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An Empirical Examination of IPO Underpricing

in

Hong Kong and Singapore

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- Title:** An Empirical Examination of IPO Underpricing in Hong Kong and Singapore
- Authors:** Chen Yuhong, Li Yingxia, Loh Stephanie Ling Li
- Advisor:** Maria Gårdängen
- Purpose:** The purpose of the study is to investigate the main determinants that influence the underpricing of IPOs in Hong Kong Stock Exchange and Singapore Stock Exchange over the period of 2004 to 2008. Further, the study is intended to examine why the level of IPOs initial returns differed between these two markets which are very similar in market mechanisms.
- Methodology:** Quantitative and qualitative methods with both univariate and multivariate regression models and a combination of conductive and inductive approach.
- Theoretical Framework:** The theoretical framework of IPO underpricing covers the Asymmetric Information Models of IPO, including the Winner's Curse, Ex Ante Uncertainty Model and Signaling Model, and Market Timing Theories and Behavioral Theories.
- Empirical Framework:** A sample containing 536 IPOs listed on the Hong Kong Stock Exchange Market (283) and Singapore Stock Exchange Market (253) during 2004-2008.
- Conclusions:** Our findings show that operating margin, financial leverage, firm size, IPO offer size and over-allotment option exercised, to some extent, influence the IPO underpricing for both markets. Based on the regressions, we could conclude that the difference between the levels of IPO underpricing in Hong Kong and Singapore can be explained by the financial leverage and firm size. Firm size is the primary determinant as compared to financial leverage.

Abstract

The objective of this thesis is to investigate the main determinants of IPO underpricing for firms listed in Hong Kong and Singapore from 2004 to 2008. Data collected from the Datastream and Reuters, together with the information disclosure in both stock exchanges is used to examine the significance of different variables in order to explain the IPO underpricing level. We find that operating margin, financial leverage, firm size, IPO offer size and overallotment option exercised, to some extent, influence the IPO underpricing for both markets. Based on the regressions, we could conclude that the difference between the levels of IPO underpricing in Hong Kong and Singapore can be explained by the financial leverage and firm size. Firm size is the primary determinant as compared to financial leverage.

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1 Introduction

In this introductory chapter choice and motives behind the research topic are presented and this leads up to the purpose of the thesis. The chapter is ended by delimitations and the outline of the thesis.

1.1 Background

In early year 2007, Initial Public Offerings (IPOs) in Asian market were so popular that investors literally were queuing up to subscribe the shares. The region was overfilled with liquidity from hedge fund managers, mutual funds, and equity investors. While market indexes in Shanghai, Hong Kong, and Singapore were rocket high, lots of companies were eager to raise capital through IPO pipeline. It wasn't uncommon for shares to reach triple-digit gains on their first day of trading. Investors are more than willing to participate in such IPOs phenomenon.

However, the contrast couldn't be starker in the beginning of year 2008. With the shock waves of the subprime crisis continuing to spread and bears stalking equity markets worldwide, the global liquidity crunch has taken a heavy toll on Asia's IPO market. Steven Barg, head of equity capital markets for Asia at UBS says that companies hungry for cash will have to price their issues at as much as a 20% discount to the price-earnings ratios of comparable listed firms if they want to IPO successfully. Six months ago, these companies could have offered no discount and still easily floated their shares. "It's now a buyer's market," he says.

Financial hubs in Asia like Hong Kong and Singapore are badly affected from the global credit crisis. Hong Kong has had just one listing by February, New Media Group Holdings, and the IPO raised a mere \$13.1 million. Compared to prior year mid-February in 2007, Hong Kong companies had already raised \$512 million from four issues. The story is similar in Singapore: \$23.6 million shared among three issues in 2008 as compared with \$283 million from four issues in the first six weeks of 2007 (Sourced from Business Week.com, 22/2/2008).

1.2 Problem discussion

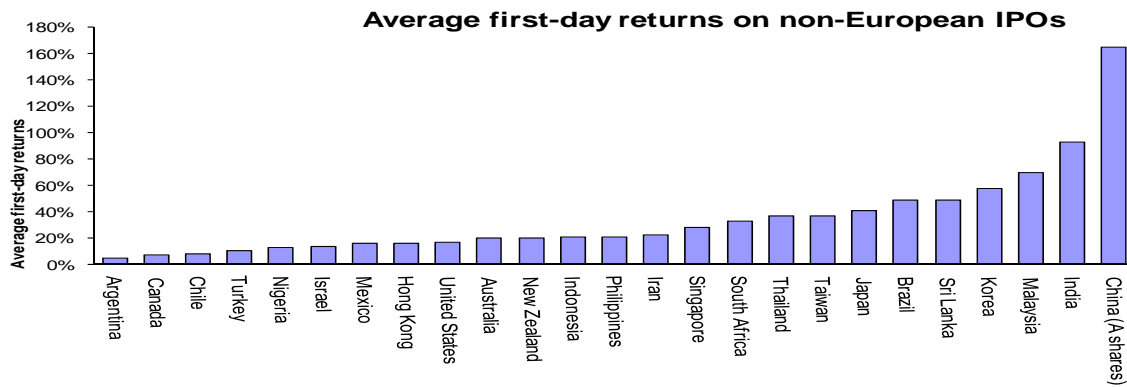
IPOs have been a prominent focus of conceptualization and empirical tests since the 1960s (Reilly & Hatfield, 1969). Much of this attention can be attributed to the increase in IPO activity as a function of the "dot com" phenomenon especially in the late 1990s. Of particular interest to both academicians and practitioners is IPO underpricing. There are evidences that the IPO prices increase substantially on the first trading day and leave considerable amount of 'money left on the table' (Ibbotson, 1975 and others). Researchers offered several theories to argue that underpricing of IPO is an equilibrium phenomenon in an efficient capital market which indicates that IPO underpricing is deliberated by the issuers and underwriters for a variety of reasons. Much of the attentions have been paid to the information asymmetry problem. Rock (1982 and 1986) and Beatty and Ritter (1986), followed by others, argue that issuers were coerced to underprice their IPOs to attract investors. Investors would ask for high returns as there is more uncertainty on the valuation of the IPO due to the information heterogeneity. Others argue that issuers strategically underprice their IPO to signal the favorable prospects of the firm (see e.g. Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989)). Determinants of the IPO underpricing level vary from firm specific factors (i.e. profitability, size and industry), market condition, to investors behaviors (Welch (1992) and Loughran and Ritter (2002)).

However, empirical evidences show that the relationship between IPO underpricing and its determinants are not consistent across countries and time frame. For example, hiring prestigious underwriter was considered a good way to reduce IPO underpricing level before 1980s (Booth and Smith (1986); Carter and Manaster (1990); Michaely and Shaw (1994)) but prestigious underwriters are associated with higher underpriced IPOs in recent years (Loughran and Ritter, 2004 and 2008).

Given the present state of academic knowledge about IPO underpricing, we become motivated to examine this research issue after observing wide variations of IPO initial returns from first day trading in different countries (Loughran et al, 1994 and 2008). Evidence from Loughran et al (1994 and 2008) found that China and India IPOs could provide over 100

percent of initial returns while the US and UK IPOs normally provide about 20 percent of initial returns. “A picture is worth a thousand words”. Below is the chart that triggered the interest for our studies.

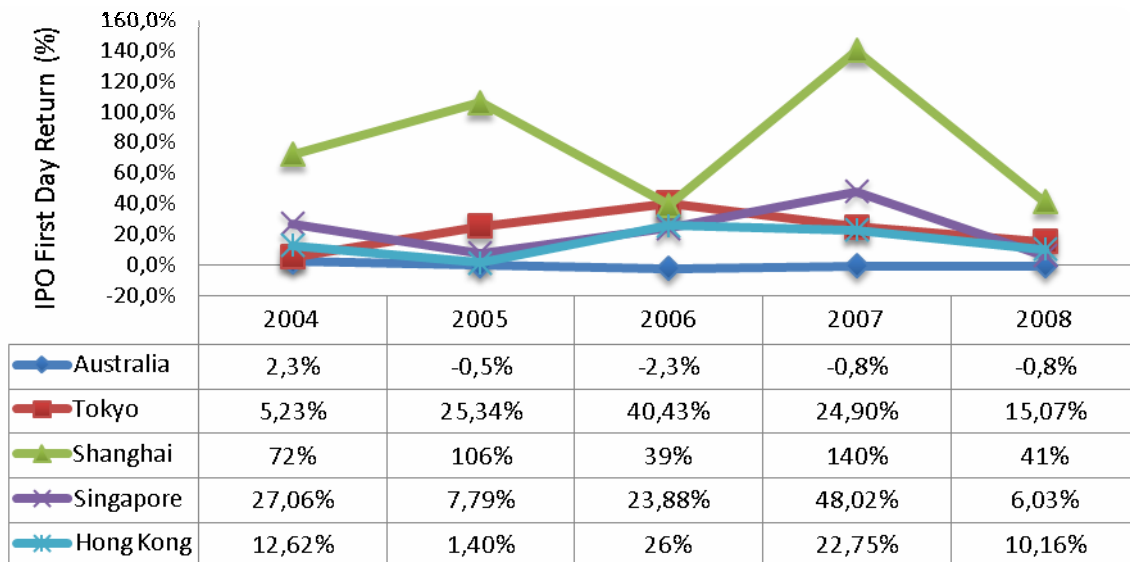
Exhibit 1-1: Average First-Day Returns on Non-European IPOs



Source: Prof. Jay Ritter, University of Florida, November 2008

The above chart prompts us to question why it is necessary for the issuers to sacrifice such a large portion of corporate wealth while raising new capital particularly in countries with high average IPO first-day returns. It is suggested that this could be the result of different public offer contractual mechanisms applied and market environment in different countries.

Exhibit 1-2 IPO First-Day Return in Five Major Stock Exchanges in Asia-Pacific (2004-2008)



Source: Own construction based on data collected from Thomason Datastream®

With special interest in the Asia-Pacific region, we further investigate the trends of annual average IPO first-day return during the period of 2004 to 2008 in five major stock exchange markets, namely Australia, Hong Kong, Shanghai, Singapore and Tokyo. As shown in Exhibit

1-2, IPO annual average first-day returns in Singapore and Hong Kong as compared with the other three exchanges show same trend but slight deviation in underpricing of IPO. Thus, we are motivated to study the IPO underpricing in Hong Kong and Singapore, and try to investigate what are the main determinants resulting.

It has also raised questions on why IPO underpricing first day returns vary even with countries that has similar characteristic such as geographical size and area, and business sector and environment. We have selected and empirically examined the IPO underpricing initial return in the Hong Kong and Singapore Stock Exchange Markets, given that these two markets being well known as major financial hubs in Asia-Pacific region with similar market mechanisms and geographical sizes. However, a significant difference exists in its IPO initial return. Evidences show that the average initial IPO return in Singapore from 441 IPOs over the last 34 years is almost doubled, 28.3% as compared to Hong Kong, 15.9% return in 2008 from 1,008 IPOs over the last 27 years (Loughran et al, 1994 and 2008).

1.3 Similarities between Hong Kong and Singapore

There are many similarities between Hong Kong and Singapore. These two were known as "East Asian Tigers," having made the transition from poverty to newly industrialized economies in a relatively short time. Details of similarities are shown below:

Exhibit 1-3: Similarities Between Hong Kong and Singapore

Similarities	Hong Kong	Singapore
British Colonies	Yes	Yes
Geographical size	Small	Small
Economic freedom	High	High
Heavy immigrations from China	Yes	Yes
Average Real GDP growth rate during studied period	6.34%	6.25%
Densely populated cities (scarcities in land resources)	Yes	Yes
Efficient governmental bodies	Yes	Yes
Favor by firms from China to raise capital abroad	Yes	Yes
Financial centre in Asia-Pacific	Important	Important

Source: Phang, 2000, American Journals of Economics and Sociology

1.3.1 Hong Kong and Singapore Financial Markets

The Hong Kong Stock Exchange (HKEX) and Singapore Exchange Limited (SGX) are the stocks markets of Hong Kong and Singapore respectively.

HKEX, first formally established in 1891, is Asia's third largest stock exchange in terms of market capitalization, behind the Tokyo Stock Exchange and the Shanghai Stock Exchange (HKEX.com, assessed on 17/5/09). There are two types of securities trading markets in HKEX, namely Main Board for common equity raising companies and Growth Enterprise Market (GEM) for fast-growing companies. As of 31 December 2007, the Hong Kong Stock Exchange had 1,261 listed companies with a combined market capitalization of HKD10.3 trillion (HKEX Fact book, 2008).

