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Under-Pricing and Long-Run Performance of Initial Public Offerings in Developing Markets

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UNDER-PRICING AND LONG-RUN PERFORMANCE OF INITIAL PUBLIC OFFERINGS IN DEVELOPING MARKETS

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1. INTRODUCTION

The transition from being a private company to a public one is one of the most important events in the life of a firm. It is also one of particular interest to institutional investors, and the transition is facilitated through the initial public offering (IPO) process. The IPO provides a fresh source of capital that is critical to the growth of the firm and provides the founder and other shareholders such as venture capitalists a liquid market for their shares. From an institutional investor's perspective, the IPO provides an opportunity to share in the rewards of the growth of the firm.

When a firm issues equity to the public for the first time, it makes an initial public offering consisting of two kinds of issues – the primary issue and the secondary issue. In a primary, the firm raises capital for itself by selling stock to the public, whereas in the secondary issue, existing large shareholders sell to the public a substantial number of shares they currently own.

It is a well documented fact that IPOs tend to be under-priced. From the viewpoint of financial research, IPO under-pricing in the sense of abnormal short-term returns on IPOs has been found in nearly every country in the world[i]. This suggests that IPO under-pricing may be the outcome of basic problems of information and uncertainty in the IPO process, and is unlikely to be a figment of institutional peculiarities of any one market.

There have also been various studies made to suggest the reasons for such under-pricing[ii]. From the investors' point of view, this under-pricing appear to

provide the sure and quick profit that most dream about. Taking the shares for VA Linux in 1999 as an example, it was a happy day for investors as the IPO prices took a huge jump of about 700 percent, all in a day's work. It then becomes inevitable for most investors to measure the performance of IPOs by the short term (usually within one week of issue), as the general scheme is to buy the shares at a low initial offering price and sell it the next day when the price increases.

Pricing of the IPOs are done by underwriters from investment banks. There are various ways to price the stocks but what is commonly used now is a process called book building. It is basically a capital issuance process used in an Initial Public Offer which aids price and demand discovery. It is also a process used for marketing a public offer of equity shares of a company. During the period for which the book for the IPO is open, bids are collected from investors at various prices, which are above or equal to the floor price. The offer/issue price is then determined after the bid closing date based on certain evaluation criteria. For a more detailed discussion of book building, one can visit any of the many stock exchanges. An example of the book building process can be seen from the Bombay Stock Exchange. This Initial Public Offering can also be made through the fixed price method or a combination of both book building and the fixed price method.

There have been various studies conducted on the price changes of the shares after prolonged periods (six months to five years). These studies show that while the short-run performance of IPOs is often quite impressive, the long-run performance over the subsequent three to five years is not as impressive.[iii] Excluding the initial-day return, IPOs tend to under-perform various benchmarks. However, these studies focus

mainly on developed economies and tend to neglect the developing counterparts. It is in the hope that the long term performance of IPOs in developing economies can also be a useful indicator to the potential investor that this study is to be undertaken.

One possible explanation for these long-run IPO results stem from the type of investors who buy IPOs. These Investors tend to be the most optimistic, but there is often great uncertainty about the long-run prospects of the firm. Over a period of time, the uncertainty is resolved and the divergence of opinion between optimistic and pessimistic investors narrows, resulting in a relatively lower price.

The purpose of this paper is to examine the long-run performance of IPOs in developing markets using various methods to ascertain the significance of the over or under-performance of IPOs. Among the many reasons for the performance which we see, one of them could be the sensitivity of the results to the choice of benchmarks. Dimson and Marsh[iv], Ritter[v], Gregory *et al*[vi], Fama and French[vii] and Fama[viii] have successively demonstrated the sensitivity of the long-run performance of the IPOs the benchmark used in the study. For this reason, I am also motivated to study the effect of various benchmarks on the return measurements so as to elucidate the possibility that the magnitude of the performance is benchmark dependent. Finally, the focus of this study will be the Chinese and Indian markets.

2. LITERATURE SURVEY

There have been numerous evidences which show that short-run under-pricing and the long-run underperformance are the two main patterns associated with IPOs. In 1975, Ibbotson [ix] wrote the article which was to spur the future development of research on IPO returns. In the article, a negative relation between initial returns at the IPO and long-run share price performance was found. In 1991, Ritter[x] analysed the performance of US IPOs issued between the years 1975 to 1984. He found that IPOs underperformed a control sample of matching seasoned firms for a three-year holding period. The natural conclusion was that IPOs are significantly undesirable as medium or long-run investments. In 1993, Levis [xi] conducted a study on UK IPOs and identified underperformance of a similar magnitude in the long run. In 1994, Loughran, Ritter and Rydqvist[xii] reported that market-adjusted three-year abnormal performance following an IPO is always small and mostly negative in all 25 countries investigated with higher IPO under-pricing in developing markets, with the exception of Japan. Also in 1994, Kinz and Aggarwal examine the returns on IPOs for a number of countries during a three year period after a company goes public. The IPOs are equally weighted and report under-performance. However in 1997, Brav and Gompers[xiii] using US data find that underperformance is sensitive to the method used during evaluation of IPO performance. In their sample, underperformance is shared by small, non-IPO firms with similar low book-to-market values. Jones et al.[xiv] in 1999 show that there is relatively more under-pricing in privatisation IPOs (PIPOs) than their private sector counterparts and according to them, this may perhaps reflect political motives. For the long-run performance of privatisation IPOs Researchers find a very different picture for the long-run performance of PIPOs. In 2000, Megginson et al.[xv]

examine 158 share issue privatisations from 33 countries during the period 1981-1997. They find statistically significant positive long-run returns for the sample firms for all holding periods as compared to a variety of benchmarks.

