section 4.1 presents the levels of IPO mispricing (i) by countries, (ii) by time periods, and (iii) by sectors. Section 4.2 outlines the aftermarket performance of IPOs presenting both CAR and BHAR returns discussed in the methodology chapter. Section 4.3 summarises the results of the statistical analyses used to investigate the potential factors influencing IPO mispricing in China, India, and Brazil.

Previous studies use the term ‘underpricing’ to refer to the levels of abnormal performance of IPOs on the first day of trading. However, as the findings of this study indicate ‘mispricing’⁶ is a more appropriate term to use as IPOs show underpricing⁷ and overpricing⁸ on the first day of trading.

⁶ Mispricing is calculated as the difference between the offer price and the closing price on the first day of trading of the IPO.

⁷ Underpricing refers to IPOs with the offer price set below the market price resulting in unrealised IPO profits by the company or ‘money left on the table’.

⁸ Overpricing refers to IPOs with the offer price set at a higher level than the market price resulting in lower than expected IPO proceeds.

4.1 Research Question 1: Levels of IPO mispricing in China, India, and Brazil

The analysis of the average levels of IPO mispricing is based on the sample of 58 companies in China, 128 companies in India, and 45 companies in Brazil that had their listings in the period of 2007-2010.

4.1.1 Summary statistics on IPO mispricing

Table 4.1 presents the mispricing statistics for the sample. For the purpose of this study negative values indicate IPOs that have been overpriced (OP) and positive values indicate IPOs that have been underpriced (UP). Overpriced (OP) IPOs are highlighted in red and underpriced IPOs are highlighted in green.

The average mispricing for China is 64 per cent for the four-year period, with the maximum mispricing levels reaching 330 per cent and minimum levels of -32 per cent. The majority of firms (86 per cent of the sample) in China are underpriced on average by 76 per cent. The overpriced IPOs in the Chinese sample include eight firms with the average level of overpricing of -15 per cent. This means that on average 14 per cent of Chinese IPOs have been setting the offer price at 15 per cent higher than the market price.

In India average IPO mispricing level is 14 per cent. The maximum level of mispricing is 184 per cent and minimum is -55 per cent. A total of 51 firms were overpriced in India. This means that on average 38 per cent of IPOs in India had the offer price set at 16 per cent higher than market pricing. Highest level of overpricing for India is 55 per cent. Underpricing in India occurs in 62 per cent of IPOs with the highest level of underpricing of 184 per cent and the lowest of 0.1 per cent.

Table 4.1: Summary statistics for the average first day IPO mispricing in China, India and Brazil in 2007-2010

	Sample size	% of total dataset	Mean	Median	Standard deviation	Maximum value	Minimum value	Outliers*
CHINA								
Mispricing total	58	100%	64%	45%	70%	330%	-32%	1
<i>Mispricing without outlier</i>	<i>57</i>	<i>98%</i>	<i>59%</i>	<i>45%</i>	<i>60%</i>	<i>215%</i>	<i>-32%</i>	
Overpricing (OP)	8	14%	-15%	-13%	13%	-1%	-32%	0
<i>Overpricing (OP) without outliers</i>	—	—	—	—	—	—	—	—
Underpricing (UP)	50	86%	76%	57%	67%	330%	1%	1
<i>Underpricing (UP) without outliers</i>	<i>49</i>	<i>84%</i>	<i>71%</i>	<i>56%</i>	<i>56%</i>	<i>215%</i>	<i>1%</i>	
INDIA								
Mispricing total	128	100%	14%	6%	37%	184%	-55%	0
<i>Mispricing without outlier</i>	—	—	—	—	—	—	—	—
Overpricing (OP)	49	38%	-16%	-13%	14%	0%	-55%	2
<i>Overpricing (OP) without outliers</i>	<i>47</i>	<i>37%</i>	<i>-15%</i>	<i>-11%</i>	<i>12%</i>	<i>0%</i>	<i>-42%</i>	
Underpricing (UP)	79		62%	33%	34%	184%	184%	3
<i>Underpricing (UP) without outliers</i>	<i>76</i>	<i>59%</i>	<i>29%</i>	<i>21%</i>	<i>25%</i>	<i>103%</i>	<i>0.1%</i>	
BRAZIL								
Mispricing total	45	100%	0.35%	0%	19%	65%	-55%	0
<i>Mispricing without outlier</i>	—	—	—	—	—	—	—	—
Overpricing (OP)	20	44%	-13%	-9%	14%	-0.08%	-55%	2
<i>Overpricing (OP) without outliers</i>	<i>18</i>	<i>40%</i>	<i>-10%</i>	<i>-7%</i>	<i>8%</i>	<i>-0.08%</i>	<i>-25%</i>	
Underpricing (UP)	25	56%	11%	8%	16%	65%	0.35%	3
<i>Underpricing (UP) without outliers</i>	<i>22</i>	<i>49%</i>	<i>6%</i>	<i>4%</i>	<i>7%</i>	<i>21%</i>	<i>0.35%</i>	
Positive values indicate underpricing, negative values indicate overpricing.								

*The outlier for China is Northern United Publishing & Media (Group) Company Limited (underpricing of 329.53%)

*The outliers for India are MIC Electronics Ltd. (-54.91%) and Reliance Power Ltd. (-48.29%) for overpricing, and Religare Enterprises Ltd.(183.95%), Icrta Ltd.(143.41%), and EDSERV Softsystems Ltd.. (129.5%) for underpricing

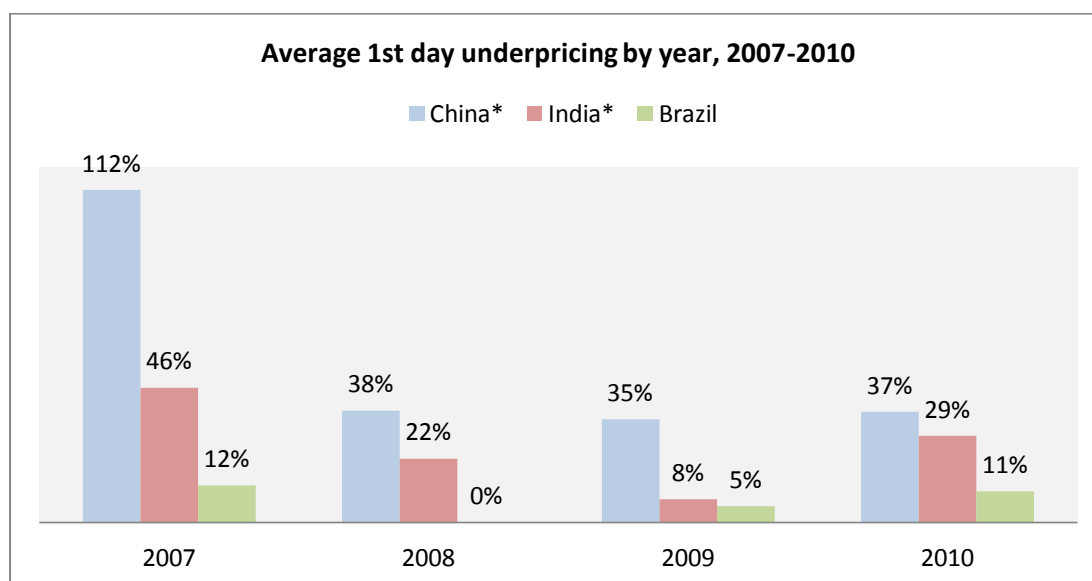
*the outliers for Brazil are Even Const. e Incorp.(-55.07%) and Rodobens Negócios Imobiliários (-39.75%) for overpricing and JBS(64.75%), SLC Agrigola (46.43%), and EZTec Empreend. & Participacoes (32.73%) for underpricing.

Brazil presents an interesting case as the findings suggest that average level of underpricing in Brazil in 2007-2010 is 0.35 per cent. This is the lowest level of underpricing between the three countries indicating that offer prices in Brazil are set very close to the market price. The Brazilian sample also shows the lowest levels of standard deviation (19 per cent) meaning that there is less differences between the price setting of Brazilian IPOs compared to Chinese IPOs (st.dev of 70 per cent) or Indian IPOs (st.dev. of 37 per cent).

20 IPOs in Brazil (44 per cent of the sample) have been overpriced in 2007-2010. The majority of overpricing occurs in 2007-2008. Average overpricing level is -13 per cent with maximum overpricing of -55 per cent and minimum of -0.08 per cent. This means that similarly to China, 44 per cent of Brazilian IPOs were overpriced by 13 per cent between 2007 and 2010 (in 2007-2008 more precisely). Underpricing in Brazil occurs in 56 per cent of IPOs. The average underpricing is six per cent (excluding outliers), with the highest level of 65 per cent and the lowest of 0.35 per cent.

Figures 4.1 and 4.2 show the levels of underpricing and overpricing for China, India and Brazil in 2007-2010.

Figure 4. 1: Average first day underpricing by year and by country

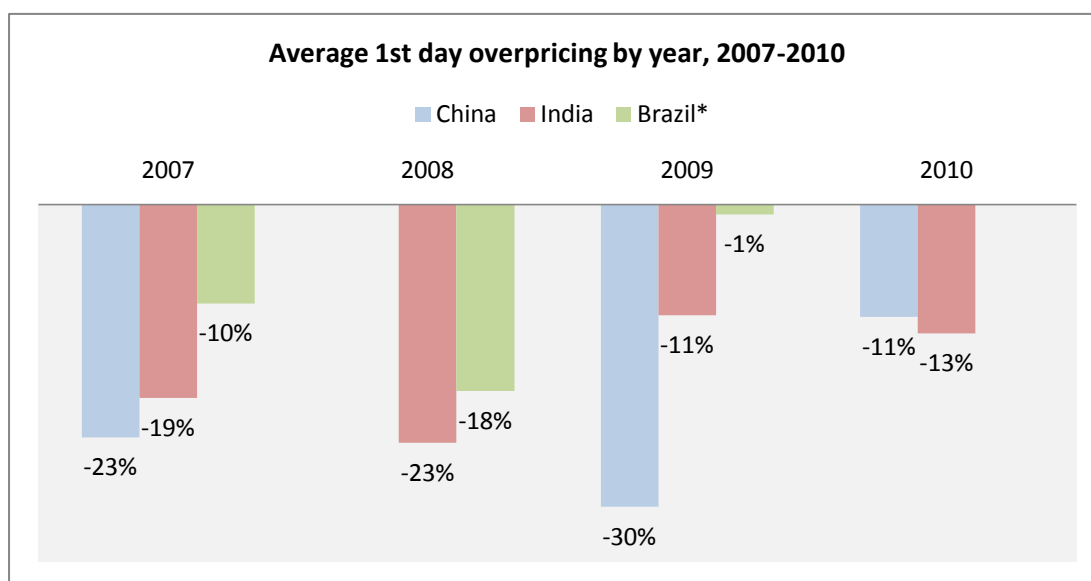


Positive values indicate underpricing, negative values indicate overpricing

*Excluding outliers

Brazil shows highest levels of overpricing, followed by India, while China has the highest levels of underpricing, followed by India and Brazil.

Figure 4. 2: Average first day overpricing by year and by country



Positive values indicate underpricing, negative values indicate overpricing

*Excluding outliers

The findings for the overpriced IPOs in China for 2008 and Brazil for 2010 have been omitted due to the limited data.