SGX, inaugurated on 1 December 1999 as result of the merger of two well-respected financial institutions—the Stock exchange of Singapore and the Singapore International Monetary Exchange, is Asia-Pacific's first demutualised and integrated securities and derivatives exchange. On 23 November 2000, SGX became the first exchange in Asia-Pacific to be listed via a public offer and a private placement (SGX.com, assessed on 19/4/09). As one of the forefronts of exchanges, SGX has been globally attracting international issuers and is also rapidly becoming Asia's offshore risk management centre for international derivatives. Similar to HKEX, there are also two types of securities trading markets in SGX, namely Main Board and Singapore Catalist for fast-growing companies. By 31 December 2008, the Singapore Exchange had 767 listed companies with a combined market capitalization of SGD 385 billion (SGX.com, assessed on 17/5/09).

Both of these exchange markets, HKEX and SGX, were well-developed and have transparent trading systems. According to Jagannathan and Sherman (2006), the most commonly used IPO pricing method for both markets are public offer. However, the popularity of book building has been increasing in recent years for both markets (as practiced by developed countries). In Hong Kong, hybrid method which is the combination of public offer and book building is largely undertaken by underwriter to determine IPOs' offer price whereas IPOs in Singapore are priced after proper book building activities (Uddin, 2008).

Furthermore, according to the World Development Disclosure Index in 2006 from World Bank, both Hong Kong and Singapore scored 10, which is the highest score indicating that both markets are very transparent and protect investors right by requiring more disclosure on firm's financial and ownership information. La Porta et al (1997) document a number of similarities in both of these financial markets with respect to the codification of shareholder rights (e.g. anti director rights, proportional representation, proxy by mail, preemptive rights, etc.). Over allotment options are allowed in both markets to be exercised for price stabilization purpose during oversubscription of shares. Hence, difference in issues like investor protection, the quality of financial information disclosure and IPO share allocation do not likely affect the IPO underpricing level across both markets.

1.4 Purpose

The aim of this study is to investigate the main determinants that influence the underpricing of IPOs in HKEX and SGX over the period of 2004 to 2008. Further, the study is intended to examine why the level of IPOs initial returns differed between these two markets which are very similar in market mechanisms.

1.5 Delimitations

Our study is conducted with focus on the stock exchange markets in Hong Kong and Singapore during the period of 2004 to 2008. Both of these markets are assumed to be similar for the purpose of this research even though they have different political and regulatory environment. Further, we have excluded Real Estate Investment Trusts (REITs) as they are created for special purpose only.

1.6 Thesis outline

A critical review of literature and empirical hypothesis, for the purpose of the research, is presented in the next chapter. In the subsequent four chapters, we respectively present methodology and data, results and discussions. Finally, the conclusion is given in the last chapter.

1.7 Audience

Our study will be of academic interest for those in the field of corporate finance, underwriters and stockbrokers, practitioners in the financial community, the government and all other companies that plan to be listed in near future in the Hong Kong and Singapore Stock Exchange.

2. Theoretical framework and empirical studies

In this chapter, theoretical framework is presented as the basis of our hypothesis. The chapter begins with the IPO Underpricing and Asymmetric Information Models, including the Winner's Curse, Ex Ante Uncertainty Model and Signaling Model. The rest of the chapter is organized as such: IPO Underpricing and Listing Time Lag, IPO Underpricing and Market Timing Theories, and IPO Underpricing and Behavioral Theories.

2.1. IPO Underpricing and Asymmetric Information Models

It is a well-known fact that companies going public tend to discount their IPO subscription prices. Such discount is generally explained in the literature with asymmetric information about the security's value and the fundamental risk of the firm. Asymmetric information models assume that one of participants of IPO transactions knows more than the others, and that the resulting informational frictions give rise to underpricing in equilibrium. Three models on information asymmetry are considered influential, namely the Winner's Curse (Rock, 1986), the Ex Ante Uncertainty Model (Beatty and Ritter, 1986) and the Signaling Model (Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989)).

2.1.1 The Winner's Curse Model

The Winner's Curse Model (Rock, 1982 and 1986), an implication of Information Asymmetry Theory (Akerlof, 1970), is perhaps the best-known asymmetric information model of IPO underpricing, describing the equilibrium result of IPO underpricing.

Rock's model (1986) assumes IPO participants are categorized into two groups based on the information heterogeneity, and the IPO market is driven by the continuous participation of less informed participants. Some participants, classified as informed investors, have superior information on the true value of the IPO, than the others, classified as uninformed investors including the issuing firm and its underwriters. Being informed is considered costly in Rock's model. Understandably, the informed investors bid only for the attractive offers with high expected return, which are identified by the advanced information they obtained, this will result in excess demand of the underpriced IPOs. As the uninformed investors have to

subscribe all shares indiscriminately, they would face a ‘winner’s curse’ problem: their demand is partly crowded out by the informed investor in attractive offers and are allocated a large portion in unattractive offers. This is to say that, if the uninformed investors were successfully allocated shares, it could be that the informed investors have not submitted purchasing orders since the fair value of the share is lower than expected trading price according to their valuation. As a result, the successful but uninformed investors are cursed by paying an extra amount of money for some goods which are not worthy. Consequently, the expected return earned by uninformed investors, ‘conditional upon being allocated shares’, is less than informed investors’ expected return which is ‘conditional upon submitting a purchase order’ (Rock, 1986). In one extreme, uninformed investors could only successfully subscribe overvalued IPOs, leading to negative expected return. In order to induce uninformed investor to participate in the IPO market (even into unattractive offers), IPO firms have to underprice to compensate for losses experienced by uninformed investors due to the winner's curse, so that the expected return of uninformed investors is non-negative (Beatty and Ritter, 1986). In other words, all IPOs must be underpriced to attract uninformed investors and to compensate informed investors since their information production activities are costly.

Koh and Walter (1989) conducted a study on new issues in Singapore during the period of 1973 to Jun 1989, and found that the Winner’s Curse was strongly evident in their study. Other scholars such as Lee et al. (1996) and Chowdhry and Sherman (1996) found evidence of the Winners’ Curse in both developed and developing markets including the U.K., Hong Kong, Malaysia, Indonesia, India, Thailand and Bangladesh, among other countries and regions.

2.1.2 The Ex Ante Uncertainty Model

The Ex Ante Uncertainty Model, originated from Ritter (1984) and formalized by Beatty and Ritter (1986), is a further implication following from the Winner’s Curse Model. According to Rock’s model, there is asymmetric information among informed and uninformed investors, which leads to a heterogeneous estimation of the stock’s intrinsic value and winner’s curse

problem. Beatty and Ritter (1986) find that this heterogeneity results uncertainty on the offer's value once it starts trading, such uncertainty is defined as the ex ante uncertainty. As argued by Beatty and Ritter (1986), potential investors have to engage in security analysis to identify the offer's true value. Such analysis in the IPO process is costly and could be analogous to a call option on the IPO for these investors, who will exercise the option if the 'true' price exceeds the strike price, namely the subscription price of the IPO. The value of the call option increases with the level of uncertainty of the issuer's value. Therefore, the greater the uncertainty of the firm's value, the more investors will ask for a lower IPO price to make the value of the call option higher, namely the larger amount of 'money left on the table' is expected by the investors for compensation of the 'winner's curse' problem. In short, 'the higher the ex ante uncertainty, the higher the expected IPO underpricing' (Beatty and Ritter, 1986).

This model is supported by overwhelming empirical studies. The ex ante uncertainty is measured in a proxy measure, and the various proxies that have been used in the literature loosely fall into four groups: company characteristics (i.e. firm size (Ritter, 1984) and industry (Benveniste et al, 2003), offering characteristics (i.e. gross proceeds (Beatty and Ritter (1986), Habib and Ljungqvist (1998) and others) and intermediaries such as underwriter (Beatty and Ritter (1986), Nanda and Yun (1997), Dunbar (2000) and others), prospectus disclosure (i.e. the number of use of IPO funds (Beatty and Welch, 1996), and aftermarket variables (i.e. trading volume (Miller and Reilly, 1987), volatility (Ritter, 1984 and 1987)). The most important determinants of the uncertainty are the deal size and the firm size. Beatty and Ritter (1986) predict an inverse relationship between the deal size and the degree of underpricing. Evidences from the studies of Tomczyk (1996) and Rahman and Yung (1999) confirm that it is significant in explaining the pricing of new shares.

2.1.3 Underpricing as a Signal of Firm Quality

The Signaling Model of underpricing is originated from Ibbotson (1975) and further developed by Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989). In contrast with Rock's assumption regarding the informational asymmetry between issuing firms and investors, the Signaling Model of IPO assumes that firms have better information

about the present value or the risk of future cash flows than investors. As a result, the underpricing of IPO is used to signal the quality of the firm. The model argues that ‘good’ firms wish to signal investors their superior prospects, in a term of underpriced IPO and large amount of retained ownership (Allen and Faulhaber (1989), Grinblatt and Hwang (1989) and Welch (1989)). In the words of Ibborston (1975), such underpricing is to ‘leave a good taste in investors’ mouths’. Hence, ‘good’ firms prompt to diversify themselves from the pool of ‘bad’ issuers by credibly signaling their quality in order to raise capital on more advantageous terms in subsequent seasoned issues (Welch, 1989). The logic is that only ‘good’ firms are able to recoup the losses after their IPO performance is realized. However, the ‘bad’ firms could not mimic what the ‘good’ firms do, as the owners of the ‘bad’ firms know they are unable to sustain profitability to recoup the initial losses from underpricing. Thus, the model provides an explanation for the IPO underpricing as an ‘equilibrium signal’ of firm’s quality (Allen and Faulhaber, 1989).

In common with the other asymmetric information theories of underpricing, the signaling models also predict a positive relationship between underpricing and the ex ante uncertainty on firm value, such as profitability, size and speed (Ritter (1986), Uddin (2001 and 2008)). The signal of a firm’s quality has extent to a wider range, including pre-IPO leverage (Su, 2004), the quality of the board of directors, direct information disclosure to IPO investors, the choice of particularly reputable parties who could perform a ‘certification-of-quality’ role, such as underwriters (Booth and Smith (1986), Carter and Manaster (1990), Michaely and Shaw (1994)), auditors (Titman and Trueman, 1986), or venture capitalists (Megginson and Weiss (1991) and Lee and Wahal (2004)).

2.2 IPO underpricing and Listing Time Lag

The problem of listing delay was discussed as institutional lag by Ritter in 1984, finding that the time difference between listing announcement date and trading date could unintentionally result in high level IPO underpricing for firms in specific industry, for instance natural resources industry. However, the effects of listing delay in different countries are firstly recognized by Loughran et al (1994) that IPO listing on the exchange is delayed from one day

to three months after fixing the offer price, Chowdhry and Sherman (1996) further argue that the time lag between the date the issue price is set and the first-day market trading positively affects IPO underpricing by analyzing the listing time lag effects on the IPO underpricing in U.K. and U.S.A.: The IPO offer price in UK is fixed much earlier than listing date, whereas in US the time lagging between price fixing dates and listing date is only one day. This is also supported by other empirical findings (Chan et al (2004) and Uddin (2001 and 2008)), who argue that an IPO is underpriced to a greater extent if there is a long listing lag. They point out that the IPO underpricing is positively related to the number of days between offering and listing in China and Malaysia.

However, Lee et al. (1996a and 1996b) found such relationship is significantly negative in Australia but insignificantly negative in Singapore. Several arguments have been formed in explaining this inconsistency. Lee et al (1996a and 1996b) argue that the time between prospectus registration and listing may proxy for informed investors demand as ‘underpriced’ issues will sell more quickly prior listing because informed investor demand will be stronger for such issues. However, Uddin (2008) argues that greater listing time lag could increase the IPO ex ante uncertainty; but issuers and underwriters may not correctly predict the extent of ex ante uncertainty about IPO valuation. Hence, the empirical tests on the effect of listing time lag and ex ante uncertainty are not consistent across countries and time period.