2.1 Background on the Chinese Market

China is the world's largest socialist economy and the second largest economy in terms of purchasing power after the US. Its entry into the World Trade Organisation (WTO) in 2001 has increased its global integration with global capital markets and as a result, China is becoming a major economic force to be reckoned with.

In view of its rising economy, China has shown tremendous growth in the pass few decades. In particular, the last twenty years or so have seen China undertaking a series of economic reforms moving gradually from an economy which is centrally planned to one which is characteristic of a socialist-market economy. In the bid to develop a climate for investors both foreign and at home, the Shanghai stock exchange was established in 1990, followed by the Shenzhen stock exchange a year later. The Shanghai stock exchange and the Shenzhen stock exchange are both non-profit membership organizations under the supervision of the China Securities Regulatory Commission (CSRC). After getting permission to go public, issuers can choose either stock exchange to be listed on.

Although the Chinese stock markets are only 16 years old, they enjoy very high growth. This can be seen as one of the major efforts in the process of development. Enterprises can thus raise funds by issuing corporate bonds and stocks to the public, while the government seeks to improve both efficiency and productivity in state-owned enterprises (SOEs) through reforms on economic and shareholding issues.

From the literature review, we can see that though IPOs have been studied in many countries, there has been very little research focused on the long-run performance of Chinese IPOs. This is primarily due to data shortage and the current results on the long-run performance are mixed. Sun and Tong[xvi] in 2003 studied the operating performance of Chinese IPOs. They looked briefly at the long-run share returns of IPOs based on the raw returns and Hong Kong Hang Seng Index adjusted returns and find that the stock returns show mild improvements up to five years after the share issue privatisations. Following that in 2004, Chan et al.[xvii] study 570 A-share IPOs and 39 B-share IPOs from 1993-98 and 1995-98 respectively. They find that within three-year after listing, the shares outperform the benchmark portfolios.

The importance and newness of the markets and unique institutional features make China a special environment to conduct research on IPOs and findings from studies in other markets cannot be extrapolated to China. We shall note and discuss a number of characteristics which distinguish Chinese IPO markets from those in other countries.

Up till 2001, the authority governing new Chinese share issues is the CSRC. Before 1996 the Chinese stock markets were very immature and unregulated, and the stock performance was very abnormal. For instance, the CSRC once stopped IPOs for about 9 months from the period of 1994 to 1995 due to poor market performance.

The CSRC determines an annual quota of new shares to be issued each year. Allocation of this quota was carried out according to criteria which supported regional or industrial development goals and the shares were allotted among the provinces and state-industrial commissions, taking also into consideration the balance among provinces and industries. In 2001, this quota system changed into the verification system. With this change, investment banks could now recommend companies to the CSRC for going public.

Up till 2003, the CSRC calculates most offering prices were according to a formula set by them. There were two components to the formula, the first one being earnings per share (EPS) which can be obtained from the companies' annual reports. The definition of EPS varied from time to time. Before 1997, there were six different ways to calculate EPS and the issuing companies could choose any one of them. From 17 January 1997, the CSRC regulated the calculation of EPS by using the average EPS of the past three years before listing as the standard method in calculating the EPS for an issuing company. The second component was the price to earnings ratio which was itself set by the CSRC. In addition, the CSRC also controlled the timing of IPOs according to the market situation and capacity. Although after 2000, the CSRC started to give investment banks and issuers freedom to price IPOs, it is still the CSRC that makes the final decision on firms going public. Rights issues and SEOs

also need permission from the CSRC. In August 2004, the CSRC took a step forward in improving market transparency by issuing a new regulation which allowed investment banks to price IPOs after obtaining feedback from institutional investors and the market. By doing this, the CSRC hopes that IPO pricing can better reflect market conditions.

Stocks in China are classified into six categories. There are three categories of non-negotiable stocks which are the state-owned stocks, the employee stock and the legal-person stock. For example, 10% of the total public offerings in companies which went public before November 1998 could be apportioned to their employees and these stocks could start trading 6 months after listing. The next three categories of stocks are negotiable and they are the 'A', 'B' and 'H' shares. 'A' shares are shares traded exclusively by domestic Chinese investors and are traded in the Renminbi while the 'B' shares are traded by international investors and the currency traded in depends on the exchange they are listed. The shares are traded in US Dollars on the Shanghai stock exchange and in Hong Kong Yuan when on the Shenzhen stock exchange. Finally, the 'H' shares are those traded on the Hong Kong stock exchange. Shares not retained by the government, other enterprises or employees after going public are sold to foreign investors. Negotiable shares are tradable and comprised of up to about 36% of the total shares issued, according to the CSRC statistics. It is interesting to note that since February 2001, domestic Chinese have been able to invest in B shares in foreign currencies.

2.2 Background on the Indian Market

There has been relatively little study done on IPO under-pricing and long-run performance in India. The primary market in India has been shaped uniquely by an unusual history of regulation coupled with the institutional details of how IPOs take place. The total resources raised on the primary market from 1994 to 1995 which includes IPOs and seasoned earnings were 20% of domestic savings. As a channel for resource allocation, it is an interesting study to undertake so as to ascertain any positive long-run economic benefits the IPO market may have.

Up till November 1998, all capital issues were regulated and controlled by a government agency named the Controller of Capital Issues (CCI) and any public issues were subject to the clearing of the offering price by the CCI. The fair-price of issues was calculated by making use of accounting information, thereby often leading to severe under-pricing and over-subscription. With such an extent of under-pricing, many companies were deterred from going public. The result was relatively few issues taking place with debt playing a major role in financing projects.