4.1.2 Overview of the IPO mispricing by sector in China, India, and Brazil

A summary of the levels of mispricing by sector is presented in the Table 4.2. According to the findings, different sectors are represented differently in the three countries. Brazilian IPOs are represented mostly by Banking and Financial sector, and the Real Estate Investment and Services sector, while the latter is not represented in the Chinese sample at all. The technology sector is represented mostly in the Indian IPOs with only one IPO in that sector in Brazil and none in China.

Table 4. 2: Average mispricing by sector

Average Mispricing by Sector, 2007-2010						
Sectors represented by 4 or more firms in at least two countries						
	China		India		Brazil	
	Avg	No of IPOs	Avg	No of IPOs	Avg	No of IPOs
Banking & Financial Services	46%	13	48%	9	-3%	15
Real Estate Investment & Services	–	–	-4%	9	-3%	11
Construction & Materials	37%	5	19%	21	–	–
Technology, Hardware & Software	–	–	26%	10	–	–
Industrial Engineering	30%	10	3% **	3	–	–
Industrial Metals	113%	5	34%	5		
General Personal and Household*	82%	5	1%	17	1%	4
Food Producers	–	–	30%	6	18%	5
Positive values indicate underpricing, negative values indicate overpricing						
*General personal and household sector includes Personal and Household Goods, General Retailers, Travel and Leisure and Automobile and Parts sectors						
**Represented by 3 companies only						

The breakdown by sector shows that Chinese IPOs in Construction and Materials sector and General Personal and Household sector have the highest levels of underpricing. In India Banking and Financial Services sector has the highest level of underpricing. Industrial Metals sector and Food Producers sector show high levels of underpricing, followed by Technology, Hardware and Software sector. Construction and Materials sector in India also seems to be quite developed. It has the highest number of IPOs and an average underpricing of 19 per cent. Brazil has only four sectors that are sufficiently represent the data sample. Real Estate Investment and Services sector, and Banking and Financial Services sector both show overpricing of IPOs by three per cent. General Personal and Household sector and Food Producers sector show underpricing of one per cent and 18 per cent respectively.

Banking and Financial sector and General Personal and Household sector are the only two sectors represented in all three countries. The overview of IPO mispricing in these sectors by the day of trade is summarised in the Table 4.3 and Table 4.4.

Table 4. 3: Mispricing in the Banking and Financial Sector

Levels of IPO Mispricing in Banking & Financial Services Sector, 2007-2010									
	No of IPOs	1 st day	5 th day	10 th day	1 month	1 st day UP	No of IPOs	1 st day OP	No of IPOs
China	13	46%	54%	60%	48%	52%	12	-23%	1
India	9	48%	50%	43%	50%	54%	8	-6%	1
Brazil	15	-3%	0%	1%	-2%	4%	8*	-10%	7
Positive values indicate underpricing, negative values indicate overpricing									
* for 3 of the companies 1st day underpricing figure is 0%									

China and India have similar levels of mispricing in the Banking and Financial sector. Majority of IPOs in both countries are on average underpriced by 52 and 54 per cent respectively on the first trading day. Brazilian IPOs in the sector are on average mispriced by negative three per cent and majority of Brazilian IPOs in the sector show overpricing by 10 per cent on the first trading day. As the table indicates, underpriced IPOs in China and India continue to be underpriced during the first month of trading. The level of IPO overpricing in Brazil is reduced by one per cent by the end of the first month.

Table 4. 4: Mispricing in the General Personal and Household Goods Sectors

Levels of IPO Mispricing in General Personal and Household Goods Sector*, 2007-2010									
	No of IPOs	1 st day	5 th day	10 th day	1 month	1 st day UP	No of IPOs	1 st day OP	No of IPOs
China	5	82%	82%	71%	77%	82%	5	—	—
India	17	1%	4%	3%	-6%	17%	9	-17%	8
Brazil	4	1%	6%	6%	6%	1%	3	-2%	1
Positive values indicate underpricing, negative values indicate overpricing.									
*General personal and household sector includes Personal and Household Goods, General Retailers, Travel and Leisure and Automobile and Parts sectors									

Findings indicate that in the three countries IPOs in the General Personal and Household Goods sector are on average underpriced. India and Brazil have similar levels of underpricing (one per cent), while China shows significantly different level of underpricing in the sector (82 per cent). Underpriced and overpriced IPOs in India show similar levels of mispricing (17 per cent and -17 per cent respectively), while Chinese IPOs show no overpricing on the first trading day. Average level of underpricing in the sector increases in Brazil. It shows slight reduction in China. In India average level of IPO mispricing becomes negative during the first month,

There is a significant number of IPOs in Industrial sectors in China and India. The overview of IPOs mispricing in the combined Industrials sector is presented in Table 4.5.

Table 4. 5: Mispricing in the combined Industrials Sector

Levels of IPO Mispricing for combined Industrials Sector*, 2007-2010									
	No of IPOs	1 st day	5 th day	10 th day	1 month	1 st day UP	No of IPOs	1 st day OP	No of IPOs
China	22	65%	58%	62%	66%	95%	16	-16%	6
India	18	13%	14%	7%	2%	29%	12	-19%	6
Positive values indicate underpricing, negative values indicate overpricing.									
*Combined Industrial Sector includes Industrial Transportation sector, Industrial Engineering sector, Industrial Metals sectors, and General Industrials sector									

First day average mispricing for combined Industrial Sector is 65 per cent in China and 13 percent in India. Majority of Chinese IPOs in the sector are underpriced by 95 per cent on average. Indian IPOs show average underpricing of 29 per cent and average overpricing of 19 per cent for the first day. As the table indicates, mispricing in China remains relatively stable during the first trading month, while India shows significant decline in the average level of mispricing for the sector.

Real Estate and Investment Services sector in Brazil has the second highest number of IPOs in the country. The sector is also represented by a number of Indian IPOs. The overview of IPO mispricing in the sector by trading day is summarised in the Table 4.6.

Table 4. 6: Mispricing in Real Estate Investment and Service Sector

Levels of IPO Mispricing in Real Estate Investment and Services Sector, 2007-2010									
	No of IPOs	1 st day	5 th day	10 th day	1 month	1 st day UP	No of IPOs	1 st day OP	No of IPOs
India	9	-4%	-5%	-6%	-7%	9%	4	-14%	5
Brazil	11	-3%	-7%	-5%	-4%	14%	6	-24%	5
Positive values indicate underpricing, negative values indicate overpricing.									

Average mispricing for Indian IPOs is negative four per cent. About half of the IPOs in the sector show underpricing on the first trading day (nine per cent on average). In Brazil IPOs are on average mispriced by negative three per cent. Underpriced IPOs

represent about half of the total number of Brazilian IPOs in the sector. Average level of underpricing is 14 per cent and average level of overpricing is -24 per cent. Mispricing levels in India and Brazil remain relatively stable during the first trading month.

One of the highest levels of mispricing in the sample (330 per cent) is an IPO in Media and Broadcasting Sector in China. The sector is represented by one IPO of a state-owned company (Northern United Publishing Media Co. Ltd.) and one IPO of a private company (China South Publishing and Media Group). Similarly to Media sector the Public Utilities sector had two IPOs in 2007-2010 that included a state-owned Chongqing Water Group and a privately-owned company Shenzhen Gas Ltd. Table 4.7 presents the comparison of IPO mispricing in the two sectors.

Table 4. 7: Media and Broadcasting sector and Public Utilities sector in China

Stock ID	Company name	Sector	IPO date	Underpricing
601999-SH	Northern United Publishing & Media (Group) Company Limited	Media and Broadcasting	21/12/2007	330%
601098-SH	China South Publishing & Media Group Co., Ltd.	Media and Broadcasting	28/10/2010	30%
601139-SH	Shenzhen Gas	Public utilities	25/12/2009	46%
601158-SH	Chongqing Water Group Co., Ltd.	Public utilities	29/03/2010	73%
Positive values indicate underpricing, negative values indicate overpricing				

Northern United Publishing Media Co. Ltd. has the highest level of mispricing in the data sample. The firm is one of the first state-owned publishing companies to be publicly listed on stock exchange. It had numerous subsidiaries that have been restructured prior to IPO in 2007 and the company had reported significant increases in operating profits. China South Publishing and Media Group is one of the private publishing companies that have been created in 2008 following the deregulation of the sector. The company had its IPO in 2010 or four years later than the Northern United Publishing and Media Group.

The Chongqing Water Group Co. Ltd. was a state-owned company that had its IPO in 2009, while Shenzhen Gas Corporation Ltd. is a private company that had its listing in 2010. However, Shenzhen Gas (private company) had higher level of underpricing as compared to the state-owned Chongqing Water Group. Such contrasting findings for

the two sectors may be due to the different nature of the businesses. Public utilities sector involves high maintenance costs and has less flexibility than media and publishing sector that has become highly digitised and is more adaptable to changing business environment.

4.1.3 Mispricing by day for IPOs in China, India, and Brazil

Table 4.8 represents the overall summary statistics for the levels of mispricing according to the trading day. It includes mispricing on the 1st day, the 5th day, the 10th day of trade, and at the end of the first month⁹ after the IPO.

Table 4. 8: Summary statistics for mispricing by trading day

Mispricing Statistics by Trading Day, 2007-2010				
	1st day	5th day	10th day	1 month
CHINA				
Sample size	58	58	58	58
Mean	64%	63%	65%	61%
Median	45%	46%	52%	34%
Standard deviation	70%	72%	76%	87%
Maximum value	330%	352%	361%	387%
Minimum value	-32%	-37%	-34%	-46%
INDIA				
Sample size	128	128	128	128
Mean	14%	12%	8%	6%
Median	6%	6%	0%	-4%
Standard deviation	37%	41%	42%	51%
Maximum value	184%	173%	175%	193%
Minimum value	-55%	-6%	-34%	-66%
BRAZIL				
Sample size	45	45	45	45
Mean	0%	-1%	0%	-1%
Median	0%	0%	3%	3%
Standard deviation	19%	17%	18%	21%
Maximum value	65%	42%	40%	33%
Minimum value	-55%	-64%	-64%	-85%
Positive values indicate underpricing, negative values indicate overpricing.				
Underpricing is calculated as the difference between the offer price and the closing price on the 1 st trading day, the 5 th trading day, the 10 th trading day and end of 1 st month of trading following the IPO				

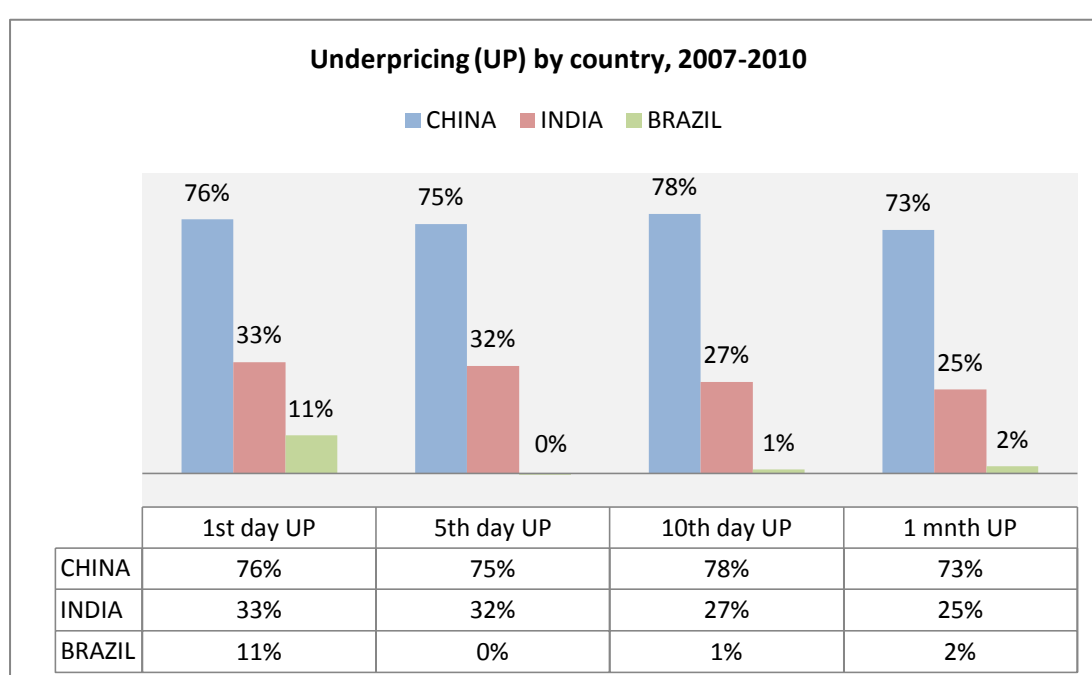
⁹ First trading month is taken as a calendar month or 30 days.