2.3 IPO Underpricing and Market Timing Theory

Market Timing Theories are often used to explain why there are more IPO activities in some periods (hot-market period) than in others (cold-market period) and are often associated with information asymmetry theory. Lucas and McDonald (1990) firstly investigate this hot-market effect and argue that firms prefer to issue new equity in a bull market instead of a bear market so that they can get a more favorable pricing. Derrien (2005) argue that individual investors’ demand is positively related to market conditions. In other words, investors in a bull market are overoptimistic and firms respond by issuing equity as a window of opportunity (Loughran, Ritter and Rydqvist (1994), Welch and Ritter (2002), Ljungqvist and Wilhelm (2002) and Loughran and Ritter (2004)). Evidences show that the average IPO first-day returns during the

dot-com bubble were almost four times higher (65%) than that (15%) in late 1990s (Loughran and Ritter, 2004). Cook et al (2003) refine this analysis by conditioning on hot and cold markets. They find that IPO firms trade at higher valuations only in hot markets. This is also supported by Derrien (2005) and Purnanandam and Swaminathan (2004) that the pre-issue shareholders of the overpriced IPO firms, who expect a high initial return, tend to take advantages of overoptimistic investors by choosing to go IPO in hot market period. They argue that many IPOs listed in U.S. market during the internet bubble period have become 'penny stock' or have been delisted (Purnanandam and Swaminathan, 2004).

2.4 IPO Underpricing and Behavioral Theories

IPO underpricing phenomenon could also be explained on the behavioral perspective. Specifically, behavioral theories associated with finance are categorized into two, which are cognitive psychology and the limits to arbitrage (Ritter, 2003). Cognitive refers to how people think. One of the behavioral theories called investors' sentiment theory is interested in the effect on stock price of 'irrational' or 'sentiment' investors, who bid up the share price beyond true value of the firm. Ljungqvist et al (2004) and (Yan, 2005) assume some sentiment investors hold optimistic beliefs about the prospects for the IPO companies although those firms are difficult to value due to lack of prior history, young, immature and relatively information opaque. Cook, et al (2006), Cormelli et al (2006) and Dorn (2003) also document that retail investors do not update their prior beliefs about the value of an IPO in an unbiased fashion and tend to overpay for IPOs listed in hot market period, and for IPOs that have more promotional activities. In other words, sentiment investors 'irrationally' rely on their own information sources and interpretation of their knowledge on IPO firms' value and tend to overpay in hot market period. Investors' irrational' behaviors are also supported by the 'informational cascades' theory (Welch, 1992). The theory suggests that if investors make their investment decisions sequentially later, investors can condition their bids on the bids of earlier investors rationally disregarding their own information. As a consequence, demand is either oversubscription or remains low over time, which is also supported by Amihud et al (2003) analysis of demand and allocations in Israeli IPOs. To sum up, while sentiment

investors make their investment decisions based on overoptimistic and irrational belief on shares' value, a positive informational cascades forms and later investors might blindly follow the cascades disregard their own information.

2.5 Summary

Overall, these theories from previous scholars and studies explain the IPO underpricing phenomenon. However, the previous empirical findings indicate that the inconsistency of those theories across markets and time periods. Thus, we build hypotheses to research on the determinants of IPO underpricing in Hong Kong and Singapore during 2004-2008, which are presented in the following chapter.

3. Methodology and Data

The following part describes the data and research method used in this thesis. For the purpose of the thesis, the most suitable method is a mixed designed research that combines both qualitative and quantitative data. A statistical analysis can identify the development of IPO underpricing over the past 5 years on both Hong Kong and Singapore and provide the fundamental of hypothesis testing, while a carefully designed regression model based on the theoretical framework and empirical data would provide the insights and explanation to such IPO underpricing activities and the differences.

3.1 Research Approach

The aim of our studies is to empirically test some of the theoretical explanations behind the IPO underpricing phenomenon by building a series of hypothesis; hence we use a deductive approach (Saunders et al, 2003). We have also applied inductive approach while trying to develop new hypothesis to explain the correlation between the local code with lucky number ‘8’ on Chinese culture perspective and the market adjusted initial return in Hong Kong and Singapore.

Thus, we have chosen to make use of a combination of deductive and inductive research, since it is the most suitable approach for the purpose of this paper in explaining the different level of IPO underpricing between these two countries.

3.2 Research Method

In order to identify the general IPOs underpricing determinants, and explain the different level of IPOs underpricing in Hong Kong and Singapore, we used both quantitative and qualitative data which allow us to analyze these determinants with greater accurate view of the market reality. The quantitative data provides us an objective overview of the correlation between the IPO underpricing level and its determinants; while the qualitative data gives a more nuanced explanation to how and what impacts on the pricing of these IPOs.

3.3 Hypotheses

Firm Specific Factors

According to the signaling model, the quality of the firm is positively related to IPO's initial return based on the assumption that good firms tend to underprice as a signal to the market. They are confident that they are able to recoup the initial loss in the future (Allen and Faulhaber, 1989). Furthermore, the model also predicts that IPO underpricing is positively related to the ex ante uncertainty on firm value, such as profitability, size, financial leverage and speed (Ritter (1986), Su (2004), Uddin (2001 and 2008)). Informed investors were expected to prefer fundamentally strong and high quality firms than underperformed and inferior firms. Thus, this would inflate the IPO price of the high quality firm on the first day of trading in the stock market due to high demand from investors by fixed supply of IPO shares (Lowry et al, 2008). IPO shares in high quality firms will be in demand as investors who make sequential later investment decision would follow the earlier investors according to Welch's theory of informational cascades (1992). Consequently, this would result in high initial return on the IPO price of the high quality firm.

We use several accounting measure as the proxy to analyze the firm's quality such as profitability, solvency, financial leverage, and size. As such, we constructed four sub-hypothesis using the above firm's quality as a proxy measure to explain the expected IPO underpricing relationship with each firm's quality determinants.

Purnanandam and Swaminathan (2004) argue that the key differences between underpriced and overvalued IPO firms are their (current) profitability before IPO. Higher profitability signals good quality. Thus, the profitability should be positively related to the underpricing level. We defined operating margin as the proxy for firm's profitability as we believe that it is a more stable measure of profitability than net profits. The main reason is that operating margin is not affected by non-operating items and therefore represents the intrinsic value of the firm. Another reason is that some of our IPO firms have positive operating but negative net profits, which make the use of net profit margin a little restrictive. As a result, a sub-hypothesis is conjectured as follows:

Hypothesis 1-a: IPOs of firms with high degree of profitability are expected to be more underpriced than IPOs of firms with low degree of profitability in Hong Kong and Singapore.

Low leverage and high degree of solvency signal the firm's strong cash flow position. Under the signaling model, such firms are more likely to underprice (Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989). Denis and Mihov (2003)) argue that the firm's leverage indicates the firm's reputation in credit markets as firms with high leverage are more likely to issue public debt. This would cause a hard budget constraint on managers and limits management's control over firm's future cash flows. Thus, managers will not underprice their IPO as they have lack of confidence in recovering their initial loss. Based on the discussion above, we have constructed hypothesis 1-b and c:

Hypothesis 1-b: IPOs of firms with high degree of solvency are expected to be more underpriced than IPOs of firm with low degree of solvency in Hong Kong and Singapore.

Hypothesis 1-c: IPOs of firms with a low degree of financial leverage are expected to be more underpriced than IPOs of firms with a high degree of financial leverage in Hong Kong and Singapore.

The firm size can be considered as a proxy that measures how well established the IPO firm is. Ritter (1984) and Purnanandam and Swaminathan (2004), among others, assume a negative relationship between IPO underpricing and firm size. The logic behind is that there tends to be more uncertainty on valuation on small firms, since they are speculative. As a result, the uncertainty on evaluating the small firm faced by the investors might be much higher than that on large firm. In this case, investors might ask for the larger amount of 'money left on the desk' as compensation for the higher risk. Thus, we expected a positive relationship between IPO underpricing and market value of the firms in Hong Kong and Singapore, leading to another sub-hypothesis constructed as below:

Hypothesis 1-d: IPOs of large firms are expected to be less underpriced than IPOs of small firms in Hong Kong and Singapore.

Firm riskiness such as technological and valuation uncertainty of the firm was also an ex ante uncertainty factor that was used to explain in IPO underpricing. According to Rock's model (1982), riskier issue (firms with valuation uncertainty) will be more underpriced than less risky firms to induce uninformed investors to participate their IPO offer. Evidences from Ritter (1984) also show that riskier IPOs will be more underpriced than less-risky IPOs since it is an equilibrium condition to induce investors to participate in the IPO market.

High growth companies who want to go IPO are usually not listed in the main board due to the restriction in the listing rules on profitability requirement and high cost incurred. In order to raise capital in the market, they could alternatively go public through GEM or Catalist in Hong Kong and Singapore respectively. As the requirement to be listed in these secondary boards is much lower than the main board, we expect that higher valuation uncertainty for these firms. Consequently, we assumed that firms listed in GEM or Catalist ought to be highly underpriced to compensate the investor for the risk they are willing to take. Following these logics, we constructed our second and third hypothesis as follows:

Hypothesis 2: IPOs of firms which operate in risky industry are expected to be more underpriced than IPOs of firms which operate in less risky industry in Hong Kong and Singapore.

Hypothesis 3: IPOs of firms listed in GEM or Catalist are expected to be more underpriced than IPOs of firms listed in Main Board in Hong Kong and Singapore.

Beatty and Ritter (1986) firstly argue that the amount of gross proceeds, among offering characteristics, is one of the primary proxy for ex ante uncertainty faced by IPO firms. Since then, the gross proceed, measuring how much capital the firm intend to raise (based on firm's current valuation and future prospects), has become a popular proxy measure for the risk on firm's value. Many empirical findings conducted by previous studies have confirmed that the amount of gross proceeds is negatively related to the degree of IPO initial return since 'smaller offers are more speculative on average than larger offers' (Beatty and Ritter (1986), Loughran and Ritter (1986), Habib and Ljungqvist (1998)). Consequently, we conjecture our fourth hypothesis as follows:

Hypothesis 4: IPOs of firm with larger offerings are expected to be less underpriced than IPOs of firm smaller offerings in Hong Kong and Singapore.

Market Specific Factors

The market condition during the firm's IPO listing period has significant influence on the initial return of the firm's share at the first day of trading. It was best evidenced from Loughran and Ritter (2008) whereby IPO firm average first-day return jumped to 65% during the internet bubble years (hot issue period) in 1999-2000 from 15% during 1990-1998, before and then reverting to 12% during 2001-2003. This phenomenon was explained as individual investors' demand is positively related to market condition as he or she is highly overoptimistic with the market performance and tends to respond positively to new opportunities in the market (Derrien, 2005). Based on this logic, we build our fifth hypothesis as follows:

Hypothesis 5: The initial return of IPOs listed in 'hot' period would be higher from that of the IPOs listed in 'cold' period in Hong Kong and Singapore.

From theoretical framework, listing time lag was usually explained using ex ante uncertainty model from Loughran et al (1994). It was expected that the longer the time lag between listing date and announcement date, increases the IPO ex ante uncertainty, thus required more discount on IPO price. The reason is that the appropriate level of IPO pricing cannot be measured accurately because the effectiveness of the IPO market valuation reduces following the longer time lag. This relationship was empirically examined by Chan et al (2004) and Uddin (2001 and 2008) in China and Malaysia respectively.

However, earlier studies in Australia and Singapore (Lee et al, 1996a and 1996b) show negative relationship between time lag and IPO initial return. Lee et al (1996a and 1996b) further explained that the time lag between announcement date and listing date may capture the effect of winner's curse which uninformed investors faced from the presence or absence of informed investor demand.

The difference in empirical findings indicates that there is an inconsistent explanation of the relationship between listing time lag and IPO underpricing across countries. However, we expect listing time lag to be significantly positive related to IPO underpricing, given that the average listing time lag (14 days) and average market adjusted initial return (15.51%) in Hong Kong, are lower than those in Singapore (47 days and 24.07%) from 2004 to 2008. Thus, we build our sixth hypothesis and this hypothesis can be further constructed as follows:

Hypothesis 6: IPO underpricing ought to be positively related to listing time lag in Hong Kong and Singapore.

Hypothesis 6-a: IPO underpricing in Singapore ought to be significantly higher than that in Hong Kong due to longer listing time lag.