Of interest is the Bombay Stock Exchange (BSE) episode which happened from October 1991 to May 1992. During this time, the BSE was then embroiled in a speculative bubble engineered by an illegal diversion of funds from the banking system. This resulted in issues being priced just before the incident to produce enormous returns from issue date to listing date, with the converse being true.

Soon after the incident, the CCI was abolished on 29 May 1992 and firms were free to price equity at whatever price they chose. A new regulator agency called

the Securities and Exchanges Board of India (SEBI) was set up to govern financial markets. Under this new governing body, the number of public issues rose sharply, but this new period still saw high level of under-pricing by world standards.

The pricing of IPOs in India now follows a systematic process. Initially, the firm and the merchant banker will choose an offering price and prepare a prospectus about five months before the issue date. The prospectus is then submitted to the SEBI for approval. After SEBI approves of the information disclosures in the prospectus, a mass media advertising campaign targeted at the lay investor will commence about a month before the issue date. The issue then closes four to ten days after it opens, after which investors apply for shares and pay an amount which is often less than the full offering price. After the issue closes, the allotment itself takes place. The actual listing and the date of first trading takes place long after the issue itself opens

The difference between the face value and offering price of the issues is called the premium. It is prohibited by law to price equity with a positive premium unless the issuing company has been making profits for at least three recent years. The amount of equity sold also cannot exceed 75% of the total.

Before 1 April 1995, SEBI required the offering price to be precisely chosen at the time the prospectus is submitted for vetting. In comparison, the offering price can be adjusted to be between the submitted price or 1.2 times that. While underwriting arrangements were mandatory before January 1995, they are now optional. An underwriter guarantees to bring forth application forms, either from lay investors or from their own funds, and upon successful delivery will be paid a fee typically 2.5%

of the initially submitted offering price. In the case of over-subscription, the money paid at the time of application may be returned some months later. For issues where the issuer chose to not put together an underwriting consortium, the issuing company is required to refund all applications within 90 days if the subscriptions received fall below 90% of the shares offered. Highly over-subscribed issues may yield no allotment and in the case where there are, the allotment process is often delayed due to the volume of paperwork.

3. METHODOLOGY

The methodology used by Aggarwal, Leal and Hernandez [xviii] (1993) to measure the short-run performance for each IPO and for groups of IPOs. The total return for stock "*i"* at the end of the first trading day is calculated as:

$$R_{i1} = \left(P_{i1} / P_{i0} \right) - 1 \qquad (0.1)$$

where P_{i1} is the closing price of the stock *i* at the first trading day, and P_{i0} is its offering price and R_{i1} is the total first-day return on the stock. The return on the market index during the same time period is:

$$R_{m1} = \left(P_{m1} / P_{m0} \right) - 1 \qquad (0.2)$$

where P_{m1} is the closing market index value at the first trading day and P_{m0} is the closing market index value on the offering day of the appropriate stock, while R_{m1} is the first day's comparable market return.

Using these two returns, the market-adjusted abnormal return for each IPO on the first day of trading is computed as:

$$MAAR_{i1} = 100\left(\frac{1 + R_{i1}}{1 + R_{m1}} - 1 \right) \qquad (0.3)$$

MAAR is the sample mean abnormal return for the first trading day and may be viewed as a performance index which reflects the return, in excess of the market return, on an investment divided equally among *N* new issues in a sample:

$$\overline{MAAR_1} = \frac{1}{N}\sum_{i=1}^{N} MAAR_{i1} \qquad (0.4)$$

To test the hypothesis that 1 *MAAR* equals zero, we compute the associated *t* statistic:

$$t = \frac{\overline{MAAR_1}}{S/\sqrt{N}} \qquad (0.5)$$

where *S* is the standard deviation of $MAAR_{i1}$ across the companies.

The market-adjusted long-run returns are calculated for a period of 36 months following the first trading month. The monthly return is measured by comparing the closing price on the last trading day of the month on which the stock is traded to the closing price of the previous month. Following Ritter[xix] we make use of the size and book-to-market value as parameters. The reason for this is that it is a more sophisticated methodology since the size and book-to-market characteristics have been documented as important determinants of stock returns. The long-run returns in our study incorporate dividend payments and are adjusted for dividend and stock splits.

To formalize, this study employs the basic capital asset pricing model (CAPM), the Fama and French[xx] (1996) three-factor model and the average return

model. In addition to the firm betas, Fama and French[xxi] in their 1992 paper suggested that firm size and book-to-market effects also play a role in explaining returns, which resulted in their 1996 paper where they came up with a three-factor model[xxii] to offer explanations for the many anomalies in 'efficient markets'. In this model, the factors are the excess returns on the market, the difference in returns between companies with high book-to-market value (BMV) and low BMV ratios, and the difference in returns between large and small companies.

For the long-run performance analysis, the standard event-study methodology is used. For each benchmark, monthly abnormal returns are computed for up to sixty months after the IPO (excluding the month of new issue), companies with a minimum of twelve monthly observations post-IPO.