The average underpricing in China remains relatively the same across the specified time periods. There is slightly higher variance in India while in Brazil the underpricing level remains quite stable throughout the first month of trading.

China also exhibits the highest maximum underpricing (well over 300%) throughout the first trading month and much higher levels of standard deviation between the three countries.

Figure 4.3 presents the average levels of underpricing (UP) according to the day of trade and the country (excluding outliers).

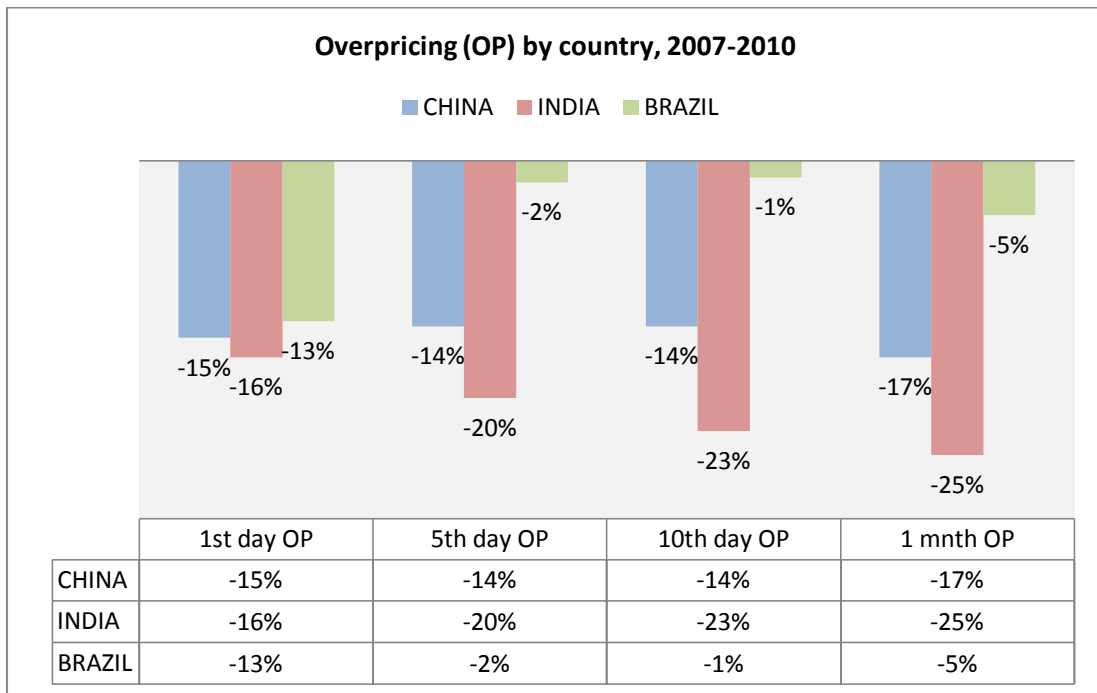
Figure 4. 3: Underpricing by the trading day (excluding outliers)



Positive values indicate underpricing, negative values indicate overpricing

China has the highest levels of IPO underpricing. In India underpricing is around half the levels of underpricing in China. Brazil represents only a small fraction of the IPO underpricing levels in China. Both Brazil and India show an increase in the underpricing over time while China indicates a slight decline at the end of the first trading month.

Figure 4. 4: Overpricing by the trading day (excluding outliers)



Positive values indicate underpricing, negative values indicate overpricing

India has the highest level of overpricing, followed by Brazil. In India overpricing has a tendency to increase with time, while in Brazil it is significantly reduced. In China overpricing remains relatively stable and shows only slight increase.

4.2 Research Question 2: Aftermarket performance of IPOs in China, India, and Brazil

The second research question examines the aftermarket performance of Initial Public Offerings in China, India and Brazil. To address this question the abnormal aftermarket returns of the IPOs are calculated according to the Cumulative Abnormal Returns (CAR) and Buy and Hold Abnormal Returns (BHAR) formulas specified in the Methodology chapter.

4.2.1 First Month Buy-and Hold Abnormal Returns in China, India, and Brazil

The first month of trading usually involves high volatility in the share price due to the information asymmetry between issuers and/or underwriters and investors in the market. For that reason calculating the BHAR for the share price at the end of the first month of trading may provide some insights into how the share price adjusts to the market levels as more and more information becomes available.

Table 4.9 provides the summary statistics on the average BHAR by country.

Table 4. 9: Summary statistics for BHAR, end of first trading month

Summary Statistics for BHAR, end of 1 st trading month, 2007-2010			
	China	India	Brazil
Sample size	58	128	45
Mean	61%	6%	-2%
Median	39%	-4%	1%
Standard deviation	79%	49%	19%
Maximum value	342%	182%	32%
Minimum value	-32%	-84%	-59%
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.			

As the table indicates, Chinese IPOs have the highest average abnormal BHAR returns at the end of the first month of trade, while Brazilian IPOs on average continue to underperform the market by four per cent for the same period.

Table 4.10 shows average abnormal BHAR returns for underpriced and overpriced IPOs at the end of the first trading month.

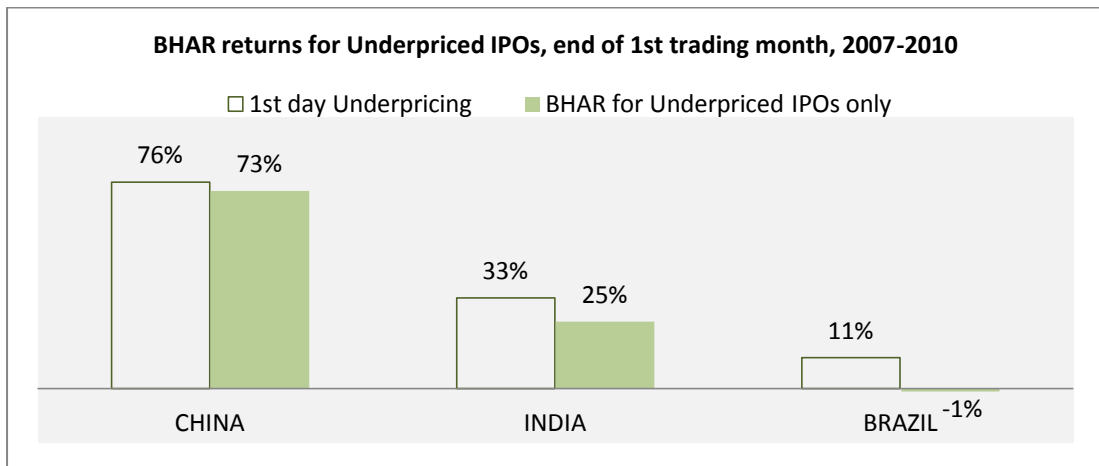
Table 4. 10: Average abnormal BHAR returns, end of first trading month

Average abnormal BHAR returns, end of 1st trading month, 2007-2010		
	for Underpriced IPOs	for Overpriced IPOs
CHINA		
Sample size	50	8
% of total IPOs	86%	14%
Mean	73%	-14%
INDIA		
Sample size	79	49
% of total IPOs	62%	38%
Mean	25%	-24%
BRAZIL		
Sample size	25	20
% of total IPOs	56%	44%
Mean	-1%	-2%
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.		

Average first month abnormal BHAR returns for underpriced IPOs are highest in China (73 per cent), India provides 25 per cent and Brazil shows negative one per cent abnormal returns. On the other hand, IPOs that have been initially overpriced provide the lowest first month returns in India (-24 per cent), while Brazil has the smallest negative abnormal BHAR.

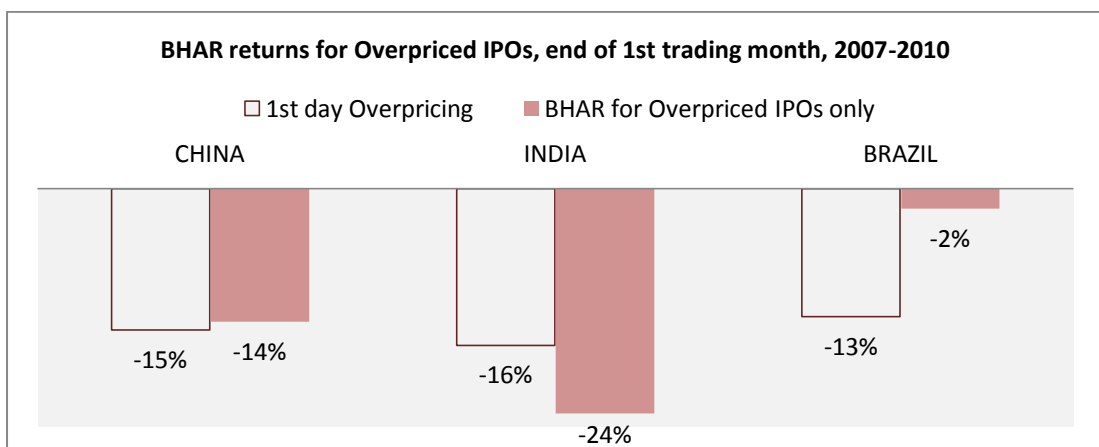
Figures 4.5 and 4.6 provide the comparative summary for underpriced and overpriced IPOs and abnormal BHAR returns for the first trading month by country for the period of 2007-2010.