Information asymmetry between uninformed investors and informed investors can be explained in the form of aggregate demand for the IPO (Lowry et al, 2008). Lowry et al (2008) noted that as IPO is a common-value share allotment method, the aggregate demand uncertainty should be positively related to the level of underpricing. Since the supply of the IPO shares relies on the issuing firms and is almost constant, the price is fluctuated by the demand side. In other words, the IPO is more underpriced if the demand of the shares exceeds supply. This means an IPO that is oversubscribed in the pre-market sale almost certainly will experience a short-term price increase in the secondary market (Gouldey, 2006). Evidence (Lee et al, 1996b) shows that the initial return is positively related to the level of oversubscription in Singapore from year 1973 to 1992. The oversubscription can be expressed by the exercise of over allotment option of the IPO. This indicates that there is a positive relationship between the IPO underpricing and the exercise of over allotment option. As both Hong Kong and Singapore markets also practice book building IPO method which allows the practice of over allotment options, our seventh hypothesis are stated as follows:

Hypothesis 7: IPO firm exercising over allotment option are expected to be more underpriced in Hong Kong and Singapore.

Underwriters are believed to have better information of the IPOs as compared to other IPO participants under price delegation theory of Baron and Holmstrom (1980) and Baron (1979, 1982). It is expected that underwriters are able to identify risky and less risky deals.

Evidences from Loughran and Ritter (2004) show that highly ranked underwriters tend to avoid risky deals. Hence, IPO firms especially risky firms tend to choose prestigious underwriter to signal the credibility of the firm. Ljungqvist and Wilhelm (2003) point out that risky firm tend to benefit more from having prestigious underwriters manage their IPOs and actively seek them out. Hence, it was expected that underwriter reputation plays a significant role in signaling of the firm's reputation.

From the signaling theory, it was assumed that good firms tend to be more underpriced to signal the quality of the firms as they believed they would be able to recoup the initial losses in the future. Therefore, given that reputable underwriters would choose good firms, this explained the more prestigious the underwriter, the higher is the IPO underpricing level. This forms our eighth hypothesis:

Hypothesis 8: IPOs backed by prestigious underwriters are expected to be more underpriced in Hong Kong and Singapore.

Investor's behavior and their market perspective are viewed to be highly correlated to their cultural background. In Hong Kong and Singapore, Chinese cultural is very influential since the Chinese are the major population in both of these countries. In recent years, investors from Mainland China have increasingly participated in both markets. The influence of Chinese culture on the fundamental value of investor views towards business environment has multiplied significantly.

Firms prior to IPO are not required to disclose any insider information of the firms to the public. Consequently, only limited IPO information is available in the market for investor to value the IPO's intrinsic value other than IPO firm's prospectus. Thus sentimental investors would rely on other alternative source of information that signals the firm's quality.

In Hong Kong and Singapore, it is common for Chinese investors to speculate stock performance from stock code numbers as a basic trading strategy based partially on superstition and self-fulfilling prophecy. According to Areddy (2007) from the Wall Street Journal, the Chinese commonly believe that numbers contain clues to good fortune, especially the auspicious number '8' which depicts rich and fortune. Evidences from extreme example,

the Beijing Summer Olympics opening ceremony starts on 8/8/08 at 8 minutes, 8 seconds past 8 pm. Hence, it was expected that Chinese investor perceive that shares with a number '8' in the stock codes would bring good fortune, thus increase the demand of the shares. This phenomenon could be supported by the investor sentiments theory from Ljungqvist et al (2004) as investors disregard the valuation of the shares but irrationally invest based on their sentiment on number '8'. Furthermore, as the belief of the lucky number '8' is very well spread in the Chinese society, it prompts investors cascade towards shares with lucky code which leads to high returns. Since Hong Kong and Singapore are highly populated with Chinese, it was expected that there is a positive reaction of the investors in these countries regarding the lucky number '8'. Thus, we formed our ninth hypothesis as follows:

Hypothesis 9: IPO shares with lucky number '8' in their local codes are expected to experience higher initial return in Hong Kong and Singapore.

Here below shows the summary of our hypotheses, supported by theories and empirical studies:

Exhibit 3-1 Summary of Hypotheses

Hypotheses	Supported Theories
Firm Specific Factors	
Hypothesis 1-a: IPOs of firms with high degree of profitability are expected to be more underpriced than IPOs of firms with low degree of profitability in Hong Kong and Singapore.	Allen and Faulhaber (1989); Benveniste and Spindt (1989); Chemmanur (1993); Grinbatt and Hwang (1989);, Purnanandam and Swaminathan (2004) ; Welch (1989)
Hypothesis 1-b: IPOs of firms with high degree of solvency are expected to be more underpriced than IPOs of firm with low degree of solvency in Hong Kong and Singapore.	Allen and Faulhaber (1989); Benveniste and Spindt (1989); Welch (1989); Grinbatt and Hwang (1989); Chemmanur (1993); Hogholm, (1994), and Denis and Mihov (2003)
Hypothesis 1-c: IPOs of firms with a low degree of financial leverage are expected to be more underpriced than IPOs of firms with a high degree of financial leverage in Hong Kong and Singapore.	Allen and Faulhaber (1989); Benveniste and Spindt (1989); Grinbatt and Hwang (1989), Welch (1989); Chemmanur (1993); Denis and Mihov (2003), and Su (2004)
Hypothesis 1-d: IPOs of large firms with are expected to be less underpriced than IPOs of small firms in Hong Kong and Singapore	Allen and Faulhaber (1989); Benveniste and Spindt (1989); Grinbatt and Hwang (1989); Welch (1989), Chemmanur (1993); Purnanandam and Swaminathan (2004); Gregoriou (2006)

Hypothesis 2: IPOs of firms with higher risk are expected to be more underpriced than IPOs of firms with lower risk in Hong Kong and Singapore	Beatty and Ritter (1986), Benveniste, Ljungqvist, Wilhelm, and Yu (2003)
Hypothesis 3: IPOs of firms listed in GEM or Catalist are expected to be more underpriced than IPOs of firms listed in Main Board in Hong Kong and Singapore	Beatty and Ritter (1986), Benveniste, Ljungqvist, Wilhelm, and Yu (2003)
Hypothesis 4: IPOs of firm with larger offerings are expected to be less underpriced than IPOs of firm smaller offerings in Hong Kong and Singapore	Beatty and Ritter (1986), Habib and Ljungqvist (1998) and others
Market specific factors	
Hypothesis 5: The initial return of IPOs listed in hot period would be higher from that of the IPOs listed in cold period in Hong Kong and Singapore.	Lucas and McDonald (1990); Loughran et al (1994); Ljungqvist and Wilhelm (2002); Loughran and Ritter (2004); Welch and Ritter (2002); Purnanandam and Swaminathan (2004) and Derrien (2005)
Hypothesis 6: IPO underpricing ought to be positively related to listing time lag in Hong Kong and Singapore.	Loughran et al (1994); Chowdhry and Sherman (1996); Lee et al. (1996a and 1996b); Chan et al. (2004) and Udinn (2001 and 2008)
Hypothesis 6-a: IPO underpricing in Singapore ought to be significantly higher than that in Hong Kong due to longer listing time lag.	Loughran et al (1994); Chowdhry and Sherman (1996); Lee et al. (1996a and 1996b); Chan et al. (2004) and Udinn (2001 and 2008)
Hypothesis 7: IPO firm exercising over allotment option are expected to be more underpriced in Hong Kong and Singapore.	Rock (1986); Lee et al. (1996a and 1996b); Gouldey (2006) and Lowry et. al (2008)
Hypothesis 8: IPOs backed by prestigious underwriters are expected to be more underpriced in Hong Kong and Singapore	Beatty and Ritter (1986); Booth and Smith (1986); Carter and Manaster (1990); Michaely and Shaw (1994)
Hypothesis 9: IPO shares with lucky number '8' in their local codes are expected to experience higher initial return in Hong Kong and Singapore.	Welch (1992); Amihud et al (2003); Dorn (2003); Ritter (2003); Ljungqvist et al (2004); Cook et al (2006) and Cormelli et al (2006)

3.4 Data

We examined the above hypotheses using a relatively large sample covering the 5 years period from year 2004 and year 2008. The sample sets consists the 536 IPOs listed on the Hong Kong Stock Exchange Market (283) and Singapore Stock Exchange Market (253).

3.4.1 Data Collection

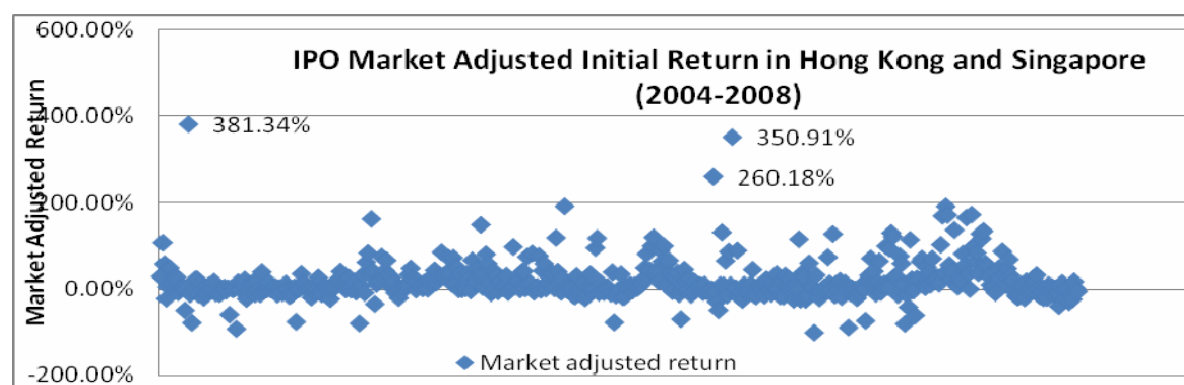
Due to the large sample size of 536 IPOs from both exchange markets during our studied period, primary data is not feasible to collect from these companies. We were forced to rely on

the secondary data primarily extracted from Thomson Financial's DataStream Advance 4.0 and Reuters 3000Xtra Database. We have also collected missing information for hundreds of observations from a number of sources, including companies' prospectuses and annual reports, stock exchange markets websites, internet websites, government statistics, and various other secondary sources.

3.4.2 Excluded sample

After analyzing the data collected, we have excluded some observations that could otherwise distort our findings. First, we have excluded REITs (Real Estate Investment Trusts) and other trusts which were created for specific purposes as their first day return could be distorted by specific reasons (e.g. availability to public subscription).

Exhibit 3-2: Market Adjusted Initial Return in Hong Kong and Singapore (2004-2008)



Source: Own construction based on data collected from DataStream.

We have also excluded a total of 3 outliers which have abnormal market adjusted initial return more than 250% from both markets to avoid distortion in our findings and 30 companies, 4.7% of total IPOs, due to incomplete information. What remains are almost all IPOs in the exchange markets with the sample size of 536 companies with complete information. According to Loughran and Ritter (2008), there is no survivorship bias by using Thomson Financial Ltd and Reuters databases as there is no evidence that subsequent 'winners' are more comprehensively or accurately covered than other IPOs.

3.4.3 Other company specific data

Company specific data, such as information regarding debt and book value of assets, was collected using Reuters 3000Xtra database, Reuters. From this source, currency exchange rates were also retrieved. Exchange rates were used in order to recalculate all companies' financial data into local exchange market currency, thus enabling better comparisons between firms from different countries. The exchange rates used were the spot rates at the end of the year which was practiced in Reuters database. Furthermore, financial data of firms listed in Singapore Stock Exchange were translated into Hong Kong dollar for the comparisons across stock exchange markets.

3.5 Validity and Reliability

By using a combination of both qualitative and quantitative method, we believe our research is valid and reliable.

For our studies to have high validity, it is important that the method chosen is able to measure the purpose of our studies. The method chosen in our studies is similar in many aspects with previous studies regarding IPO underpricing dated back since 1960s. Most of the explanatory variables selected for our studies to explain the IPO underpricing level were used and supported by previous studies. There are only two explanatory variables that are specially designed in this paper to explain the underpricing level between Hong Kong and Singapore, namely over allotment option exercised and lucky meaning '8' in local stock code. These new explanatory variables were designed given the characteristic of the markets which are similar in many aspects. To our knowledge, these two variables have not been used in previous studies. We believed that by adding these explanatory variables, it would help to serve the purpose of our paper. Therefore, the chosen method is judged to be valid.

To generate reliable result, the method and data used must be collected from trustworthy resources. In our studies, IPOs information collected from Reuters and DataStream databases, which are judged to be reliable after cross checking with company announcements (e.g. Annual reports and IPO allotment results). Announcements from company are considered as the best proxy of information available to external investors, and therefore reliable and

trustworthy. Data accuracy and errors are also checked and corrected prior running the regression test.