For the first two models, abnormal returns with respect to each benchmark are computed, and are cumulated over time up to period ***T*** after the IPO, using the Cumulative Average Abnormal Return *(CAAR$_T$)* measure

$$CAAR_T = \sum_{t=1}^{T} \frac{1}{N} \sum_{i} \varepsilon_{it} \qquad (0.6)$$

where the abnormal return in month *t* after the IPO for firm *I* is given by $\boldsymbol{\varepsilon}_{it}$ and N is the number of firms in the sample. The test for significance is based on the t-test of Brown and Warner[xxiii] which is given by:

$$t \sim \frac{\sum_{t=1}^{T} \frac{1}{N} \sum_{i} \varepsilon_{it}}{\sqrt{\left(\sum_{t=1}^{T} \left(\bar{\varepsilon}_t - \frac{1}{T} \sum_{t=1}^{T} \bar{\varepsilon}_t \right)^2 \right) / (T-1)}}$$

Where (0.7)

$$\bar{\varepsilon}_t = \frac{1}{N} \sum_{i} \varepsilon_{it}$$

where

$$\bar{\varepsilon}_t = \frac{1}{N} \sum_{i} \varepsilon_{it} \tag{0.8}$$

These t-test statistics are based on the Crude Dependence Adjustment test for the CAARs in order to correct for cross-sectional dependence.

The first benchmark is based on the Capital Asset Pricing Model (CAPM) which is given by:

$$\varepsilon_{it} = R_{it} - \left[R_{ft} + \hat{\beta}_i \left(R_{mt} - R_{ft} \right) \right] \tag{0.9}$$

and the second benchmark makes use of the Fama-French three-factor model given by:

$$\varepsilon_{it} = R_{it} - \left[R_{ft} + \hat{\beta}_{1i} \left(R_{mt} - R_{ft} \right) + \hat{\beta}_{2i} \left(SMB_t \right) + \hat{\beta}_{3i} \left(HML_t \right) \right] \tag{0.10}$$

For both models, R_{it} is the return on company i in event month t, R_{mt} is the return on the market in event month t measured by the NYSE ARCA index, β_t is the model beta which measures systematic risk due to the respective independent variables, SMB_t is the value weighted return on small firms minus the value-weighted return on large firms, formed by sorting all companies in each year by book-to-market value (BMV) and market capitalisations. Value weighted returns are calculated for the bottom and top 30% of companies by market capitalization. HML_t is the value-weighted return on high firms minus the value-weighted return on low BMV firms. Value weighted

returns are calculated for the top 50% of companies by BMV and the bottom 50% of companies by BMV.

Lyon et al.[xxiv] document that the CAR approach should be employed to answer if sample firms persistently earn abnormal monthly returns. Though CARs implicitly assume frequent portfolio rebalancing, Fama[xxv] justifies its use since it would produce fewer spurious rejections of market efficiency than would the use of other benchmarks. There also exists a good knowledge of the distribution properties and the statistical tests for CARs. Since in China and India, the majority of investors are individual investors, the frequency with which they trade will be much higher than those in other markets. Hence, CARs may be able to give a good estimate of the long-run performance of IPOs in both the Chinese and Indian markets.

4. Data

The sample consists of all 116 IPOs issued by companies in the Indian market and 341 issued by companies in the Chinese market during the period from 2000 to 2001. Since our dataset ends in 30th April 2006, only issues with a first trading day earlier than 30th April 2001 were considered so that the aftermarket performance within the first five years can be analysed. The sample only considers the Indian and Chinese domestic companies. Monthly share prices, BMV figures and market capitalisation data are collected from Bloomberg. The market indices used are the Bombay Sensitive 30 for India and the Shanghai Composite for China. Both Indices are gathered from Yahoo Finance World Indices. Discrete (not log) returns are computed from the share prices. This is to avoid any downward bias in returns caused by Jensen's inequality when averaging returns across portfolios. The returns are computed from the last price of the shares for each month and used in the cross-sectional regressions.

5. Results and Analyses

Tables 1 and 2 give the average first day returns for the entire sample of Indian and Chinese IPO Stocks. Figures 1 and 2 show the frequency of the market-adjusted initial returns of IPOs for the entire sample of Indian and Chinese Stocks respectively. For the Indian market, the $\overline{MAAR_1}$ is found to be 17.2% with an associated *t*-statistic of 3.46, which is significantly different from zero at the 5% level. The $\overline{MAAR_1}$ has a median of 10.7% and a standard deviation of 24.7%. For the Chinese market, the $\overline{MAAR_1}$ is found to be 93.5% with an associated *t*-statistic of 5.05, which is significantly different from zero at the 5% level. The $\overline{MAAR_1}$ has a median of 83.2% and a standard deviation of 92.1%.

5.1 Results for India

Table 3 shows the cumulative average abnormal return for up till 60 months using the CAPM. Among the 60 monthly cumulative average abnormal returns, none of them are negative with 1 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 59 of them having t-statistics higher than 2.0. Figure 3 shows the abnormal returns over 60 months for India using the CAPM. The abnormal returns vary between 8% and 264%. A minimum return of 8% is recorded in the 2nd month of listing, and the return peaks at 264% in the 60th month of trading. Average monthly returns up to the 60th trading month are all positive. Figure 3 shows the abnormal returns over 60 months for India using the CAPM. The abnormal returns vary between 8% and 264%. A minimum return of 8% is recorded in the 2nd month of listing, and

the return peaks at 264% in the 60th month of trading. Average monthly returns up to the 60th trading month are all positive.

Table 4 and table 5 show the cumulative average abnormal return for the top and bottom 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns for the top 30%, none of them are negative with 34 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 26 of them having t-statistics higher than 2.0. As for the bottom 30%, 4 of them are negative with 13 of them having t-statistics lower than 2.0 / -2.0, while 56 are positive with 47 of them having t-statistics higher than 2.0. Figure 4 shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the CAPM model.