Figure 4. 5: Abnormal BHAR returns for underpriced IPOs



Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

Figure 4. 6: Abnormal BHAR returns for overpriced IPOs



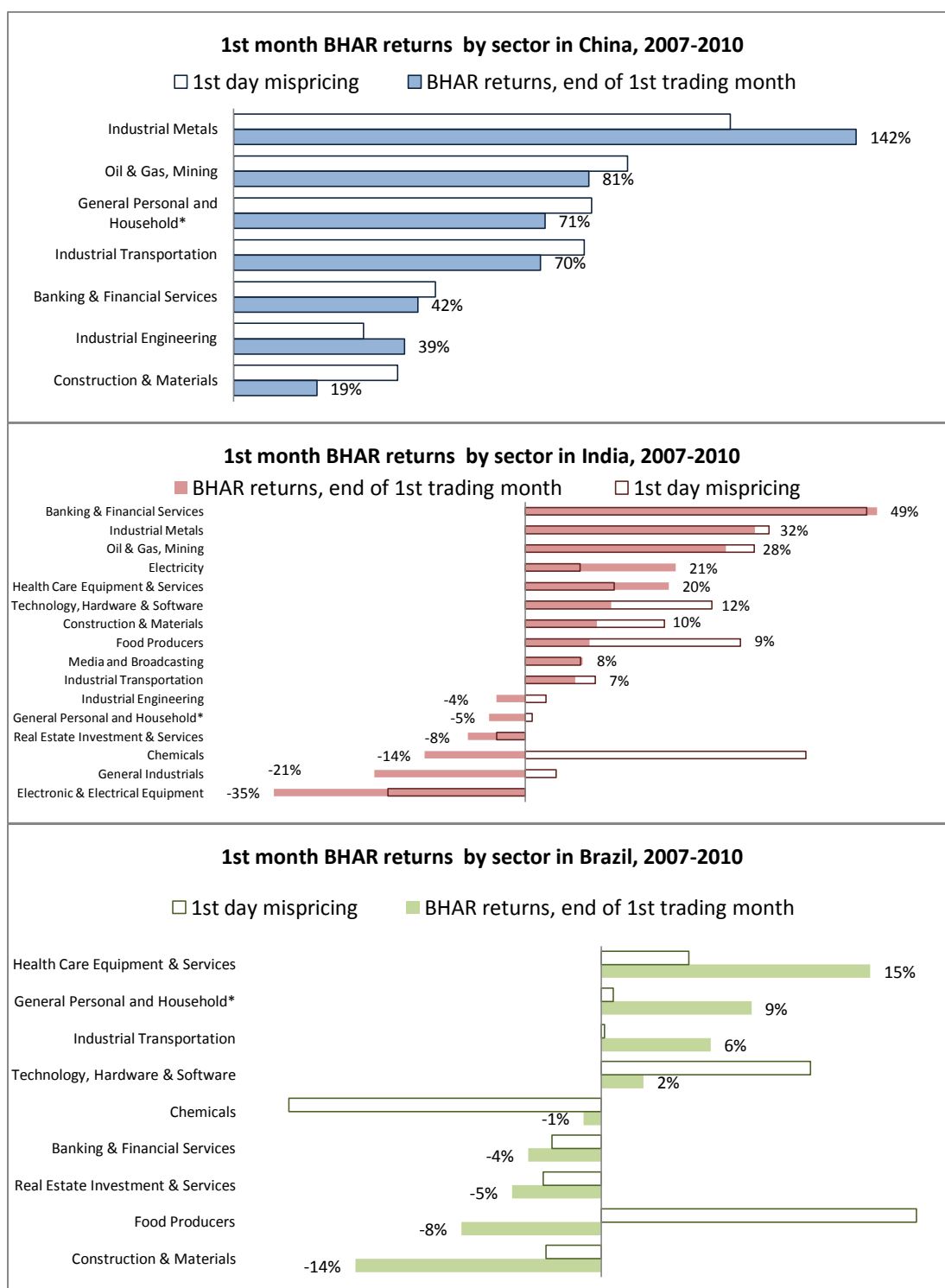
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

In China and India underpriced IPOs continue to outperform the market and overpriced IPOs continue to underperform the market during the first trading month. In Brazil both underpriced and overpriced IPOs underperform the market during the first trading month.

The summary of the first month BHAR returns for China, India and Brazil by sector is provided in Figure 4.7. In China IPOs outperform the market during the first month. IPOs in Industrial Engineering sector, General Personal and Household Goods sector, Chemicals sector, and General Industrial sector in India show initial overpricing. However, these sectors outperform the market by the end of the first trading month. In

Brazil Food Producers sector with initial overpricing of IPOs (by eight per cent) outperforms the market by 18 per cent during the first month.

Figure 4. 7: First month BHAR returns by sectors



Positive values indicate underpricing, negative values indicate overpricing.

*General personal and household sector includes Personal and Household Goods, General Retailers, Travel and Leisure and Automobile and Parts sectors

4.2.2 Descriptive Statistics for CAR and BHAR for the 12 months period

Table 4.11 provides summary statistics for abnormal CAR and BHAR returns for the 12-months period.

Table 4. 11: Summary Statistics for CAR and BHAR, end of 12 months

Summary Statistics for CAR and BHAR 12 months, 2007-2010			
	China	India	Brazil
Abnormal CAR, 12 months			
Sample size	58	128	45
Mean	62%	-18%	-3%
Median	47%	-27%	-41%
Standard deviation	70%	72%	51%
Maximum value	340%	211%	63%
Minimum value	-22%	-123%	-146%
Abnormal BHAR, 12 months			
Sample size	58	128	45
Mean	38%	-10%	-31%
Median	28%	-30%	-41%
Standard deviation	50%	67%	43%
Maximum value	234%	245%	97%
Minimum value	-23%	-82%	-92%
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.			

China has the highest average returns at the end of the 12 months both for CAR and BHAR. Also, the standard deviation for the sample does not differ much from that of India and Brazil (as opposed to the levels of underpricing).

There is a significant difference in the maximum CAR and BHAR returns for the three countries. In China mispriced IPOs outperform the market by 62 per cent on average according to abnormal CAR and by 38 per cent according to abnormal BHAR returns. In India and Brazil IPOs show negative abnormal returns, meaning that mispriced IPOs in these countries on average underperform the market by the end of 12 months.

4.2.3 Cumulative Abnormal Returns (CAR) for the 12 months period

Table 4.12 shows average abnormal CAR returns for underpriced and overpriced IPOs at the end of the first 12 months of trading.

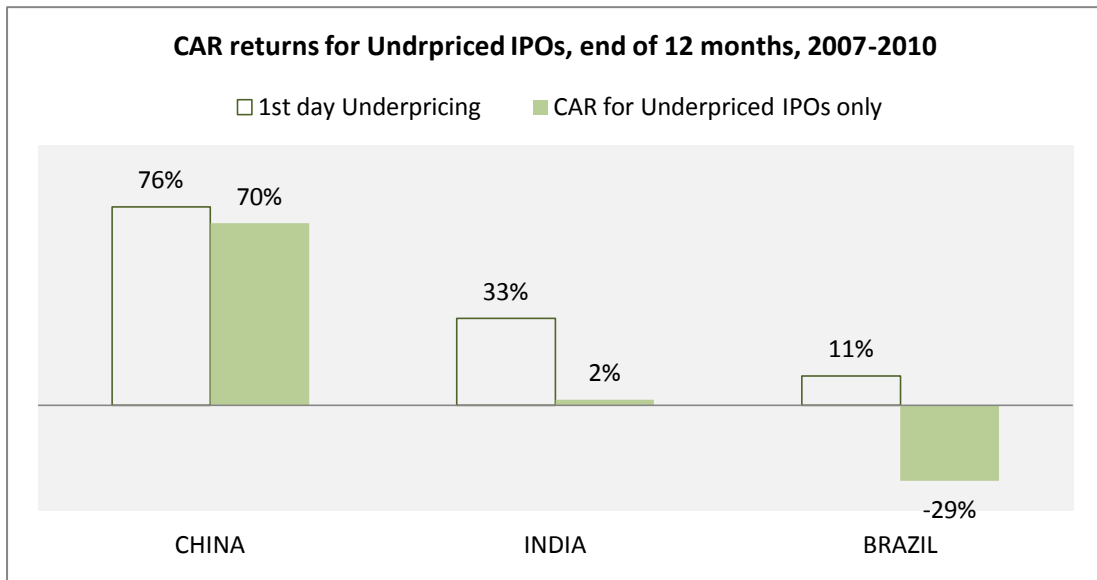
Table 4. 12: Average abnormal CAR returns, end of 12 months

Average abnormal CAR returns, end of 12 months, 2007-2010		
	for Underpriced IPOs	for Overpriced IPOs
CHINA		
Sample size	50	8
% of total IPOs	86%	14%
Mean	70%	12%
INDIA		
Sample size	79	49
% of total IPOs	62%	38%
Mean	2%	-50%
BRAZIL		
Sample size	25	20
% of total IPOs	56%	44%
Mean	-29%	-51%
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.		

In China underpriced IPOs show 70 per cent abnormal CAR returns on average by the end of 12 months. In India CAR returns for underpriced IPOs (62 per cent of total IPOs) are two per cent above average market returns. Brazil shows negative CAR for underpriced IPOs. IPOs that are overpriced on the first trading day show positive abnormal CAR returns in China (14 per cent of total IPOs). In India and Brazil overpriced IPO show similar levels of negative CAR returns.

Figure 4.8 shows the 12 months abnormal CAR returns by country for IPOs that are underpriced on the first trading day.

Figure 4. 8: Abnormal CAR returns for underpriced IPOs, end of 12 months

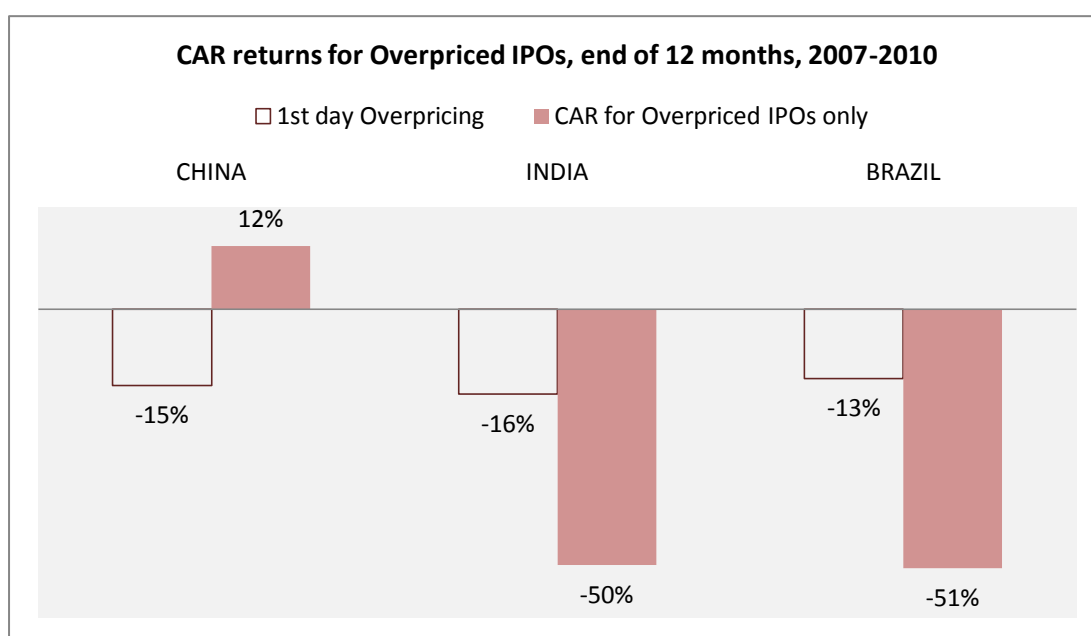


Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

Chinese IPOs have the highest initial underpricing levels, and they also provide the highest 12 months cumulative returns, while CAR returns for underpriced IPOs in India are very close to market levels. In Brazil underpriced IPOs show negative CAR returns at by the end of the first year. This means that underpriced IPOs in China continue to significantly outperform the market by the end of the 12 months trading period. In India aftermarket performance of underpriced IPOs is not significantly different from the average market returns. In Brazil underpriced IPOs underperform the market by 29 per cent by the end of the first year.

Figure 4.9 shows abnormal CAR returns by country for the IPOs that are overpriced on the first trading day.