Our regression model is performed using OLS in the econometric software EViews, popular software within statistical research. For OLS to present a correct result certain assumptions has to be fulfilled. A series of tests has been performed to test the assumptions of OLS. All tests have resulted in acceptable values which could not indicate untrustworthiness and unreliability. The main problem in our regression test is a lack of normally distributed residuals. Outliers have also been excluded and several of the variables have been transformed into logarithmic values to enable the regression to be more normal distributed. However, according to Brooks (2005), if the sample is large enough a lack of normality does not pose a problem. For our studies, a total sample of 536 IPOs is collected, which deemed to be a large sample that allow us to disregard the normality. Hence, we would conclude that our data and regression model is reliable to serve the purpose of our studies.

3.6 The Regression model

Regression model are widely used in IPO underpricing research, e.g. Ritter (1984), Su (2004), among others. Two regression models, univariate and multivariate regression models are used in our studies to test our hypothesis with the correlation between the dependent variable, Market-adjusted Initial Return and other independent variables. The potential problem with this approach is the existence of significant white's heteroscedasticity in the error term. Thus, we use ordinary least squares (OLS) regression with a white's heteroscedasticity consistent covariance matrix (Brooks, 2005). Both of these models are explained as follows:

3.6.1 Univariate regression model

Univariate regressions are performed with IPO Market-adjusted Initial Return as dependent variables, in each industry category for Hong Kong and Singapore to analyze the significance in the difference of IPO underpricing.

The industries need to be reclassified due to the different industry classification systems

between Hong Kong and Singapore. The classification system in Hong Kong called Hang Seng Stock Classification System, classifies the sectors as 1) Energy, 2) Materials, 3) Industrial goods, 4) Consumer goods, 5) Services, 6) Telecommunications, 7) Utilities, 8) Financials, 9) Properties & Construction, 10) Information Technology, 11) Conglomerates. On the other hand, Singapore stock exchange classifies the sectors as 1) Commerce, 2) Construction, 3) Finance, 4) Manufacturing, 5) Hotels and Restaurants, 6) Properties, 7) Multi-industry. For the purpose of comparing the IPOs in these two markets, we combine some sectors, e.g. Industrial and Consumer goods in Hong Kong and Commerce and Manufacturing in Singapore are kept in one category; Conglomerates in Hong Kong and Multi-industry in Singapore are kept in the category of others. We categorize the industries in both markets into eight industries according to the similar characteristics of the industries. These eight industries are shown as following: 1) Energy & Materials; 2) Financials & Finance; 3) Industrial & Consumer Goods, Commerce, Manufacturing; 4) IT & Electronic Manufacturing; 5) Properties & Construction; 6) Real Estate Investment & Services; 7) Telecommunications, Utilities and Hotel & Restaurants; 8) Others.

3.6.2 Multivariate regression models

To investigate the combined effect, a multivariate regression model is carefully designed based on the independent variables that are mostly selected on the basis of findings of previous research work. The independent variables are grouped into two categories, which are firm specific factors and market specific factors, to explain the IPO underpricing level.

Independent variables grouped under firm specific factors are used to measure the firm's quality prior to IPO. These variables are:

- (1) Operating margin;
- (2) Net assets;
- (3) Debt to Market Value of Equity;
- (4) Firm size; and
- (5) Firm - industry riskiness;
- (6) Listing Board; and
- (7) Gross Proceeds.

Independent variables grouped under market specific factors are used to measure the significant impact on IPO underpricing level from the business environment factors, are:

- (1) “Hot” or “Cold” market condition;
- (2) Time lagging;
- (3) Overallotment option exercised;
- (4) Underwriter’s reputation; and
- (5) Lucky number ‘8’ on local code.

Using a multivariate regression model, we examine which independent variables hold significant position in explaining the IPO underpricing level in Hong Kong and Singapore respectively and whether the different in IPO underpricing level between these countries can also be explained by the firm and market independent variables presented above over the 5 years studied period. The above chosen variables specification are from IPO firm’s pre IPO information and will be described in details in Appendix 1-1 and 1-2.

3.6.2.1 Dependent Variable

The Level of Underpricing

The level of underpricing is assumed to be reflected in the first day trading return of investors. In our studies, we measure the degree of IPO underpricing using stock market adjusted first-day return (MAR_{1st}) (Carter et al, 1998) as follows:

- (1) Stock first-day return ($Fr_{i,1st}$)

$$Fr_{i,1st} = (P_{i,1st}/P_{i,0}) - 1$$

where $P_{i,1st}$ is the closing price of the stock i on the first trading day and $P_{i,0}$ is the offer price of stock i .

- (2) Stock market return at the first trading day ($SMR_{m,1st}$)

$$SMR_{m,1st} = (P_{m,1st}/P_{m,0}) - 1$$

where $P_{m,1st}$ is the corresponding Hang Seng Composite Indexes (HSCI) for Hong Kong and FTSE (Singapore All Capital) for Singapore market return on the first trading day and $P_{m,0}$ is HSCI and FTSE market return on the announcement day.

- (3) Stock market adjusted first-day return ($MAR_{i,1st}$)

$$MAR_{i,1st} = (P_{i,1st}/P_{i,0}) - (P_{m,1st}/P_{m,0})$$

Stock market return is the changing of the corresponding HSCI and FTSE on the 1st listing date of an IPO compared with that on announcement date. It indicates market sentiment of the total stock market in the duration period. Therefore, MAR_{1st} can value underpricing more accurately because it extracts the impact of the overall stock market on an individual IPO's price.

3.6.2.2 Independent Variables

Firm Size

Previous studies from Ritter (1984) and Loughran and Ritter (2008) have used logarithm of revenue as firm size measurement. However, this measurement would create bias towards growing firms or firms in specific industry that have temporarily no revenue but potentially to be ranked as big firms based on the asset size. Hence, in order to make a fair comparison between firms, market capitalization of the firm was selected.

Market capitalization was computed by using IPO firm outstanding shares multiply with the IPO first day closing price to reflect the 'true value' of the firm after floatation. We have used the median of market value of equity after floatation for all IPOs during the studied period to split the sample into two groups. Firm above median, which is the market norm, will be ranked as 'Big firm' whereas firm below median will be ranked as 'Small firm'. This method was also used in previous studies such as Gregariou (2006).

Firm- industry risk

Industry riskiness is categorized using average industry beta. Industry is defined as risky if beta is more than 1. Beta is used as the determinant as it was assumed that the more correlated the industry with the overall market, the more it will be affected by the market uncertain. This method was also used by other empirical test such as Uddin (2008).

Market Condition 'Hot' and 'Cold'

Market hot and cold issue period is ranked based on the average quarterly market return from the Hang Seng Composite Index for Hong Kong and FTSE (Singapore All Cap) for Singapore.

We define a market as “hot” when the quarter is ranked among the top 33% of the average market return over our studied period. Conversely, a “cold” is one when the quarter is ranked among the bottom 33%. A market is “normal” if the quarter lies within the middle 34%.

Underwriter reputation

Underwriter was described as ‘prestigious’ by the numbers of IPO deals they have from year 2004 to 2008. We ranked the top 50% of the underwriter which has more deals than others as ‘prestigious’ as we presumed that they have hold a total of 50% market share in underwriter business environment.

This method is also used by previous studies such as Hogholm (1994), Wang (2008) and others. Other more common ranking methods used by previous studies such as underwriter reputation index developed by Carter and Manaster (1990) and further updated by Carter, Dark, and Singh (1998) is not applicable for our studies as these indexes are bias towards on U.S. underwriters reputation.

Lucky number ‘8’ in local code

Investor’s irrationality with lucky number ‘8’ in Chinese Culture is a well known fact. Share with local code consists of number ‘8’ in Chinese culture is perceived as wealth and fortune (Arredy, 2007). For Hong Kong, the share codes consist of 4 digit numbers which provide more number combination of ‘8’ with other numbers that gives new meaning in the code interpretation. Thus, in order to eliminate the possibility of distortion with local codes that have ‘8’ as starting digit of the code due to the listing rules in Hong Kong, only share codes with number ‘8’ at the end of the code is selected for our studies as it represents more of the lucky meaning of number ‘8’.

For Singapore, the local code consists of 3 digits in total with combination of various alphabetical and numbers. Due to this special characteristic, local code that contains number ‘8’ is perceived to have lucky meaning in Singapore context. For the special meanings of numbers in Chinese, please refer to Appendix 5.

Special considerations for independent variables

Net Assets, used to measure the solvency of the firm is the natural logarithm of net assets. Solvency is measured by natural logarithm of net assets, and financial leverage is measured by natural logarithm of D/E ratio. Given that many of our sample companies have zero long-term debt before IPO, we assigned long-term debt of zero (million) as 0.01 (million) with the same approach by Loughran and Ritter (2004 and 2008), since in our empirical work we use logarithms and logarithm of zero is undefined. If we are unsure whether the long-term debts are zero or are missing, we treat the value as missing. The IPO offer size is measured by natural logarithm of IPO gross proceeds. The aim to use the natural logarithm is to control the possible non-linearity and heteroscedasticity (Hogholm, 1994; Lee et al., 1996; Uddin, 2008).

Here below shows the summary of expected sign towards each variable, for details, please refers to Appendix 1 to 2.

Exhibit 3-3 Variables and Expected Sign

Dependent Variable: Market Adjusted Initial Return

Independent Variables

Firm Specific Variables	Expected Sign	Market Specific Variables	Expected Sign
Operating margin	+	“Hot” market condition	+
Net assets	+	“Cold” market condition	-
Financial leverage	-	Gross Proceeds	-
Firm size	-	Listing Board	-
Firm – industry riskiness	+	Time lagging	+
		Overallotment option exercised	+
		Underwriter’s reputation	+
		Lucky number ‘8’ on local code	+

4. Empirical findings

This chapter starts with data collection and selective statistics. A correlation matrix between variables is also provided. Lastly, the results from the performed regressions are presented and analyzed.

4.1 Results and analysis

In order to interpret the empirical findings with more information, descriptive statistics and correlation matrix are presented together with our analysis of the regression results. Below are our result and analysis of the descriptive statistics, followed by our regression analysis:

4.1.1 Descriptive statistics

Market Adjusted Initial Return of IPOs in Hong Kong and Singapore from 2004 to 2008

Exhibit 4-1 Yearly descriptive statistics of MAIRs in Hong Kong and Singapore from 2004 to 2008

Singapore						
Year	Mean	Median	Max	Min	Standard Deviation	No. of IPOs
2004	27.06%	8.89%	349.74%*	-70.60%	62.00%	69
2005	7.79%	2.28%	129.57%	-25.64%	29.37%	57
2006	23.88%	13.96%	125.31%	-74.24%	42.30%	46
2007	48.02%	31.43%	177.65%	-26.02%	53.43%	52
2008	6.33%	4.51%	55.77%	-28.61%	19.82%	29
Total	24.07%	10.69%	329.74%	-74.24%	49%	253
Hong Kong						
Year	Mean	Median	Max	Min	Standard Deviation	No. of IPOs
2004	12.62%	2.39%	381.28%*	-73.08%	59.04%	58
2005	1.40%	0.70%	41%	-78.40%	19.96%	59
2006	25.83%	19.62%	160.85%	-31.74%	30.31%	59
2007	22.75%	10.54%	192.38%	-15.20%	36.66%	79
2008	10.16%	6.57%	123.29%	-15.57%	27.04%	28
Total	15.51%	7.24%	381.28%	-78.40%	39%	283

* Outliners are excluded from our regression model analysis.

Exhibit 4.1 provides some summary statistics on the sampled IPO firms in both markets. The sample consists of 283 IPO firms listed in Hong Kong and 253 IPO firms listed in Singapore from 2004 to 2008. The table shows that the mean, median, maximum and minimum of IPO MAIR and number of IPOs each year in both markets. The yearly average MAIR for all IPOs

listed over the past five years has become more stable in both countries where the IPO underpricing gap between firms listed in both markets has become narrow over the years. This could be explained by the more efficient IPO mechanism due to more pre-deal information are made available to the public and the gaining popularity of book-building IPO method. The IPO underpricing trends on both markets for these past 5 years are very much similar as both are situated in the same geographical region and very much correlated in their business environment. Both markets IPO has low MAIR in year 2005 and 2008 as they are both affected by the economic downturn. It was evident that Gross Domestic Product (GDP) growth rate hit low in both markets during these two years. Even the number of IPO listing has reduced almost half in both markets for year 2008, Hong Kong (28) and Singapore (29) due to the frozen liquidity in the equity market which was highly affected by the global financial crisis spread from the U.S. market started in the beginning of year 2008.