Table 6 shows the cumulative average abnormal return for up till 60 months using the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, none of them are negative with none of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 60 of them having t-statistics higher than 2.0. Figure 5 shows the abnormal returns over 60 months for India using the Fama-French three-factor model. The abnormal returns vary between 11% and 548%. A minimum return of 11% is recorded in the 1st month of listing, and the return peaks at 548% in the 60th month of trading. Average monthly returns up to the 60th trading month are all positive.

Table 7 and table 8 show the cumulative average abnormal return for the top and bottom 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal

returns for the top 30%, none of them are negative with 2 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 58 of them having t-statistics higher than 2.0. As for the bottom 30%, 1 of them is negative with 3 of them having t-statistics lower than 2.0 / -2.0, while 59 are positive with 57 of them having t-statistics higher than 2.0. Figure 6 shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the Fama-French three-factor model.

5.2 Results for China

Table 9 shows the cumulative average abnormal return for up till 60 months using the CAPM. Among the 60 monthly cumulative average abnormal returns, 11 of them are negative with 1 of them having t-statistics lower than 2.0 / -2.0, while 49 are positive with 59 of them having t-statistics higher than 2.0. Figure 8 shows the abnormal returns over 60 months for China using the CAPM. The abnormal returns vary between -206% and 181%. A minimum return of -206% is recorded in the 60th month of listing, and the return peaks at 181% in the 29th month of trading.

Table 10 and table 11 show the cumulative average abnormal return for the top 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns for the top 30%, 24 of them are negative with 2 of them having t-statistics lower than 2.0 / -2.0, while 36 are positive with 58 of them having t-statistics higher than 2.0. As for the bottom 30%, none of them are negative with 19 of them having t-statistics lower than 2.0 / -2.0, while 60

are positive with 41 of them having t-statistics higher than 2.0. Figure 9 shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the CAPM model.

Table 12 shows the cumulative average abnormal return for up till 60 months using the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, none of them are negative with none of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 60 of them having t-statistics higher than 2.0. Figure 10 shows the abnormal returns over 60 months for India using the Fama-French three-factor model. The abnormal returns vary between 26% and 715%. A minimum return of 26% is recorded in the 1st month of listing, and the return peaks at 715% in the 60th month of trading. Average monthly returns up to the 60^{th} trading month are all positive.

Table 13 and table 14 show the cumulative average abnormal return for the top 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns for the top 30%, 6 of them are negative with 5 of them having t-statistics lower than 2.0 / -2.0, while 54 are positive with 55 of them having t-statistics higher than 2.0. As for the bottom 30%, none of them are negative with none of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 60 of them having t-statistics higher than 2.0. Figure 11 shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the Fama-French three-factor model.

5.3 Under-pricing

It is clear from the results that under-pricing exists for both economies under consideration. Under-pricing is not a violation of no-arbitrage nor is it a market inefficiency which will vanish when some agents become aware of it. Instead, under-pricing is structural in the sense that it derives from sound microeconomics underlying the behaviour of firms and investors. There are a number of explanations offered below which can help shed some light on the nature and extent of under-pricing.

The first explanation we look at is the determination of the offer price at an early date. Firms are likely to be risk-averse with respect to the prospect of issues failing. Hence they would under-price in order to forestall this possibility. From the time when the firm sets the offer price to the time the issue opens, the firms would be afraid of a drop in stock prices by the issue date which can render the public issue unattractive. A famous example of such risk is the seasoned offering of British Petroleum, which was priced just before the NYSE crash of 19 October 1987.

For India, the delay between choosing an offering price and the issue date has somewhat diminished after the setting up of a new SEBI policy which allows firms to choose a price band at the time of vetting the prospectus instead of a precise price. However, the Registrar of Companies still requires a precise offering price 21 days before the issue opens, and the price band which SEBI tolerates is rather narrow (discussed in 2.2). Hence the IPO market is still characterised by an early choice of offer price. If we follow the Brownian motion model of stock prices, uncertainty

about the future stock price blows up as the delay between offer price date and listing date increases. This can imply that the degree of under-pricing will worsen as the delay increases. This picture is consistent with a collation of the international evidence on IPO under-pricing[xxvi]. The delay between date of setting the offer price and the listing date clearly seems to be an important factor here.

Next, we look at the most basic problem of the IPO process. In any attempt to go public, there are always two types of firms: the good and the bad. This is coupled with the existence of asymmetric information between firms and investors. What firms know about themselves, investors no privy to such knowledge, and in the case when information and analysis is costly, it is optimal for investors not to learn about a firm thoroughly. This is true of IPOs all over the world, and is likely to particularly relevant in China and India, where IPOs are marketed to lay investors who know extremely little about the issuing firm.

The model of the used-car market where buyers have to choose between lemons and peaches can help elucidate the point further. Suppose the seller of the car knows its true worth but keeps that information to himself. A buyer can perform a thorough and investigative study on each car but it may not be in his best interest to do so in terms of optimality. Thus, at equilibrium, the presence lemons imply that good used-cars have to be under-priced. In the case of the IPO market good firms will have to under-price themselves to compensate investors for the risk taken in investing in a relatively unknown firm. Bad firms will command higher prices as compared with their true value. Hence we can see that under asymmetric information, the

primary market acts as a channel for a systematic subsidy from good firms to poor firms.

While such situations occur in diverse areas of economics, they are particularly important in IPOs as the value of firms going public is often in the growth opportunities which the firm may hope to capture, rather than in fixed assets and a clear track record. The greatest strength of an IPO is often likely to be in the ideas and creativity of the promoters, and not the fixed assets of the firm which are relatively easily measurable and quantifiable. Firms would resort to numerous signalling strategies to try to communicate their true value to investors. It is thus not difficult to observe that to the extent that this basic informational asymmetry exists, firms going public would have to under-price themselves.