Figure 4. 9: Abnormal CAR returns for overpriced IPOs, end of 12 months

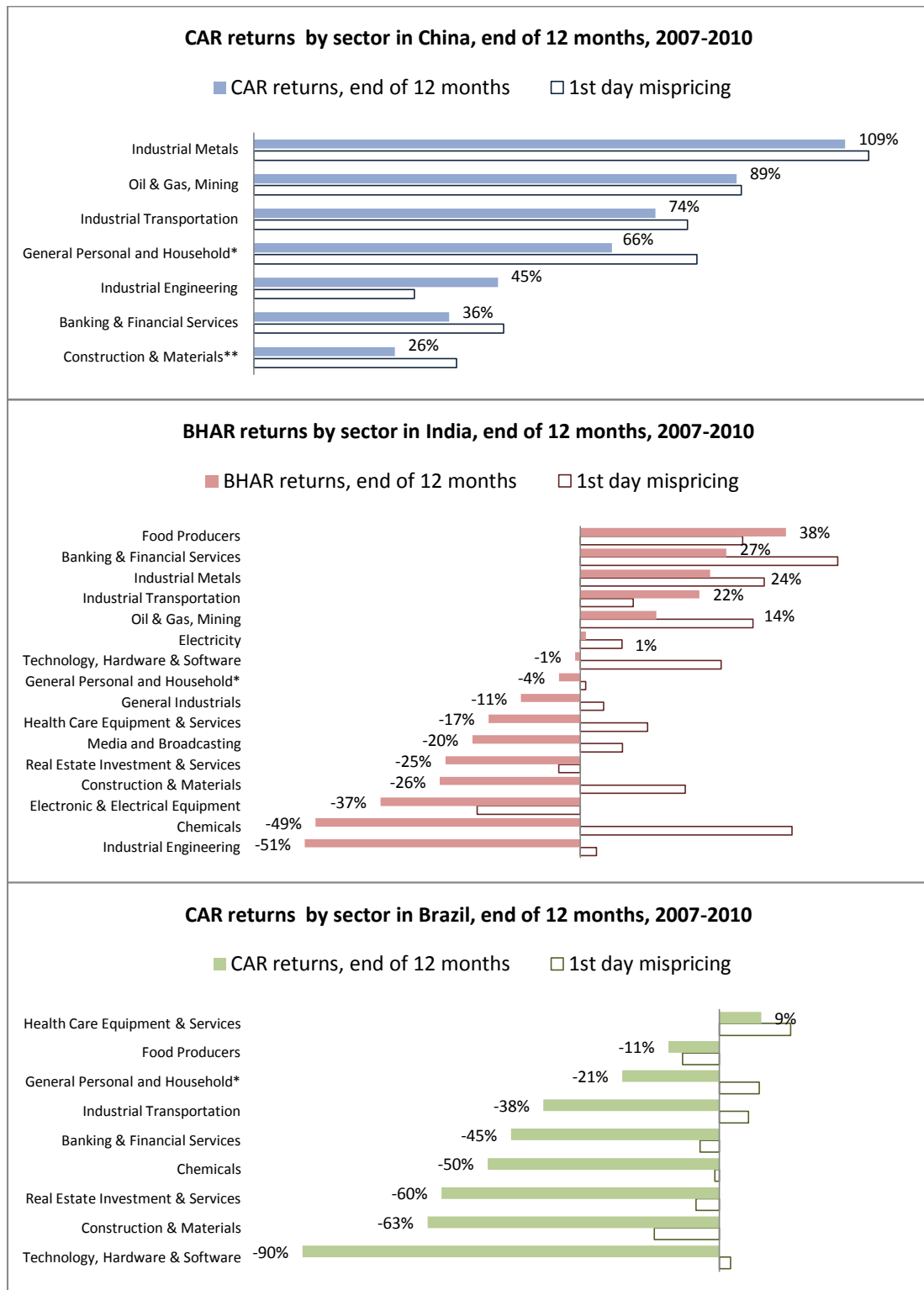


Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

For the overpriced IPOs, China is the only country that shows positive cumulative returns for the specified time interval. In India and Brazil overpriced IPOs provide similar negative returns. Therefore, by the end of 12 months overpriced IPOs outperform the market by 12 per cent in China, and underperform the market by 50 per cent and 51 per cent in India and Brazil respectively.

The overview of the abnormal CAR returns by sectors is provided in the Figure 4.10. Majority of the sectors in China provide positive cumulative returns with the highest being in Industrial Metals sector. For India, Industrial Transportation sector, Industrial Metals sector, Industrial Engineering sector, Oil, Gas and Mining sector, Banking and Financial Services sector, and Food Producers sector provide positive abnormal CAR returns at the end of 12 months. The only sector that shows positive cumulative returns in Brazil is the Health Care and Equipment sector, with majority of sectors showing negative 12 months abnormal CAR returns. Real Estate and Investment Services sector in Brazil indicates the lowest returns. It is nearly 2.5 times lower than the same sector in India.

Figure 4. 10: Abnormal CAR returns by sector, end of 12 months



Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

*General personal and household sector includes Personal and Household Goods, General Retailers, Travel and Leisure and Automobile and Parts sectors.

**Numbers for Construction and Materials Sector are given without an outlier (China railway with 12 months CAR returns of 138%).

4.2.4 Buy-and-Hold Abnormal Returns (BHAR) for the 12 months period

Table 4.13 shows average abnormal BHAR returns for underpriced and overpriced IPOs at the end of the first 12 months of trading.

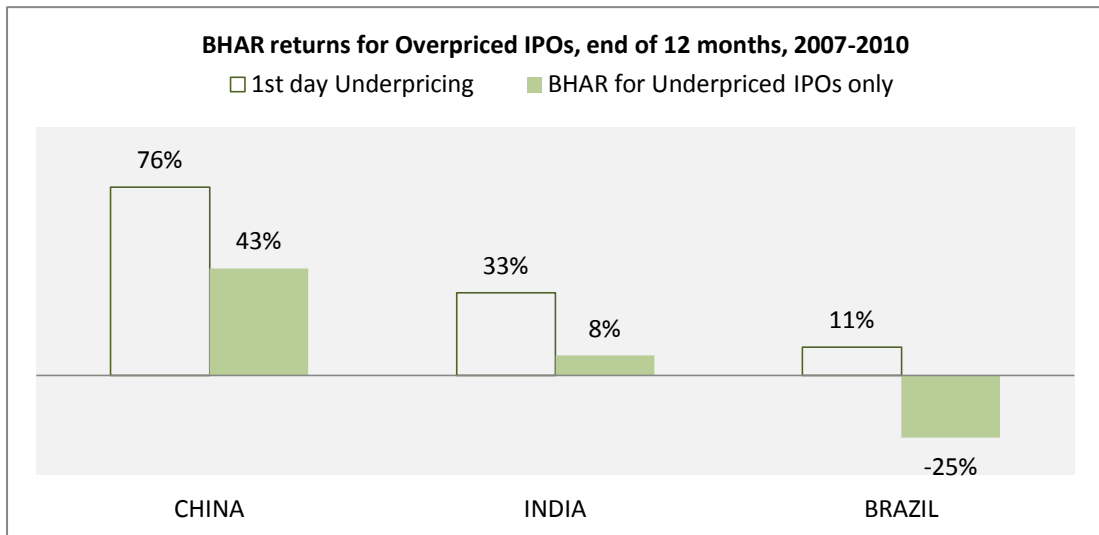
Table 4. 13: Average abnormal BHAR returns, end of 12 months

Average abnormal BHAR returns, end of 12 months, 2007-2010		
	for Underpriced IPOs	for Overpriced IPOs
CHINA		
Sample size	50	8
% of total IPOs	86%	14%
Mean	43%	8%
INDIA		
Sample size	79	49
% of total IPOs	62%	38%
Mean	33%	-40%
BRAZIL		
Sample size	25	20
% of total IPOs	56%	44%
Mean	11%	-38%
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.		

IPOs underpriced on the first day of trading show positive BHAR returns for the three countries. Underpriced IPOs have highest 12 months BHAR returns in China. Overpriced IPOs show positive BHAR returns in China and negative returns for India and Brazil.

Figures 4.11 and 4.12 present the overview of the Buy-and-Hold Abnormal Returns (BHAR) for underpriced and overpriced IPOs by country.

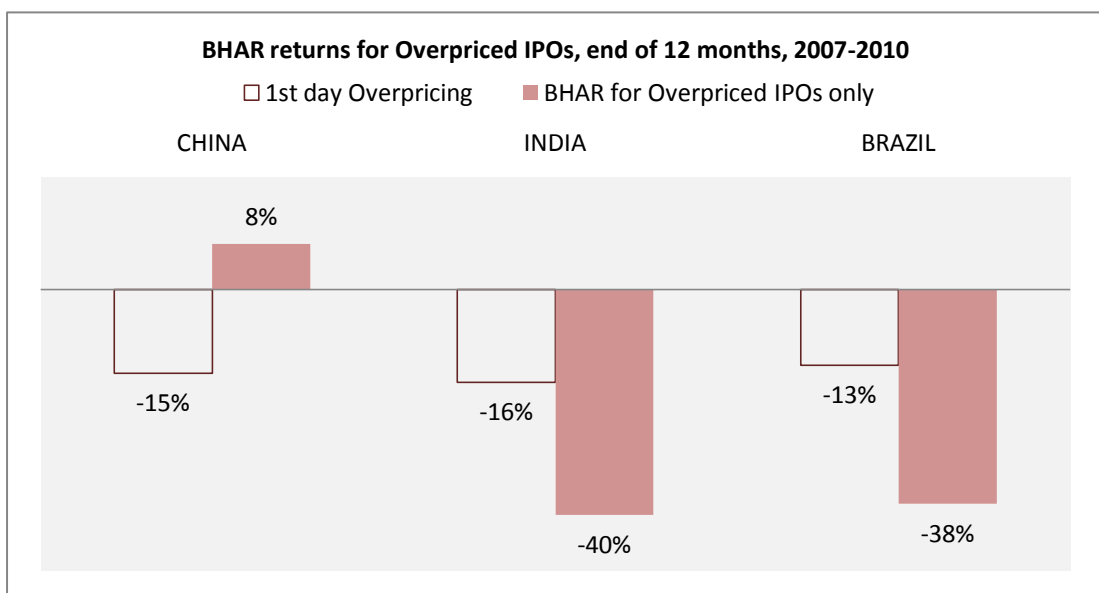
Figure 4. 11: Abnormal BHAR returns for underpriced IPOs, end of 12 months



Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

The findings are similar to the CAR returns discussed in the previous section. China provides highest buy-and-hold returns with underpriced IPOs outperforming the market by 43 percent. Aftermarket performance of underpriced IPOs in India is slightly higher than the market returns. Brazil shows negative BHAR returns indicating that underpriced IPOs underperform the market by 25 per cent by the end of the first year.