The five-year average MAIRs of IPOs are 15.51% and 24.07% in Hong Kong and Singapore respectively indicates that on average, firms listed in Singapore appear to be more underpriced than firms listed in Hong Kong. This is also consistent with previous studies Ritter (2008). From the comparison between both countries, the yearly average MAIRs of IPOs in Hong Kong are generally less than those in Singapore except in year 2006 and 2008. This is consistent with the trend of the annual median first-day return comparison between Hong Kong IPOs in Hong Kong and Singapore. The possible explanation for irregularity in the IPO underpricing comparison trend in 2006 between these countries is most likely due to the fact that there were more firms going IPO in Hong Kong, 59, than Singapore, 46. Furthermore, these firms are also highly underpriced in Hong Kong during year 2006 with the highest IPO MAIR of 160.85% and low variance of 30.31% compared to 125.31% and 42.30% respectively in Singapore. While in 2008, the average IPO MAIR in Hong Kong has increased due to one IPO which was highly underpriced, New Media Groups Holding Limited, 123.29%, which does not reflect the true level of IPO underpricing in Hong Kong compared with the highest MAIR of 55.77% in Singapore.

Market-adjusted initial return and independent variables in Hong Kong and Singapore

This table below presents the summary statistics of the characteristics of the IPO firms listed in Hong Kong and Singapore. MAIR is the initial return of the IPO at the first trading day adjusted with the market return.

Exhibit 4-2 Summary statistics of MAIR and its independent variables

Singapore	Mean	Medium	Max	Min	SD
Market-adjusted initial return (%)	24.07%	10.69%	349.74%*	-74.24%*	0.49
Operating margin (%)	21.91%	19.41%	85.40%	-39.23%	0.16
Pre D/E ratio (%)	85.12%	2.94%	13800.80%*	0%	8.69
Net assets (HKD mil)	168.93	18.48	31,786.58	0	1,998.59
Gross proceeds (HKD mil)	253.00	106.00	4,969.00	16.00	469.19
Listing time lag	47.44	43.00	235.00	9.00	28.40
Hong Kong	Mean	Medium	Max	Min	SD
Market-adjusted initial return (%)	15.51%	7.24%	381.28%*	-78.40%*	0.39
Operating margin (%)	15.73%	13.82%	229%	-429%*	0.39
Pre D/E ratio (%)	134.17%	4.74%	27681.65%*	0%	16.50
Net assets(HKD mil)	3,775.28	357.45	245,810.11*	-6,375*	22,548.90
Gross proceeds (HKD mil)	3,064.00	622.00	86,741.00	11.00	8,364.80
Listing time lag	13.54	14.00	52.00	5.00	3.86

* Outliers are excluded from our regression model analysis.

We have noted earlier that the five-year average IPO MAIR in Singapore, 24.07%, is higher than Hong Kong, 15.51%, from 2004 to 2008. In Exhibit 4-2, IPO firms listed in Singapore on average have higher operating margin (21.91%) and lower degree of leverage (85.12%) as compared to IPO firms listed in Hong Kong (15.73% and 134.17% respectively). However, mean values in this case is somewhat misleading, due to some extreme values as firms ranging from high growth to mature firms are included in the samples to have a better overview of the IPO markets. Thus, it is more reasonable to use median values to avoid such problems. Using median values, firms in both of these markets are of low leverage, with pre-IPO D/E ratio less than 10%. However, the median D/E ratios of Singapore firms are still 1.8% lower than in Hong Kong. Overall, firms listed in Singapore perform better than the firms listed in Hong Kong and both markets have conservative capital structure. This seems to be consistent with the signaling theory and hypothesis 1-a and c since in order to signal the 'good' quality of the firms to their investors, firms listed in Singapore will underprice more than the firms in Hong Kong. However, the average and median of net assets in Exhibit 4.2

indicate that firms in Hong Kong have better solvency ability than firms listed in Singapore. This is inconsistent with the signaling theory and our hypothesis 1-b.

From the table above, it shows that firms listed in Hong Kong on average have higher gross proceeds and shorter listing time lag than Singapore. This conclusion is also consistent from the comparison of median values of gross proceed and listing time lag for both countries. This supports the ex ante uncertainty theory and our hypothesis 4, 6 and 6a from Ritter (1984) and Beatty and Ritter (1986) where firms with higher gross proceed and longer listing time lag will underprice more due to greater valuation uncertainty.

4.2 Correlation Matrix

A correlation matrix is produced to test for any multi-collinearity problems of the independent variables in explaining the IPO MAIR for Hong Kong and Singapore. Exhibit 4-3 below comprises of all independent variables used in regressions.

It shows that with only one exceptional observation, there are no correlations between different independent variables that are well above the level that indicate multi-collinearity problems. Ln(gross proceeds) and Ln(net assets) have a correlation of 0.725 is due to the fact that the number of shares issued also depends on the number of shares owned by the existing shareholders. However, as the source for shares issued in IPO can come from two ways: sales of shares from existing shareholder and new issue of shares to IPO. After testing the Variance Inflation Factor (VIF), we found that the 0.725 correlation does not posed any multi-collinearity problem since the VIF does not exceed 10. Furthermore, net assets are interpreted as an important indicator of the solvency of the firm as it is calculated using total assets less total liabilities.

We have also performed correlation matrix in Hong Kong and Singapore respectively Results is displayed in Appendix 3 and 4. There are no major differences between the combined matrix and each country matrix separately.

Exhibit 4-3 Correlation Matrix for different independent variables

	OPERA TING_ MARGI N	LNET_ ASSETS	LPRE_D _E_RAT IO	FIRM_S IZE_DU MMY	INDUST RIAL_R ISK	MH	MC	LGROS S_PROC EEDS	LISTIN G_BOA RD	TIME_L AGGIN G	OVERA LLOTM ENT_D UMMY	UNDER WRITE R_REP UTATI ON	CODE_ WITH_ NO_8	COUNT RY_DU MMY
OPERATING_MARGIN	1.0000													
LNET_ASSETS	0.0604	1.0000												
LPRE_D_E_RATIO	0.0680	0.1973	1.0000											
FIRM_SIZE_DUMMY	-0.0264	0.3678	-0.0032	1.0000										
INDUSTRIAL_RISK	0.0580	0.0083	0.0423	0.0309	1.0000									
MH	0.0592	0.0480	0.0468	0.0156	-0.0237	1.0000								
MC	-0.0275	0.0397	-0.0649	0.0376	0.0328	-0.4541	1.0000							
LGROSS_PROCEEDS	0.0113	0.7250	0.0965	0.6779	0.0256	-0.0035	0.0745	1.0000						
LISTING_BOARD	0.0354	0.3499	-0.0113	0.3673	0.0097	0.0219	-0.0488	0.4314	1.0000					
TIME_LAGGING	-0.0209	-0.3966	-0.0266	0.0004	-0.0396	-0.0158	-0.0197	-0.2951	-0.0616	1.0000				
OVERALLOTMENT_DUMMY	-0.0210	0.4888	0.0493	0.3044	-0.0377	-0.0498	-0.0628	0.5358	0.2231	-0.2980	1.0000			
UNDERWRITER_REPUTATION	0.0506	0.1361	0.1057	0.2275	0.0942	-0.0129	-0.0713	0.2290	0.0516	0.0992	0.1086	1.0000		
CODE_WITH_NO_8	-0.0159	0.1588	-0.0296	0.1172	-0.0189	-0.0176	-0.0012	0.1910	0.1410	-0.0667	0.0962	-0.0072	1.0000	-
COUNTRY_DUMMY	-0.0360	-0.6915	-0.0400	0.0007	0.0019	-0.0117	-0.0741	-0.4893	-0.1381	0.6495	-0.4436	0.1346	-0.1254	1.000

4.3 Regression Results

In this section, both univariate and multivariate regression are presented in order to show the determinants of IPO underpricing that affects Hong Kong and Singapore market to test the hypothesized, and later scrutinized the determinants that explain the different IPO underpricing level between these two countries.

4.3.1 Univariate tests

Exhibit 4-4 IPO Underpricing in different industries between Singapore and Hong Kong

White's Heteroscedasticity-consistent standard errors & covariance

Industries	MAIR _(Singapore)	MAIR _(Hong Kong)	MAIR _(Singapore) - MAIR _(Hong Kong)	t-value
Energy & Materials	38.87%(n=27)	37.74% (n=30)	1.13%	-2.3573**
Financials & Finance	32.58% (n=4)	17.03% (n=12)	15.55%	-0.1709
Industrial & Consumer goods, Commerce, Manufacturing	24.13% (n=115)	11.2% (n=106)	12.93%	0.7388
IT & Electronic manufacturing	26.20% (n=46)	10.92%(n=47)	15.28%	0.2299
Properties & Construction	16.61% (n=7)	12.46% (n=10)	4.15%	0.9943
Real Estate investment & Service	2.81%(n=11)	7.35% (n=21)	-4.54%	3.1747***
Services, Telecommunications, Utilities and Hotel & Restaurants	26.20%(n=30)	19.68% (n=46)	6.52%	-0.6032
Others	1.80% (n=13)	15.36% (n=11)	-13.56%	2.2334**
Total	24.07% (n=253)	15.51% (n=283)	8.56%	3.2492***

Numbers in parentheses are the number of observations. The asterisks ***, **, * denote the level of significance respectively at one percent, 5 percent and 10 percent.

Exhibit 4-4 shows t-test results for the above industries' IPO MAIR between Singapore and Malaysia. Univariate tests are used to test the difference IPO underpricing level between Singapore and Hong Kong in different industries. We have included the three outliers that have abnormal high IPO MAIR in this sample to reflect the actual reality of each industry's IPO MAIR comparison across both countries. As noted earlier, the average IPO underpricing level in Singapore is 24.07% while that in Hong Kong is 15.51%. The differences between the IPO MAIR for both countries, 8.56% is tested to be very significant.

From the industry breakdown analysis in Exhibit 4-4, Energy and Materials industry is most highly underpriced among these eight industries in both markets (38.87% in Singapore and

37.74% in Hong Kong) and the differences of IPOs MAIRs between Singapore and Hong Kong, 1.13%, is tested to be significant. This is followed by Services, Telecommunications, Utilities and Hotel & Restaurants industry which is also highly underpriced (26.20% in Singapore and 19.68% in Hong Kong) but insignificant to explain the IPOs MAIR differences for both markets. As contrast, IPOs of firms in Real Estate Investment and Service industry and others industry listed in Singapore are significantly less underpriced than that in Hong Kong. These industries are also one of the least underpriced MAIR in these industries' IPO for both markets as compared to other industries.

IPOs of firms in Properties & Construction industry in Singapore (16.61%) are also more underpriced than that in Hong Kong (12.46%). The differences, 4.15%, could be deemed to be significant given the small sample size of 17. While IPOs of firms in Financials & Finance industry, Industrial & Consumer goods, Commerce and Manufacturing industry and IT & Electronic Manufacturing are more underpriced in Singapore and Hong Kong. The differences in MAIRs for these IPOs listed in Singapore, 15.55%, 12.93% and 15.28% respectively, shows that these firms are more underpriced in Singapore than Hong Kong. However, it was tested not significant to explain the differences in MAIR between these industries.