We can also look at the interest rate float to account for the under-pricing. The issuing company controls the application money for a few months. The interest rate on stock investment accounts of around 12% is quite low. At equilibrium, markets would compensate investors for this low rate of return through under-pricing. This interest rate float argument may account for under-pricing of around five to ten percent.

Taking a look at liquidity, investors who apply for public issues lose liquidity on the amount paid at issue date. At equilibrium, markets would compensate them for this by paying a liquidity premium and this premium shows up in IPO under-pricing. The existence of such a premium follows inexorably from finance theory. It is difficult to empirically test whether it is indeed at work in IPO under-pricing in China

and India, and to quantify its role. This is especially true in the light of the ex-ante unpredictability of the delays from issue date to listing date.

From the standpoint of the firms, they may have an incentive to under-price when they expect to return to the capital market to raise further resources at a later date perhaps via a rights issue or a public issue. In this case, it may be advantageous to the firms to under-price their issues so as to leave investors a good impression and to stimulate shareholder loyalty. Also, the interaction between the merchant banker and the company going public is typically a one-off interaction, but his relationship with his clients is considerably long-standing, especially with the large institutional investors. In this situation, the merchant banker has an incentive to under-price as a way of favouring his established clients[xxvii] at the expense of jeopardising the interest of the issuing company. While the microeconomics underlying this idea is impeccable, its empirical significance may be limited. In the US, this proposition has been tested by measuring the extent of under-pricing observed when underwriters themselves go public[xxviii]. This was found not to be seriously different from the overall average under-pricing.

Focusing on China, we see that new public issues only represent a small proportion of the outstanding shares as the aggregate amount of new shares issued each year is determined by the CSRC. It then becomes obvious that the amount of new shares made available in the market is not sufficient to meet the needs of Chinese investors, coupled with the fact that most Chinese investors have very little alternative investment choices. By controlling the supply of the new issues, the Chinese government can more effectively regulate the success of the new stocks and to keep

the stock market growing as well as raise more money in the future. In so doing, the government can prevent the failure of any IPO as it not only affects the individual company's reputation, but also the government's credibility. Hence even at the cost of under-pricing, the government has to make the supply much less than the demand to ensure the success of IPOs.

The severe imbalance of supply and demand causes the shares to be allotted through a lottery system in which there is a fixed price offer with investors bidding for quantities. Consistent with supply and demand, a higher demand for the new issues will lower the odds of winning the lottery. Chi and Padgett[xxix] find that during 1996 to 2000, the average odds of winning the lottery is 1.97%. They then use the odds of winning the lottery in a cross sectional analysis and find that this variable has a significantly negative impact on the degree of under-pricing in China.

5.4 Long-run performance

In the regression analysis, we find a significant positive long-run performance of IPOs in both developing markets. It is my guess that this abnormal rise after listing is a market inefficiency brought about by price manipulation, especially in the Indian Market. If this is true, then it will not persist into the future as agents learn about it and arbitrage strategies are put into place.

As for the Chinese IPO's positive long-run performance, it can be brought about by a significantly negative relationship between the government ownership and the

market-adjusted returns over three years after listing as suggested by Boycko et al[xxx]. A lower government ownership is interpreted by investors as a sign of greater political freedom and improved corporate governance. This negative relation also implies that privatization is good for the companies' development and is welcomed by investors. As such, this is an encouraging reason for the Chinese government to continue China's economic reforms.

Following the earlier discussion on the Chinese lottery system, the imbalance of supply and demand can affect the IPO long-run returns, and that listed firms with lower supply of shares will perform better in the long-run. From our results, Initial and long-run performances are also negatively related to each other. This is similar to the findings in previous research by Ritter[xxxi] and Levis[xxxii]. The higher the return on the first trading day, the worse the long-run performance will be.

6. Conclusion

Using the CAPM and the three-factor models as benchmarks, we have examined the evidence on the long-run underperformance of IPOs in the Chinese and Indian market using a data set of firms over the period 2000-2002. In line with Fama's[xxxiii] conclusion, the results on long-run under-performance of the IPOs depend very much on the choice of technique. For both benchmarks, there are significant positive abnormal returns. However, the three-factor model implies a greater positive return when compared to the CAPM. the long-run.

When we compare the relevance of the two benchmarks, the CAPM seems mis-specified when we take into consideration the empirical significance of size effects and the observation that IPOs are typically small stock. As such, the three-factor model may be better suited for explaining long-run underperformance.

There are various features in India which contribute to the under-pricing and are unique by world standards. For one, the delay from issue date to listing date is enormous in India when compared with other countries. Among the other features are the ways the offer price is fixed and the availability of information to lay investors. The offer price is chosen by the firm months before the issue opens and a lack of feedback mechanism means that there is no channel through which the market demand can alter the price. Coupled with the fact that IPOs are sold directly to uninformed investors rather than institutional investors, there is likely to be under-pricing.

In China, new issues are very much controlled and regulated by the government. The severe imbalance of supply and demand for these stocks creates their long-run positive abnormal returns as well as the under-pricing phenomena which we see. As the government relaxes its control over the issues, we are sure to see the beginnings of a move towards market efficiency and perhaps an alleviation of the under-pricing phenomenon.

7. Tables and Figures

Table 1

This shows the first-day return for India. The average first-day return is 17.2% with a median of 10.7%. The percentage of undervalued firms is found by looking at how many firm stocks appreciated in prices after the first day.