Figure 4. 12: Abnormal BHAR returns for overpriced IPOs, end of 12 months

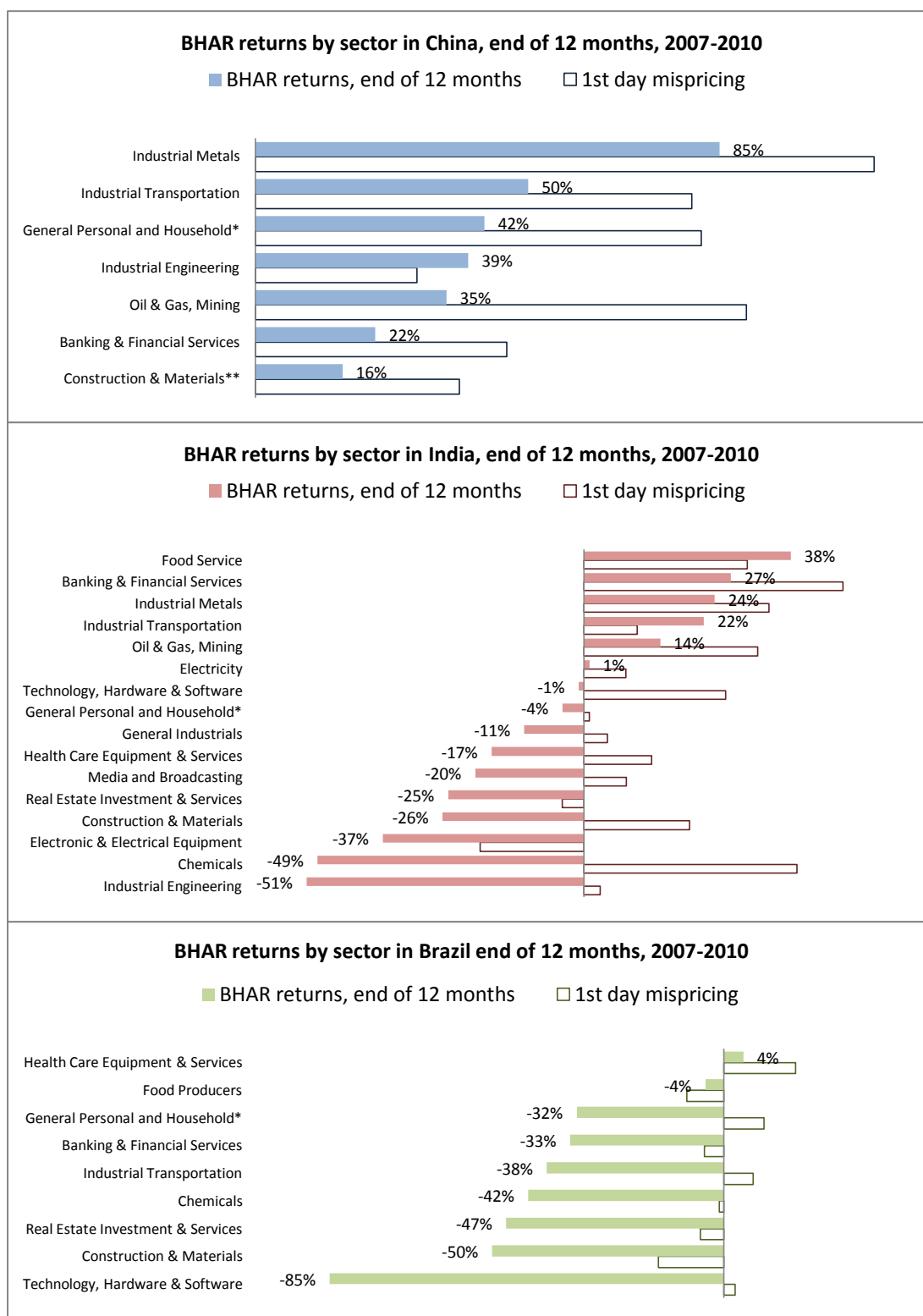


Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

Overpriced IPOs in China outperform the market by eight per cent by the end of the first year. India and Brazil show similar negative BHAR returns indicating that overpriced IPOs underperform the market by 40 per cent in India and by 38 per cent in Brazil.

Figure 4.13 summarises the 12 months BHAR returns by sector. The majority of the sectors in China provide positive BHAR with the Industrial Metals sector having the highest returns. In India, similar to the 12 months CAR, buy-and hold returns are positive for Industrial Transportation sector, Industrial Metals sector, Industrial Engineering sector, Oil, Gas and Mining sector, Banking and Financial Services sector, and Food Producers sector. The Electricity sector in India also shows positive BHAR returns at the end of the 12 months period (average of one per cent). Brazil's only sector with positive buy-and-hold returns is Health Care and Equipment sector, while Technology, Hardware and Software sector shows the highest negative returns (-85 per cent). Real Estate Investment and Services shows high negative returns of -47 per cent.

Figure 4. 13: Abnormal BHAR returns by sector, end of 12 months



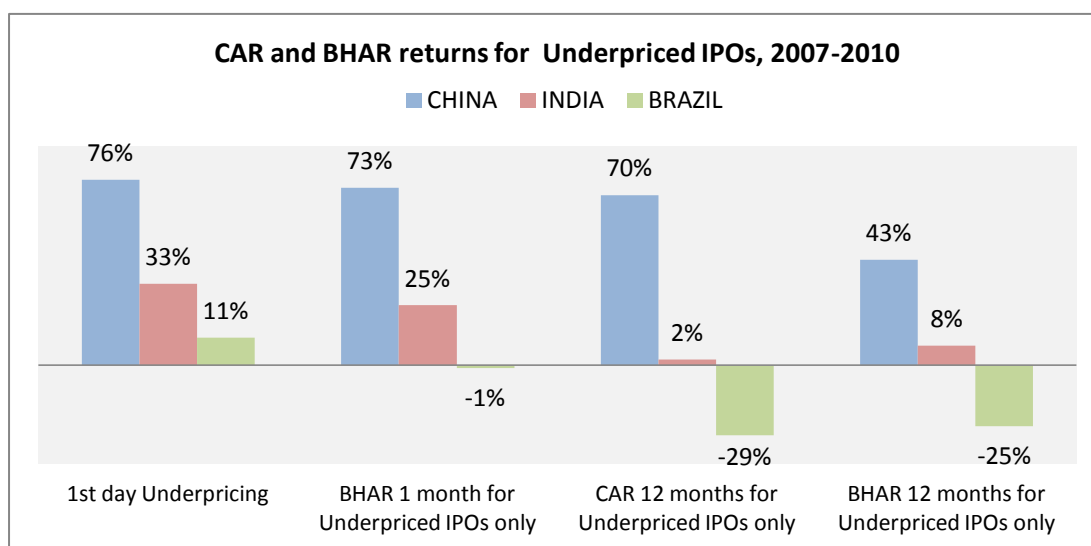
Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

*General personal and household sector includes Personal and Household Goods, General Retailers, Travel and Leisure and Automobile and Parts sectors

**Numbers for Construction and Materials Sector are given without an outlier (China railway with 12 months CAR returns of 138%)

Summary of the CAR and BHAR returns for underpriced and overpriced IPOs is presented in the Figures 4.14 and 4.15.

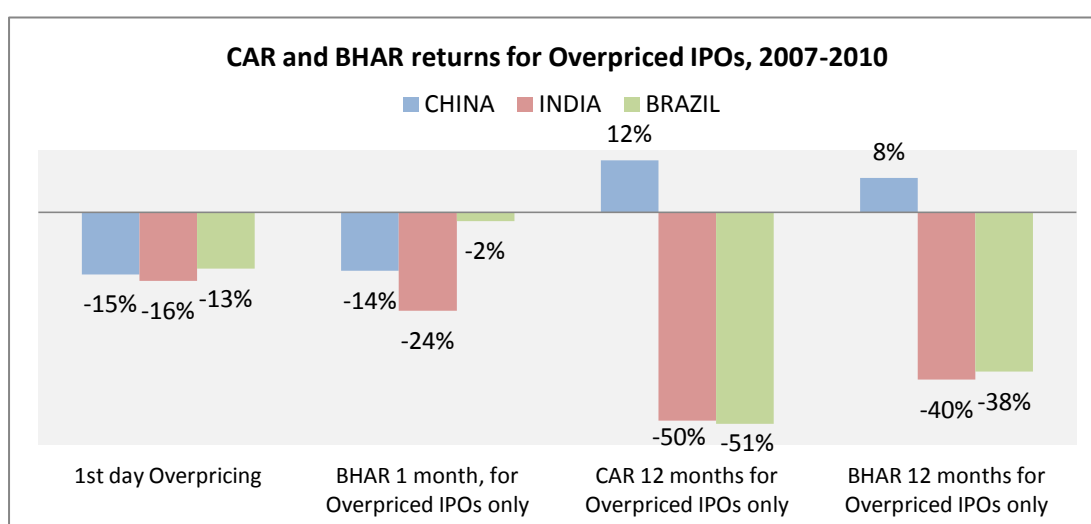
Figure 4. 14: Aftermarket returns for underpriced IPOs by country



Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

Underpriced IPOs outperform the market during the first month of trade and during the first year after IPO in China and India. In Brazil underpriced IPOs underperform the market during the first month and during the first year.

Figure 4. 15: Aftermarket returns for overpriced IPOs by country



Positive values indicate higher than market abnormal returns, negative values indicate lower than market abnormal returns.

Overpriced IPOs underperform the market during the first month in China, India and Brazil. However, Chinese IPOs outperform the market by the end of the first year, while in India and Brazil they continue to significantly underperform the market.

4.3 Research Question 3: Reasons for mispricing of IPOs in China, India, and Brazil

Research question three investigates possible factors that influence the levels of mispricing of IPOs in China, India and Brazil. Previous studies identify a number of variables that potentially influence IPO mispricing. These variables refer to ex-ante uncertainty about the performance of IPO. To analyse the factors that influence mispricing, four explanatory variables have been identified and examined through the statistical tests and regression analyses. The variables include (i) size of the company (VALUE variable), (ii) operating history (AGE variable), (iii) reputation of the employed underwriter (UW rank variable), and (iv) privatization through and IPO (PRIV variable).

Table 4.14 provides summary of one-sample statistics test for the first day mispricing variable (dependent variable).

Table 4. 14: One-sample test summary for the first day mispricing variable

One-sample test for 1 st day mispricing					
1 st day mispricing	Sample size	t-stat	df	sig. (2-tailed)	Std. Dev.
CHINA	58	6.959	57	0.000*	70%
INDIA	128	4.333	127	0.000*	37%
BRAZIL	45	0.001	44	0.999	19%
*Results are statistically significant at the 0.05 level of significance					

The dependent variable (first day mispricing) for Brazil is not statistically significant. The standard deviation for the sample is small (19 per cent) and the values are not normally distributed. This confirms the findings discussed in the previous section. Brazil's IPO sample shows level of mispricing very close to zero values and small variation of mispricing between the firms.

Table 4.15 present the summary statistics for the selected variables.

Table 4. 15: Descriptive statistics and one-sample test for the explanatory variable by country

	Sample	Min	Max	Mean	Std. Dev	t-stat	df	Sig. (2-tailed)
CHINA								
Company size in mlns USD	58	68.11	1298217.2	53888.11	193245.02	2.12	57	0.038*
Company age	58	1	99	18.17	19.65	2.12	57	0.038*
Underwriter ranking	58	1	16	7.91	5.76	10.47	57	0.000*
Privatization	58	–	–	–	–	–	–	–
INDIA								
Company size in mlns USD	128	2.29	16798.63	712.99	2469.17	3.27	127	0.001*
Company age	128	2	114	17.61	17.53	11.36	127	0.000*
Underwriter ranking	128	1	46	16.28	12.5	14.73	127	0.000*
Privatization	128	–	–	–	–	–	–	–
BRAZIL								
Company size in mlns USD	45	0.03	142942.15	3909.45	21218.47	1.24	44	0.223
Company age	45	1	72	28.89	19.22	10.08	44	0.000*
Underwriter ranking	45	0	9	3.44	2.66	8.69	44	0.000*
Privatization	45	–	–	–	–	–	–	–
<p>*Results are statistically significant at the 0.05 level of significance</p> <p>Company size is measured as the value of the total assets of the company at the end of the year prior to IPO</p> <p>Company age is measured as the years of operations of the company (starting from the foundation date)</p> <p>Underwriter ranking is measured as the total number of IPOs managed by the underwriter in the country of IPO</p> <p>Offer rate is measured as the total number of shares offered at the IPO</p> <p>Privatization is a dummy variable that takes value of 1 for state-owned companies that had their privatization through an IPO in 2007-2010, and 0 otherwise.</p>								

Table 4.16 provides the results of the Independent Sample Test for the selected variables.