4.3.2 Multivariate tests

In order to provide a more extensive analysis and capture the multivariate effects of the possible explanations of underpricing, multivariate regressions are performed for Combined, Hong Kong and Singapore samples. Exhibit 4-5 presents the results from the multivariate analyses. The regression model for combined sample is as follows:

$$\begin{aligned} \text{Market adjusted initial return}_i = & a_0 + a_1 \text{ operating margin} + a_2 \ln(\text{net assets}) + a_3 \ln(\text{pre D/E} \\ & \text{ratio}) + a_4 \text{ firm size dummy} + a_5 \text{ industry risk} + a_6 \text{ 'hot' market condition} + a_7 \text{ 'cold' market} \\ & + a_8 \ln(\text{gross proceeds}) + a_9 \text{ listing board} + a_{10} \text{ time lagging} + a_{12} \text{ overallotment dummy} + \\ & a_{13} \text{ underwriter reputation} + a_{14} \text{ code with no. 8} + a_{15} \text{ country dummy} + e_i \end{aligned}$$

Exhibit 4-5 Regression results using Market adjusted Initial return (MAIR) as the Dependent variables (White's Heteroscedasticity-consistent standard errors & covariance)

Independent variables	Regression coefficients (t-statistics)						Expected sign
	Panel A: Combined sample		Panel B: Hong Kong Sample		Panel C: Singapore Sample		
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	
Constant	1.2338 (2.6441***)	1.2334(2.7017***)	-0.2407 (-0.4901)	0.0378(0.5176)	3.4738(4.0207***)	3.2068 (4.0281***)	
OPERATING MARGIN	-0.0093 (-7.6928***)	-0.0092(-8.1616***)	-0.0104(-8.6326***)	-0.0108 (-10.3964***)	-0.0549 (-0.3334)		+
LN(NET ASSETS)	0.0085 (0.5224)	0.0085 (0.5134)	-0.0220 (-1.0583)	-0.0170(-1.4703)	0.0193 (0.6994)		+
LN(PRE D/E)	-0.0159(-3.7285***)	-0.0159(-3.7867***)	-0.0147(-2.7719***)	-0.0145 (-2.7841***)	-0.016 (-2.5309***)	-0.0136 (-2.3829**)	-
FIRM SIZE DUMMY	0.3406 (5.9361***)	0.3414 (5.8787***)	0.0716(1.2708)	0.0903(1.7852*)	0.5966(7.4685***)	0.6025(7.7759***)	-
INDUSTRIAL RISK	0.0138(0.3916)		0.0293 (0.7664)		0.0399(0.6679)		+
'HOT' MARKET	-0.0018(-0.0437)		0.0553 (1.13601)	0.0586(1.3609)	-0.0161 (-0.2044)		+
'COLD' MARKET	-0.0604(-1.6194*)	-0.0594 (-1.8212*)	-0.0150 (-0.3483)		-0.0904 (-1.4719)	-0.0906 (-1.7064*)	-
LN(GROSS PROCEEDS)	-0.0696(-2.5607**)	-0.0691(-2.6473***)	0.0189(0.6537)		-0.1960 (-3.7069***)	-0.1804(-3.8933***)	-
LISTING BOARD	-0.0009 (0.1190)		-0.0564 (-0.8040)		0.0580 (0.7091)	0.0673(0.8467)	-
TIME LAGGING	-0.0009 (-1.2999)	-0.0009 (-1.3293)	-0.0011 (-0.2422)		-0.0005 (-0.6900)		+
OVERALLOTMENT DUMMY	0.1568(3.1340***)	0.1560(3.1634***)	0.1806(4.4772***)	0.1802(4.5522***)	0.0931(0.4882)		+
UNDERWRITER REPUTATION	-0.0669 (-1.8230*)	-0.0659 (-1.8600*)	-0.0029 (-0.6833)		-0.0347(-0.6028)		+
CODE WITH NO 8	0.0328(0.7639)	0.0329(0.7700)	0.0323 (0.6793)		0.0159 (0.1896)		+
COUNTRY DUMMY	0.1143(1.6091*)	0.1148(1.6277*)					+
R-squared	0.1738	0.1735	0.1670	0.1582	0.2184	0.2142	
Adjusted R^2	0.1528	0.1559	0.1260	0.1395	0.1755	0.1983	
F-statistic	7.7226	9.8665	4.0711	8.4861	5.0936	13.4636	
N	536	536	283	283	253	253	

Numbers in parentheses are the t statistics of regression coefficients. The asterisks ***, **, * denote the level of significance respectively at one percent, 5 percent and 10 percent.

For individual sample, Hong Kong and Singapore, the regression model is as follows:

$$\text{Market adjusted initial return}_i = a_0 + a_1 \text{ operating margin} + a_2 \ln(\text{net assets}) + a_3 \ln(\text{pre D/E ratio}) + a_4 \text{firm size dummy} + a_5 \text{industry risk} + a_6 \text{ 'hot' market condition} + a_7 \text{ 'cold' market} + a_8 \ln(\text{gross proceeds}) + a_9 \text{listing board} + a_{10} \text{time lagging} + a_{12} \text{overallotment dummy} + a_{13} \text{underwriter reputation} + a_{14} \text{code with no. 8} + e_i$$

The Model 1 (shown in Exhibit 4-5) is the full model including all independent variables to explain the IPO underpricing in both markets (Panel A) and in Hong Kong and Singapore respectively (Panel B and Panel C). Model 2 is designed after scrutinizing the independent variables that are significant to explain the IPO underpricing for each panel. The R-Squared was improved in Model 2 and the result shows that the coefficient estimates are stable after eliminating insignificant independent variables from Model 1. There are more significant independent variables reflected in Panel A than in Panel B and C due to larger sample size from the combination of two markets. We would begin with interpreting the results from Panel A which shows the significant explanatory independent variables for both markets, and later analyze the determinants that could explain the different level of IPO underpricing between Hong Kong and Singapore.

As shown in Exhibit 4-5, Model 1 and 2 in Panel A, representing the IPO underpricing explanatory factors in both Hong Kong and Singapore, depict that operating margin, Ln (Pre D/E), Firm Size, Ln (Gross Proceeds) and Overallotment option are statistically significant. Only three of them are consistent with our expected sign of coefficient. They are Ln (Pre D/E), Ln (Gross Proceeds) and Overallotment which appear to support our hypothesis 1-c, 4 and 7. The other two independent variables that reject our hypothesis from Panel A are Operating Margin and Firm Size. Only underwriter reputation is deemed to be significant at 10% level in Panel A for both models, mainly due to larger sample size which also reject our hypothesis 8. This is also supported by other empirical studies (Booth and Smith (1986), Titman and Trueman (1986), Carter and Manaster (1990)) that issuers tend to use prestigious underwriter to eliminate some of ex-ante uncertainty on firm's 'real value' not resolved only by disclosing

in prospectus. Consequently, IPOs associated with prestigious underwriter will be less underprice. The remaining five other independent variables are deemed to be insignificant in all panels to be the main determinants of explaining the IPO underpricing level in Hong Kong and Singapore are: Solvency (Hypothesis 1-b), Industry risk (Hypothesis 2), Listing board (Hypothesis 3), Hot market (Hypothesis 5) and Time lag (Hypothesis 6 and 6a).

The coefficient for financial leverage ($\text{Ln}(\text{Pre D/E})$) suggests a weak *negative* relation with IPO MAIR, which appears to support the Hypothesis 1-c suggested by the signaling theory. This relationship is also significant across Hong Kong and Singapore (Panel B and C) to explain the IPO underpricing level in each market respectively. As for offer size which is $\text{Ln}(\text{Gross Proceeds})$, the coefficient also suggests a weak negative relation with IPO MAIR. This however support Hypothesis 4 from ex ante uncertainty theory as issuer of small offering underprice more to give incentive for investor who may not want to participate in the IPO. Beatty and Ritter (1986) argue that small offering tend to be more speculative and leads to greater valuation uncertainty. However, this variable is a significant determinant of IPO underpricing in Singapore in Panel C but not significant enough to explain the underpricing in Hong Kong (Panel B). Overallotment option is proved to be positively related to MAIR in both markets in panel A and is also consistent with our Hypothesis 7. But this variable appears to be more significant in Hong Kong whereby it is not significant enough to explain the IPO underpricing in Singapore. The possible explanation is mostly due to more over allotment option is exercised in Hong Kong where the book building IPO method is more widely used compared to Singapore.

The results also suggests a very weak significant *negative* relation between operating margin and MAIR for model 1 and 2 in both combined market and Hong Kong, this rejects our hypothesis 1-a. However, as the coefficient can only explain a very small effect on IPO underpricing level, it is deemed not significant enough to provide a better overview on the effect of IPO underpricing. There is also a possible explanation from Beatty and Ritter (1986) underwriter would underpriced less for good quality firms IPO as they are more concerned on the commission received from the IPO issue. Under the ex ante uncertainty theory from Ritter

(1984), good firms tend to have less valuation uncertainty and are in greater demand for informed investors. Thus underwriter would less underprice the good IPO in order to protect its own self interest, which is the commission from the IPO issue that is dependent on the gross proceed received.

The results in the table show that firm size coefficient is more significantly related to IPO underpricing in Combined Market and Hong Kong but less significant in Singapore compared with the other two. However, as the coefficient is positive, it rejects our hypothesis 1-d supported by ex ante uncertainty theory which shows the opposite. The result indicates that in general, firm size has a positive impact on return. The possible explanation is investors are risk averse and have more confidence in large firms since large firms are deemed to be less risky and have more information available. Hence investors are willing to pay a premium for shares of large firms and accept lower expected return for taking less risk. This is also supported by empirical findings from Gu (2004).

The cold market variable is only significant in the Singapore market. The Cold market coefficient contains the expected sign but it shows a weak negative relation with the IPO underpricing level, thus supports our Hypothesis 5. Even though the country dummy in the combined sample is significant at 10% level, it shows a positive relationship which suggests IPO underpricing level is higher in Singapore.

Code with no '8' didn't meet our expectation in this studies as the regression models shows that it is not significant enough to explain the IPO underpricing level, which reject our Hypothesis 9. The coefficient is positive relation with IPO underpricing which proved our expected sign is accurate. Based on our data collected from 2004 to 2008, the average IPO MAIR with code no 8 is 28.06% in Hong Kong and 32.62% in Singapore, which are higher as compared to average MAIR of the markets in both markets. The possible explanation of this insignificant level is most probably due to small sample size of 60 as compared to the overall sample size of 536. Hence, it is not significant enough to signal the impact on the overall market IPO underpricing level.

Explanatory variables on the differences in IPO underpricing level between Hong Kong and Singapore

There are two variables from the multivariate tests that could explained the differences in IPO underpricing level in Hong Kong and Singapore, which are D/E ratio and firm size. Both of these variables are tested significant from the multivariate regressions

D/E ratio

D/E ratio measures the financial leverage of the firms. From the regression model results, debt to equity ratio is significantly negative related to IPO underpricing level for Hong Kong and Singapore respectively and the result supports our Hypothesis 1-c. Based on the coefficient of both countries, firms listed in Singapore (-0.0136) would underprice less than firms listed in Hong Kong (-0.0145) if they are highly levered. This also indicates that firms with low leveraged would underpriced more in Singapore than Hong Kong. However, the explanatory relation is pretty weak as the coefficient is fairly small. Hence, we conclude that financial leverage of the firm could weakly explain the difference in the level of IPO underpricing in both markets.

Firm Size

Based on the regression model result, big firms will underprice more as compared to small firms. Although the results reject our Hypothesis 1-d, firm size is still a significant explanatory variable to explain the high IPO underpricing level in Singapore as compared to Hong Kong in 2004 to 2008. From the coefficient in the regression model, big firms listed in Singapore (0.60) are more highly underpriced than firms in Hong Kong (0.09). The explanatory relationship between firm size and MAIR is very strong which proved to be a good indicator to explain the high IPO underpricing level.

4.4 Summary of regression results

Here below shows the summarized table of the results of hypotheses.

Exhibit 4-6 Summary of Results (Model 1: Combined Sample Panel A)

Hypotheses	Accepted or Rejected	Significant or Insignificant
Firm Specific Factors		
Hypothesis 1-a: IPOs of firms with high degree of profitability are expected to be more underpriced than IPOs of firms with low degree of profitability in Hong Kong and Singapore.	Rejected	Significant
Hypothesis 1-b: IPOs of firms with high degree of solvency are expected to be more underpriced than IPOs of firm with low degree of solvency in Hong Kong and Singapore.	Accepted	Insignificant
Hypothesis 1-c: IPOs of firms with a low degree of financial leverage are expected to be more underpriced than IPOs of firms with a high degree of financial leverage in Hong Kong and Singapore.	Accepted	Significant
Hypothesis 1-d: IPOs of large firms with are expected to be less underpriced than IPOs of small firms in Hong Kong and Singapore	Rejected	Significant
Hypothesis 2: IPOs of firms with higher risk are expected to be more underpriced than IPOs of firms with lower risk in Hong Kong and Singapore	Accepted	Insignificant
Hypothesis 3: IPOs of firms listed in GEM or Catalist are expected to be more underpriced than IPOs of firms listed in Main Board in Hong Kong and Singapore	Accepted	Insignificant
Hypothesis 4: IPOs of firm with larger offerings are expected to be less underpriced than IPOs of firm smaller offerings in Hong Kong and Singapore	Accepted	Significant
Market specific factors		
Hypothesis 5: The initial return of IPOs listed in hot period would be higher from that of the IPOs listed in cold period in Hong Kong and Singapore.	Rejected for 'Hot'; Accepted for 'Cold'	Insignificant
Hypothesis 6: IPO underpricing ought to be positively related to listing time lag in Hong Kong and Singapore.	Rejected	Insignificant
Hypothesis 6-a: IPO underpricing in Singapore ought to be significantly higher than that in Hong Kong due to longer listing time lag.	Rejected	Insignificant
Hypothesis 7: IPO firm exercising over allotment option are expected to be more underpriced in Hong Kong and Singapore.	Accepted	Significant
Hypothesis 8: IPOs backed by prestigious underwriters are expected to be more underpriced in Hong Kong and Singapore	Rejected	Insignificant
Hypothesis 9: IPO shares with lucky number '8' in their local codes are expected to experience higher initial return in Hong Kong and Singapore.	Accepted	Insignificant

5. Conclusions and Recommendations

The aim of this study is to investigate what the main determinants influence the underpricing of IPOs over the period of 2004 to 2008 in HKEX and SGX. Further, the study is intended to examine why the level of IPOs initial returns differed between these two markets with similar market mechanisms. The IPO underpricing gap between Hong Kong and Singapore is 11.5% at 10% significant level, meaning that IPOs in Singapore underprice 11.5% more than the IPOs in Hong Kong.