Mean (%)	17.2
Standard Deviation (%)	24.7
t-statistics (%)	3.46
Median (%)	10.7
Minimum (%)	-40.4
Maximum (%)	104.8
Total Number of Issues	116

Figure 1

The average market-adjusted initial return for the whole sample is 17.2% with an associated t-statistic of 3.46, which is significantly different from zero at the 5% level. The median of the market-adjusted initial returns is 10.7%.

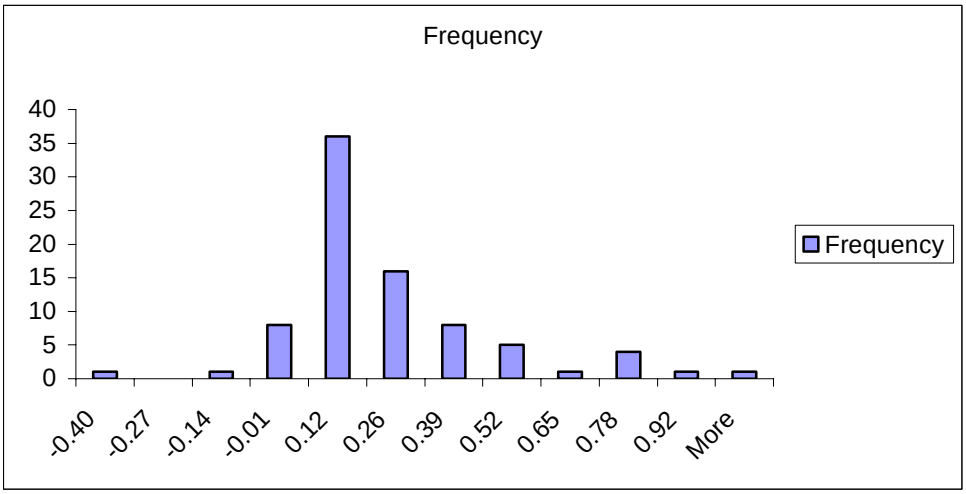


Table 2

This shows the first-day return for China. The average first-day return is 93.5% with a median of 83.2%. The percentage of undervalued firms is found by looking at how many firm stocks appreciated in prices after the first day.

Mean (%)	93.5
Standard Deviation (%)	92.1
t-statistics (%)	5.05
Median (%)	83.2
Minimum (%)	-46.3
Maximum (%)	632.5
Total Number of Issues	341

Figure 2

The average market-adjusted initial return for the whole sample is 93.5% with an associated t-statistic of 5.05, which is significantly different from zero at the 5% level. The median of the market-adjusted initial returns is 83.2%.

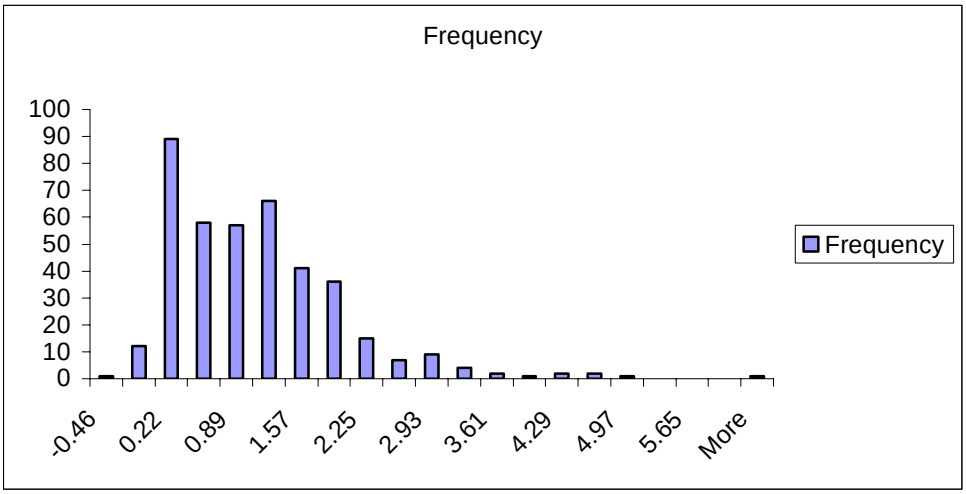


Table 3

Shown is the cumulative average abnormal return for up till 60 months using the CAPM. Among the 60 monthly cumulative average abnormal returns, none of them are negative with 1 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 59 of them having t-statistics higher than 2.0.

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.09	3.12	**31**	1.31	8.09
2	0.08	1.86	**32**	1.32	8.02
3	0.12	2.29	**33**	1.32	7.92
4	0.17	2.95	**34**	1.35	7.98
5	0.21	3.19	**35**	1.30	7.57
6	0.23	3.28	**36**	1.30	7.46
7	0.26	3.43	**37**	1.33	7.54
8	0.33	3.98	**38**	1.36	7.61
9	0.35	4.07	**39**	1.39	7.66
10	0.40	4.32	**40**	1.42	7.76
11	0.43	4.43	**41**	1.45	7.83
12	0.50	5.00	**42**	1.50	7.97
13	0.51	4.88	**43**	1.51	7.94
14	0.60	5.56	**44**	1.57	8.14
15	0.66	5.89	**45**	1.65	8.50
16	0.74	6.39	**46**	1.74	8.87
17	0.80	6.65	**47**	1.81	9.12
18	0.81	6.59	**48**	1.87	9.29
19	0.89	7.01	**49**	1.93	9.53
20	0.95	7.33	**50**	1.99	9.72
21	1.01	7.58	**51**	2.12	10.25
22	1.07	7.85	**52**	2.17	10.36
23	1.06	7.65	**53**	2.32	11.01
24	1.08	7.58	**54**	2.36	11.05
25	1.11	7.69	**55**	2.47	11.51
26	1.14	7.73	**56**	2.50	11.50
27	1.21	8.03	**57**	2.60	11.88
28	1.22	7.97	**58**	2.64	11.95
29	1.25	8.01	**59**	2.67	11.96
30	1.26	7.92	**60**	2.64	11.75