Table 4. 16: Independent Sample Test

	Sample	t-stat	df	Sig. (2-tailed)	Statistical Significance
CHINA					
Company size in mlns USD*	58	-0.407	56	0.686	insignificant
Company age*	58	-0.392	56	0.696	insignificant
Underwriter ranking*	58	-0.615	56	0.541	insignificant
Offer rate*	58	-1.691	56	0.096	insignificant
Privatization (dummy variable)*	58	-1.738	56	0.088	insignificant
INDIA					
Company size in mlns USD*	128	0.344	126	0.731	insignificant
Company age*	128	0.948	126	0.345	insignificant
Underwriter ranking*	128	-0.721	126	0.472	insignificant
Offer rate*	128	-0.719	126	0.474	insignificant
Privatization (dummy variable)*	128	0.038	126	0.969	insignificant
BRAZIL					
Company size in mlns USD*	45	0.03	43	0.976	insignificant
Company age*	45	1.1	43	0.277	insignificant
Underwriter ranking*	45	-1.716	43	0.093	insignificant
Offer rate*	45	0.732	43	0.468	insignificant
Privatization (dummy variable)*	45	0.288	43	0.775	insignificant
* Equal variances assumed					
Company size is measured as the value of the total assets of the company at the end of the year prior to IPO					
Company age is measured as the years of operations of the company (starting from the foundation date)					
Underwriter ranking is measured as the total number of IPOs managed by the underwriter in the country of IPO					
Offer rate is measured as the total number of shares offered at the IPO					
Privatization is a dummy variable that takes value of 1 for state-owned companies that had their privatization through an IPO in 2007-2010, and 0 otherwise.					

As the table indicates the indentified variables are not statistically significant at the 0.05 level of significance. This finding is also confirmed through the multivariate regression analysis indicating no statistically significant relationships between the explanatory variables and levels of IPO mispricing. Summary of regression analysis is presented in Appendix E.

Table 4.17 reports the R squares of the multivariate regression analysis. The values for R squares are very low indicating that the combined explanatory power of identified variables over the changes in the level of mispricing is very weak.

Table 4. 17: R squares of the regression analysis

	R	R²	Adjusted R²
CHINA	.295	.087	.018
INDIA	.118	.014	-.018
BRAZIL*	.351	.123	.036

*The level of underpricing in Brazil is not statistically significant (see Table 4.14), therefore, testing the hypotheses for this market is not relevant¹⁰.

Univariate regressions with underpricing as a dependent variable also reveal that there is no statistically significant relationship between each identified explanatory variable and the level of first day IPO mispricing.

Therefore, for the specified sample of IPOs in China, India and Brazil (i) size of the company (VALUE variable), (ii) operating history (AGE variable), (iii) reputation of the employed underwriter (UW rank variable), and (iv) privatization through an IPO (PRIV variable) do not act as factors influencing the level of IPO underpricing.

The summary of the results for the hypothesis testing is presented in the Table 4.18

¹⁰ Regression analyses for Brazil were run to ensure the validity of this conclusion.

Table 4. 18: Results of the Hypotheses Testing

H	Hypothesis	Statistical Relationship	Regression Results	Conclusions
H ₁ :	Larger firms have lower levels of IPO underpricing	Insignificant	Rejected	Larger firms did not have lower levels of IPO underpricing in China, India, and Brazil in 2007-2010.
H ₂ :	Older firms have lower levels of underpricing	Insignificant	Rejected	Older firms did not have lower levels of IPO underpricing in China, India, and Brazil in 2007-2010.
H ₃ :	Increase in the reputation of the underwriter is associated with decrease in underpricing	Insignificant	Rejected	Hiring a more reputable underwriter did not lead to lower levels of IPO underpricing in China, India, and Brazil in 2007-2010.
H ₄ :	Privatizations through IPO have higher level of underpricing	Insignificant	Rejected	State-owned firms that had their privatization through an IPO did not have lower levels of IPO underpricing in China, India, Brazil in 2007-2010.

4.4 Chapter Summary

The findings outlined in this chapter identify that Chinese IPOs have the highest levels of underpricing between the three countries, while IPO underpricing in Brazil is on average very close to zero. Brazil also has the highest number of IPOs that are overpriced on the first day of trading. The level of underpricing for IPOs that were initially underpriced continues to increase during the first trading month. For IPOs that were initially overpriced, Indian and Brazilian IPOs show increase in overpricing, while in China the overpricing levels remain on average the same.

Overpriced IPOs in China show positive CAR and BHAR returns, while in India and Brazil both returns are negative. For underpriced IPOs, China and India show positive CAR and BHAR returns, while in Brazil both returns are negative.

The regression analysis reveal that size of the company, operating history, reputation of the employed underwriter, and privatization through an IPO have no statistically significant relationship with the levels of IPO mispricing in China, India, and Brazil.

Chapter 5

DISCUSSION

The chapter presents the discussion of the empirical findings of the research. The layout of the chapter follows the research questions. Section 5.1 provides a discussion of mispricing of IPOs in China, India and Brazil. It also discusses possible explanations of the difference in the levels of mispricing between the three emerging markets. Section 5.2 focuses on the aftermarket performance of IPOs in China, India, and Brazil. Section 5.3 discusses the findings of the regression analysis used to investigate the possible factors influencing IPO mispricing.

5.1 Research question 1: Levels of IPO mispricing in China, India, and Brazil

The first question of the research examines the levels of IPO mispricing in China, India, and Brazil. The research investigates IPOs in 2007-2010 which is the period after the recent financial crisis.

The findings suggest that besides underpricing there is a large number of IPOs that are on average overpriced on the first trading day. The total average level of mispricing is 64 per cent in China, 14 per cent in India and 0.35 per cent in Brazil. The levels of underpricing are similar in China and India, but are significantly lower in Brazil.

The levels of overpricing, as opposed to underpricing, seem consistent for the three countries. These findings suggest that a large portion of companies have their offer price set higher than the price that investors are prepared to pay for the company's shares. For these companies such price setting results in receiving lower than expected IPO proceeds.

5.1.1 The difference between the average levels of mispricing in China, India, and Brazil

The difference between the levels of mispricing in the three markets is generally consistent with the previous findings. According to Ritter (2011), the extent of previously reported underpricing in Brazil is four times lower than in China and two times lower than in India. However, according to the findings of the current research the difference between the levels of mispricing in the three countries is much bigger than previously reported.

The gap in IPO mispricing between China, India and Brazil may be explained by two reasons.

Different levels of market efficiency. Previous research states that the large disparity of initial returns in the three countries is due to the different levels of efficiency in the markets (Loughran and Ritter, 1995; Ritter and Welch, 2002). Indeed, comparing the

stock markets in China, India, and Brazil (*see section 2.2.2*) reveals that each market is at a different stage of its development. The liberalization of the stock market in India took place in 1990s. In China government still controls the stock market to a large extent despite implementation of many new regulations aimed at improving market efficiency. Brazilian IPO market is the most deregulated out of the three. Therefore, a better market efficiency maybe assumed in India and Brazil. The levels of mispricing seem to be in line with this conclusion (Brazilian IPOs show the lowest mispricing of IPOs for the three countries). However, assuming market efficiency in Brazil in the form that it is understood in developed markets, i.e. share price reflects all the available information, is premature. Majority of publicly traded firms in Brazil are controlled by a defined group or a family. These groups often control the firms and the share prices. Information asymmetry (the underlying assumption of EMH) in Brazil is, therefore, higher than in China and India. Brazilian IPO market is much less subject to government intervention compared to China and India, but this can hardly be the basis for assuming reduced information asymmetry and better market efficiency.

Different IPO processes. The difference in the IPO process is often quoted as the reason for higher underpricing in China compared to other countries (Su and Fleisher, 1999; Chan Wei and Wang, 2004). The IPO process in China is very different to that of India and Brazil. The IPO offer price for IPOs in China is set well in advance of trading and far below the market value to guarantee a full subscription (Chan Wei and Wang, 2004). The time gap between IPO announcement day and first trading day in China was found to be much higher than in India and Brazil (Su and Fleisher, 1999). The big time gap often causes the IPO valuation on the actual trading day to be different from the time when the price for the issue was set. Furthermore, the number of IPOs and the number of new shares in China is also controlled by the central government. The tradable A-shares represent only a small proportion of the total outstanding shares (*see section 2.2.2*). As a result, investors are willing to pay higher prices to obtain the shares (Gu, 2003) driving the underpricing up. The government restrictions that apply to IPOs in China are a valid reason for explanation of significantly higher levels of underpricing in China comparing to India and Brazil. The findings of the current research support this conclusion.

5.1.2 The change in the levels of IPO mispricing

Another finding of the current research is the change in the level of mispricing. According to the research findings, levels of mispricing for each of the three countries are much lower than previously reported. Breaking the mispriced IPOs into underpriced IPOs and overpriced IPOs, and examining each group separately highlights that change even further. The number of overpriced IPOs and the level of overpricing suggest a change in IPO performance in China, India, and Brazil.

One of the reasons for changing levels of IPO mispricing may be due to the global financial crisis. The effects of the crisis have been reflected in the number of IPOs. All three countries show significant decline in the number of IPOs after 2007. A large number of investors in IPOs in China, India and Brazil are foreign investors. As the three countries are heavily dependent on foreign investors, slowdown in the global economy has affected the performance of IPO markets in China, India, and Brazil (Ernst and Young, 2011). It reduced the number of foreign investors resulting in decreased interest in IPOs that has subsequently affected the level of mispricing.

Another reason for the reduced level of IPO mispricing may be the fact that investors are becoming more selective in their investment choices. Litigations over corporate governance issues and financial reporting practices in China and India are beneficial for the long-term evolution of the financial markets. In the short run, however, these problems have affected investors' perception of the quality of new issues in China, India, and Brazil.

Investors' perception of the valuations of IPOs is also changing. For example, real estate investment and services sector in Brazil has always attracted much attention of foreign investors. However, research findings for mispricing in real estate investment and services sector shows that IPOs are on average overpriced by three per cent in Brazil. In India the sector also shows overpricing (by four per cent). In China the sector is not represented at all. On the other hand, mispricing in the combined industrial sector shows substantial underpricing in China (65 percent) and India (13 per cent). These findings suggest that investors are becoming more realistic in their valuations of IPOs. They are focusing more on the future perspectives that the company has to offer rather than a 'great investment story'. From that point of view,

industrial sectors in China, India, and Brazil offer a better chance of higher returns. The industries are heavily based on assets and the ongoing infrastructure development in the countries ensures that produce of these sectors will remain in demand for years to come. Hence, the higher level of underpricing of the IPOs in these sectors.