Our univariate tests show that IPO firms in Energy and Materials industry in Singapore are underpriced more on average than the same industry in Hong Kong. On average firms listed in Singapore in Financial and Finance, Industrial and Consumer goods, Commerce, Manufacturing, IT and Electronic Manufacturing and Properties and Construction are underpriced more, although the underpricing level is insignificant according to our results. In general, firms listed in Singapore are underpriced more than the ones listed in Hong Kong.

Our multivariate tests show that to some extent, operating margin, financial leverage of the firm, firm size, offer size, and overallotment option exercised, are the significant determinants of IPO underpricing level in the combined sample of Hong Kong and Singapore IPOs.

The significant determinants used to explain the underpricing level in Hong Kong are operating margin, firm size, and overallotment option exercised. As for Singapore, the main significant determinants are financial leverage, firm size, 'cold' market condition and offer size. Therefore, only pre-IPO leverage and firm size can be used to explain the difference in the IPO underpricing level between Hong Kong and Singapore.

Firm size is the primary significant determinant to explain the difference in IPO underpricing level in Hong Kong and Singapore. Although results from the regression rejects our hypothesis expecting a negative relationship, the result from the multivariate regression models suggests a highly significant explanation to the level of IPO underpricing by

indicating big firms listed in Singapore are highly underpriced compared with big firms in Hong Kong.

D/E ratio could also explain the difference in IPO underpricing between these two markets. However, the explanatory relation is not strong enough as the coefficient is fairly small for both markets. Hence, we conclude that only firm size could be significant explanation of the difference in IPO underpricing level in Hong Kong and Singapore.

Recommendations

Overall, HKEX is more efficient than SGX from the implication in the IPO MAIRs between these two markets. IPO underpricing level is mainly affected by the demand of investors on the newly IPO shares and supply of information disclosure. Big firms in Singapore, especially those that are in the industries of financial and finance, industrial & consumer goods and IT & electronics manufacturing, should hire prestigious underwriter to reduce the IPO underpricing level. The use of prestigious underwriter would help reducing speculative risk from lack of information disclosure which reduced investors' uncertainty of the IPO firms. We have also found that the pre IPO researches published by investment institutions are more popular in Hong Kong than Singapore, which facilitates the investors to make better valuation on IPO firms. Thus, information supply of IPO would be a good subject for further research to explain the IPO underpricing phenomenon.

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Appendix 1-1: Description of Variables: Firm specific factors

Independent Variables	The Variables Definition	Type of measures	Selected prior studies using these variables
Firm Specific Factors			
Profitability ratio	Operating profit margin calculated as EBITDA divided by pre-IPO revenue of the firm.	Continuous	Purnanadam and Swaminathan (2004)
Net assets	Net assets calculated as total assets less total liabilities, measuring the ability of the firm to finance its debt.	Continuous	Hogholm (1994)
Financial Leverage	Financial leverage, also known as debt to equity ratio calculated as book value of long term debt over the market value of equity. This ratio measures the financing capital structure of the firms using debt to equity.	Continuous	Högholm (1994), Purnanadam and Swaminathan (2004), Su (2004)
Firm Size	Firm size is determined using market capitalization of the firm. See methodology section for details.	Dichotomous. 1, if firm size is categorized as 'Small'.	Gregoriou (2006)

Appendix 1-2: Description of variables: Market Specific Factors

Independent Variables	The Variables Definition	Type of measures	Selected prior studies using these variables
Market condition “Hot” and “Cold”	IPO listed in Hot issue and Cold issue periods. See the methodology section for details.	Dichotomous. For MH, 1 if listed in hot period. For MC, 1 if listed in cold period	Ibbotson and Jaffe (1975), Ritter (1984), Uddin (2008)
Listing board	Listing board classification. Main board and 2 nd Board for growth companies (GEM for Hong Kong and Capitalist for Singapore)	Dichotomous. 1, if listed on the main board.	Uddin (2008)
Industry risk	Industry classification of IPO as “risky”. All sectors are classified as risky and less risky based on the average market beta of the sector.	Dichotomous. 1, if IPO belongs to risky (industry beta>1) sector	Clarkson and Merkey (1994), Uddin (2008)
Ln(Offer size)	Gross proceed calculated as number of shares in the offer times the offer prices.	Continuous	Beatty and Ritter (1986), McGuinness (1992), Clarkson and Merkle (1994), Holgholm (1994), Lee et al (1996a and 1996b), and Uddin (2008)
Time lag	Time lag between the IPO announcement day and the listing day	Continuous	Loughran et al (1994), Lee et al (1996a and 1996b), Chowdhry Sherman (1996), Chan et. Al (2004) and Uddin (2008)
Overallotment dummy	Overallotment option allows underwriter to exercise when shares are oversubscribed.	Dichotomous. 1, if overallotment option exercised	
Underwriter Reputation	Underwriters where altogether hold more than 50% of market power in the underwriter business environment is considered as ‘prestigious’. See the methodology section for details.	Dichotomous. 1, if underwriter belongs to prestigious underwriters.	Beatty and Ritter (1986), Carter and Manaster (1990), Hogholm (1994), Lin and Hsu (2008), and Wang (2008)
Code with no. 8	Lucky ‘8’ that is perceived as rich and prosperity. See the methodology section for details.	Dichotomous. 1, if local code consists of ‘8’ in Singapore and Hong Kong local codes. .	
Country dummy	Singapore	Dichotomous. 1, if Singapore IPO	

Appendix 2: Industry categories

Industrial dummy: A dummy variables based on the adjustment in combining both the Hang Seng Industry Classification System and Singapore industry classification.

Energy & Materials	Industry dummy 1: 0=energy & materials, 1=otherwise
Financial & Finance	Industry dummy 2: 0=financial & finance, 1=otherwise
Industrial & Consumer Goods, Commerce, Manufacturing	Industry dummy 3: 0=Industrial & Consumer Goods, Commerce, Manufacturing, 1=Otherwise
IT & Electronic Manufacturing	Industry dummy 4: 0=IT & Electronic Manufacturing, 1=otherwise
Properties & Construction	Industry dummy 5: 0=Properties & Construction, 1=otherwise
Real Estate Investment & Services	Industry dummy 6: 0=Real Estate Investment & Services, 1=otherwise
Telecommunications, Utilities and Hotel & Restaurants	Industry dummy 7: 0=Services, Telecommunications, Utilities and Hotel & Restaurants, 1=otherwise
Others	Industry dummy 8: 0=Others, 1=otherwise

Appendix 3: Correlation Matrix for Hong Kong

	OPERATING_MARGIN	LNET_ASSETS	LPRE_D_E_RATIO	FIRM_SIZE_DUMMY	INDUSTRIAL_RISK	MH	MC	LGROSS_PROCEEDS	LISTING_BOARD	TIME_LAGGING	OVERALLOTMENT_DUMMY	UNDERWRITER_REPUTATION	CODE_WITH_NO_8
OPERATING_MARGIN	1												
LNET_ASSETS	0.0629	1											
LPRE_D_E_RATIO	0.0985	0.2736	1										
FIRM_SIZE_DUMMY	-0.0462	0.5974	0.1484	1									
INDUSTRIAL_RISK	0.0782	0.0176	0.0386	0.0318	1								
MH	0.0851	0.0659	0.1179	-0.0257	0.0019	1							
MC	-0.0446	-0.0768	-0.1181	0.0167	0.0206	-0.4957	1						
LGROSS_PROCEEDS	-0.0143	0.6804	0.2001	0.7206	0.0418	-0.0372	-0.0181	1					
LISTING_BOARD	0.0385	0.3605	0.1182	0.2967	0.0074	0.0232	-0.1230	0.3838	1				
TIME_LAGGING	0.0328	0.1287	0.0381	0.1505	-0.0387	-0.0373	0.0113	0.1854	0.1963	1			
OVERALLOTMENT_DUMMY	-0.0465	0.3187	0.0374	0.4456	-0.0699	-0.0912	-0.1154	0.4544	0.2655	0.0542	1		
UNDERWRITER_REPUTATION	0.0816	0.5273	0.1482	0.6061	0.0917	0.0154	-0.0175	0.6451	0.2654	0.1625	0.3000	1	
CODE_WITH_NO_8	-0.0269	0.1505	0.0487	0.0988	-0.0518	-0.0093	-0.0442	0.1523	0.0835	-0.008	0.0577	0.0046	1

Appendix 4: Correlation Matrix for Singapore

	PROFIT_ MARGIN	LNET_AS SETS	LPRE_D_E _RATIO	FIRM_SIZE _DUMMY	INDUSTRI AL_RISK	MH	MC	LGROSS_P ROCEEDS	LISTING_B OARD	TIME_LAG GING	OVERALLO TMENT_D UMMY	UNDERWR ITER_REP UTATION	CODE_WI TH_NO_8
PROFIT_MARGIN	1												
LNET_ASSETS	0.0021	1											
LPRE_D_E_RATIO	-0.2439	0.1967	1										
FIRM_SIZE_DUMMY	0.2723	0.3861	-0.1686	1									
INDUSTRIAL_RISK	-0.0365	-0.0038	0.0461	0.0300	1								
MH	-0.0530	0.0466	-0.0320	0.0618	-0.0524	1							
MC	0.1158	0.0635	-0.0103	0.0618	0.0469	-0.4100	1						
LGROSS_PROCEEDS	0.2179	0.5678	-0.0858	0.7556	0.0057	0.0377	0.1473	1					
LISTING_BOARD	0.2339	0.3769	-0.1262	0.4387	0.0113	0.0192	-0.0079	0.5309	1				
TIME_LAGGING	0.0297	0.1471	-0.0120	-0.0171	-0.0674	-0.0133	0.0623	0.0444	0.0291	1			
OVERALLOTMENT_DUMMY	-0.0347	0.1697	0.0431	0.1622	0.0060	-0.0031	-0.1140	0.2410	0.0979	-0.0318	1		
UNDERWRITER_REPUTATION	-0.0078	0.0249	0.0720	-0.1781	0.0994	-0.0414	-0.1123	-0.1416	-0.0852	0.0043	-0.0144	1	
CODE_WITH_NO_8	0.1151	-0.0158	-0.1523	0.1472	0.0263	-0.0333	0.0363	0.1294	0.1780	0.0479	-0.0038	0.0187	1

Appendix 5: Numbers with Special Meanings in Chinese

Lucky numbers

Numbers have special meaning in Chinese culture for phonetic reasons. Numbers spoken in the languages of both Mandarin and Cantonese have homonyms that can denote luck, often good but sometimes bad. Here is how Chinese associate the numbers one through nine, according to their pronunciation in Mandarin:

NUMBER	WRITTEN IN SIMPLIFIED CHINESE	MANDARIN PRONUNCIATION	DEFINITION OF HOMONYM
1.	一	yi	together, want
2.	二	er	love, easy
3.	三	san	earn, live
4.	四	si	death
5.	五	wu	me, not
6.	六	liu	smooth
7.	七	qi	together
8.	八	ba	fortune, wealth
9.	九	jiu	long time

Source: WSJ research