One of the reasons that IPO mispricing is changing is the fact that investors are becoming disenchanted with IPO markets. The argument brought forward by Kay (2012) states that larger companies are becoming more and more self-financing and do not view equity markets as an important source of capital. They raise money through internal financing or through mergers and acquisitions rather than IPOs. The IPO market is used by smaller firms to raise finance. In terms of an emerging market, these smaller firms are often young and inexperienced, and the quality of their IPOs is often questionable. Combined with the lack of regulations and poor investor protection in emerging markets, these poor quality IPOs affect investor confidence and lead to reduced interest in primary offers.

Thus, there is an apparent reduction in the levels of mispricing in China, India and Brazil meaning that the use of underpricing as an initial discount offered to motivate investors is not as efficient as it used to be.

5.2 Research question 2: Aftermarket performance of IPOs in China, India, and Brazil

Aftermarket performance of IPOs in China, India, and Brazil is measured as a BHAR return for the first trading month (short-term aftermarket performance) and as CAR and BHAR for the 12 months following the IPO date (long-term aftermarket performance).

5.2.1 Short-term aftermarket performance

The findings suggest that on average mispriced IPOs outperform the market by 61 per cent in China and by six per cent in India, and underperform the market in Brazil by two percent during the first trading month.

The high volatility in the share price following the IPO is associated with information asymmetry between issuers and investors. As the share price adjusts according to investors' perception of the firm, the IPO either outperforms or underperforms the market.

In China and India first month BHAR returns for underpriced IPOs (73 per cent and 25 per cent respectively) indicate high demand for the stock and little change in investors' perception of IPO during the first trading month. In Brazil, however, underpriced IPOs underperform the market by one per cent suggesting higher volatility in the share price and a significant change in investors' perception of the IPOs.

The highest outperforming sectors are industrial metals sector (142 per cent) in China, banking and financial services sector in India (49 percent) and health care and equipment services sector in Brazil (15 per cent).

The consumer sector also outperforms the market. The findings indicate that mispricing of IPOs in the general personal and household goods sector shows underpricing for the three countries. It is very significant in China (82 per cent), but relatively small in India and Brazil (one per cent). However, decrease in FDI due to global financial crisis combined with the continuing growth in GDP in the two countries has triggered the increase in domestic consumption leading to better performance of the general personal and household goods sector in recent years.

5.2.2 Long-term aftermarket performance

Comparing the BHAR and CAR returns for the first year reveals that in China both underpriced and overpriced IPOs continue to outperform the market. In India

underpriced IPOs outperform the market only slightly and in Brazil both underpriced and overpriced IPOs underperform the market.

The findings for India and Brazil support the existing international evidence suggesting long-run underperformance of IPOs (Ritter, 1991; Loughran and Ritter, 1995; Ritter and Welch 2002; Sohali and Nasr, 2007; Aggarwal *et al*, 2008). The results of Chinese sample show a different trend. They do, however, provide empirical support for research focusing on Chinese market alone.

The reasons for outperformance of Chinese IPOs are related to the reasons for significantly different levels of mispricing: the high demand for newly issued shares that is artificially-driven through government control of the IPO market.

Brazilian IPOs present an interesting case. There is a limited number of previous research on Brazilian IPOs. Most of the research documents significant underpricing and aftermarket outperformance of IPOs. Aggarwal *et al*. (1993) report 78.5 per cent for initial underpricing and 151.6 per cent annual returns for the offerings in 1980-1990. The findings of the current research indicate mispricing level of 0.35 per cent, 12 months CAR returns of negative three per cent and 12 months BHAR of negative 31 per cent for Brazilian IPOs in 2007-2010. The results are significantly different to that of Aggarwal *et al*. (1993).

Brazilian IPO market shows significant decline in the last few years. Investors are becoming reluctant to invest in new issues and are focusing instead on existing equity and bonds (Ernst and Young, 2011). This may be due to the quality of the stock market participants. IPO market in Brazil is often used as a mechanism to raise capital by small and inexperienced companies who show little concern over how IPOs perform in aftermarket (Kay, 2012). This approach is fundamentally different to investors' expectations. As a result, investors, especially foreign investors, prefer to buy into existing and well-established names sidestepping the primary IPO market.

5.3 Research question 3: Reasons for mispricing of IPOs in China, India, and Brazil.

Research question three examines possible factors that influence the levels of mispricing of IPOs in China, India, and Brazil. The factors include (i) size of the company, (ii) operating history, (iii) reputation of the employed underwriter, and (iv) privatization through an IPO.

The chosen factors refer to information asymmetry and signalling theories of underpricing. However, as the findings indicate the specified variables have poor explanatory power over the levels of mispricing in China, India, and Brazil.

There is a number of additional variables that may be included into the regression model. And this is often the approach used by previous researchers to improve the explanatory power of the specified model. They argue that inclusion of proxies for economic indicators or country-specific characteristics of IPO markets can help better understanding of the IPO mispricing (Derrien and Womack, 2003; Chan et al., 2004; Guo and Brooks, 2008).

However, the problem with the explanatory power of the model may be due to the underlying theories.

The adverse selection theory argues that issuers intentionally underprice their IPOs to increase the demand for the issue (Rock, 1986). According to the findings of the current research, this assumption does not hold. In China, for example, demand for IPOs is already very high due to the government restrictions on the issues; yet, the level of underpricing is the highest amongst the three countries.

From the agency-based point of view, issuing firms leave some money for the underwriters to ensure that they act in the firm's best interest (Baron, 1982). Therefore, hiring more reputable underwriters reduces the need to underprice as these underwriters are concerned with their own reputation (Welch and Ritter, 2002). However, the relationship between the level of underpricing and the underwriter's reputation is statistically insignificant according to the research findings. The role of underwriters in China and India has been changed through the deregulation and

liberalization of the stock markets. Prior to 2004 underwriters in China had no responsibility over the aftermarket performance of IPOs. Therefore, they had little concern over the effects that poor performance of the IPO underwritten by them would have on their reputation. Nonetheless, the level of underpricing in previous research is significantly higher than reported by the findings of the current study. Consequently, issuers underpriced more in the period when underwriters cared about their reputation less. Findings of this research contradict the assumptions of the agency-based theory suggesting that the theory does not hold (at least for China, India, and Brazil).

Signalling theory of underpricing implies the use of signalling mechanisms, such as size, age, and status of the issuing firm and/or the underwriters to inform investors of the quality of the issue and to increase the demand for the IPO (Wilensborg, 1999; Karlis, 2000). The theory assumes linear relationship between the level of underpricing and the firm's demographic variables (i.e. change in size, age or status of the issuer and/or underwriter directly leads to the change in the level of underpricing). Comparing the mispricing of IPOs in different sectors (for example, the media sector and the public utilities sector) indicates that level of mispricing for companies of similar size and status is different in different sectors, and in different countries. Therefore, the relationships between underpricing and the demographic variables of a firm are more complex. Size of the issuing firm, years of operation or status of the firm do not directly affect underpricing. It is obvious that these variables do have an impact on the perception of an IPO but there are other factors that affect these relationships.

Based on the findings of this research, behavioural theories of underpricing may be the ones that can explain underpricing in China, India, and Brazil.

From the behavioural perspective, perhaps the most obvious reason that underwriters choose to systematically underprice new issues is to make it easier for them to market the IPO. Empirical studies have demonstrated that underwriters are risk averse. Without the ability to hedge the risk of holding the issuing firm's stock, it is difficult to shift the risk to another party. Therefore, there is strong incentive for the underwriter to underprice the IPO (Loughran and Ritter, 2002).

Chapter 6

CONCLUSIONS

The chapter provides the summary of the research findings and draws the conclusions suggested by the current research. It discusses the theoretical and practical implications of the study, followed by the recommendation for the future research.

The objective of the research was to investigate the initial and aftermarket performance of IPOs in China, India, and Brazil in the period of 2007-2010. To address the overall objective, levels of mispricing, aftermarket performance, and possible reasons for IPO underpricing were examined.

The findings of the research show that the performance of IPOs in emerging markets is changing. It is not longer appropriate to identify the first day's change in the share price as underpricing of an IPO. Besides offers that are underpriced, there is a significant number of IPOs that are overpriced in China, India, and Brazil.

The levels of overpricing are consistent across the three countries. However, there is a big gap between the levels of underpricing. Previous studies identify two arguments that attempt to explain the gap in the underpricing levels: (i) different levels of market efficiency, (ii) different IPO process. The current research argues that the different levels of market efficiency do not explain the extent of the difference between the levels of mispricing for the three countries. However, the differences in the IPO process between the countries provide a valid explanation of the differences in the levels of IPO mispricing in China, India, and Brazil.

An important finding of the research is the change in the IPO performance. To some extent the differences in the findings, comparing to previous empirical evidence, may be due to the time period of the study. The 2007-2010 are the years following the recent financial crisis. However, the research argues that the reduced level of mispricing is due to the change in investor perception of the quality of IPOs and their disenchantment with IPO markets rather than the slowdown of global economic activity.

Aftermarket performance of IPOs also shows a trend different to findings of previous research. In China both underpriced and overpriced IPOs outperform the market by the end of the first year. In Brazil on the other hand, both underpriced and overpriced IPOs underperform the market during the same time. The findings, however, are in line with the results for the IPO mispricing and show similar trends. The high demand for IPO shares in China is artificially driven by the government restrictions of the IPO process. For the same reason levels of mispricing and aftermarket performance of Chinese IPOs is significantly different to India and Brazil.

In case of Brazil, the general decline in the IPO market may be the reason for low levels of mispricing and underperformance of the new issues. Investors in Brazil are reluctant to invest in IPOs due to the quality of the participants in the IPO market.

The analyses of the possible factors influencing IPO mispricing reveal that traditional theories based on EMH and information asymmetry no longer provide the explanation for the levels of IPO mispricing. The findings of this study show that the proxies for ex-ante uncertainty based on traditional theories show statistically insignificant relationship with the level of IPO mispricing in China, India, and Brazil.

The research argues that including additional number of variables will not increase the explanatory power of the model because the assumption of the linear relationship between firms' demographic variables and the level of mispricing is fundamentally wrong. Mispricing of IPOs, especially in emerging markets, is influenced by the behavioural aspect of investors' decision-making process rather than a number of explanatory variables measuring size and status. In a certain sense, size and status do not matter unless investors decide that they matter.

From a practical point of view, the change in the IPO markets indicates the change in investment practices. Overall, similarly to Indian market in the period after 1990, Chinese market may be showing signs of a structural break that occurred after CSRS changed the formula for calculating IPO offer prices (Chi and Padgett, 2005; Gou and Brooks, 2008).

Investors are becoming more selective and realistic in their valuations of IPOs. Also, demand for improved corporate governance and better practices in financial reporting are making issuers focus not just on the initial returns of an IPO but more on the long-term performance. This, in turn, leads to a changing role of underwriters in emerging markets.

Many foreign investors in emerging markets are becoming reluctant to invest in new issues. This suggests that the new IPOs will probably be smaller in size with larger SEOs following and the issuers will focus on making profits through these SEOs.

The most profitable sectors in emerging markets to invest in will be industrial sectors and consumer sectors. Decrease in foreign investment on one side, and growing domestic consumption will see an increase in popularity of domestic-oriented sectors. According to the research findings, sectors that led the IPO returns are: industrial metals in China, food producer in India, and health care and equipment sector in Brazil.

The findings of this study suggest that focus of the future research should be on the investigation of behavioural explanations of IPO mispricing in emerging markets. The heuristics that constitute the basis of behavioural finance are perhaps more pronounced in these countries than in developed markets due to the stage of their development. Therefore, studying IPO mispricing on the example of emerging markets from the behavioural perspective could help the understanding of the overall IPO performance in both emerging and developed markets.

References