Figure 3

This shows the abnormal returns over 60 months for India using the CAPM. The abnormal returns vary between 8% and 264%. A minimum return of 8% is recorded in the 2nd month of listing, and the return peaks at 264% in the 60th month of trading. Average monthly returns up to the 60th trading month are all positive.

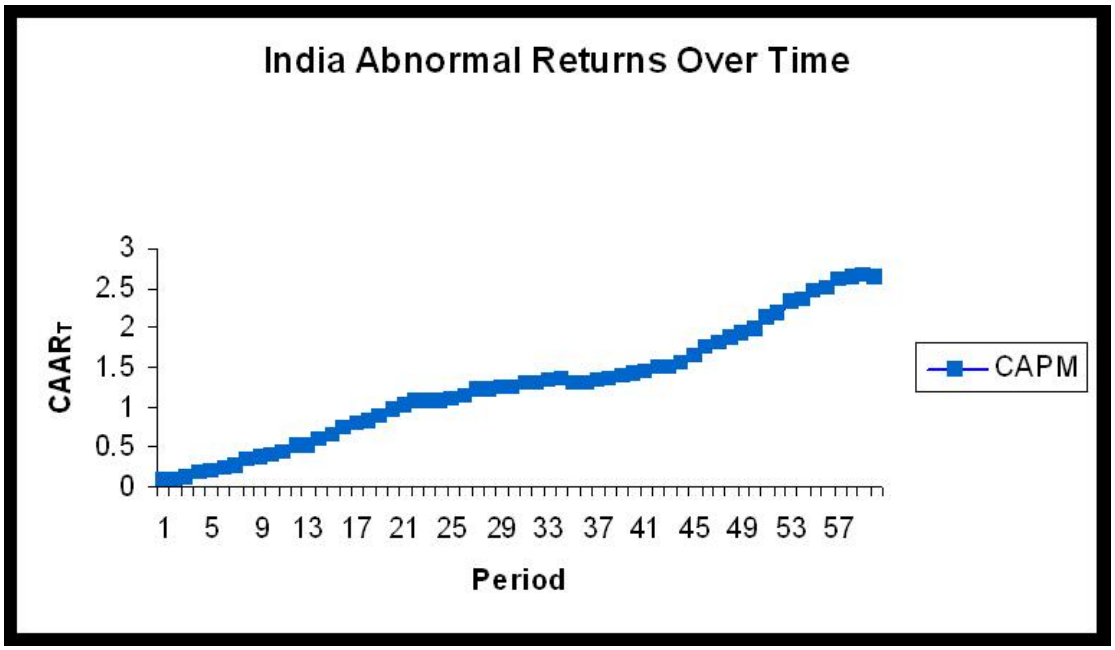


Table 4

Shown is the cumulative average abnormal return for the top 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns, none of them are negative with 34 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 26 of them having t-statistics higher than 2.0.

Top 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.49	4.55	**31**	0.92	1.52
2	0.52	3.42	**32**	0.92	1.50
3	0.54	2.85	**33**	0.98	1.58
4	0.67	3.10	**34**	0.99	1.57
5	0.63	2.62	**35**	0.88	1.38
6	0.62	2.34	**36**	0.87	1.33
7	0.69	2.42	**37**	0.98	1.49
8	0.74	2.43	**38**	0.97	1.45
9	0.80	2.47	**39**	1.03	1.53
10	0.81	2.38	**40**	1.07	1.56
11	0.82	2.28	**41**	1.13	1.63
12	0.76	2.03	**42**	1.16	1.65
13	0.80	2.04	**43**	1.23	1.73
14	0.81	1.98	**44**	1.24	1.73
15	0.75	1.78	**45**	1.26	1.74
16	0.78	1.81	**46**	1.46	1.98
17	0.79	1.77	**47**	1.47	1.98
18	0.85	1.85	**48**	1.51	2.01
19	0.86	1.82	**49**	1.54	2.03
20	0.88	1.81	**50**	1.60	2.08
21	0.90	1.81	**51**	1.73	2.23
22	0.86	1.70	**52**	1.86	2.37
23	0.81	1.55	**53**	1.90	2.40
24	0.77	1.44	**54**	1.91	2.40
25	0.76	1.40	**55**	2.01	2.50
26	0.77	1.40	**56**	1.93	2.38
27	0.80	1.42	**57**	2.19	2.67
28	0.81	1.41	**58**	2.30	2.78
29	0.91	1.57	**59**	2.30	2.76
30	0.83	1.39	**60**	2.24	2.67

Table 5

Shown is the cumulative average abnormal return for the bottom 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns, 4 of them are negative with 13 of them having t-statistics lower than 2.0 / -2.0, while 56 are positive with 47 of them having t-statistics higher than 2.0.

Bottom 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	-0.16	-1.71	**31**	2.21	4.29
2	-0.19	-1.45	**32**	2.19	4.19
3	-0.13	-0.81	**33**	2.11	3.98
4	-0.06	-0.34	**34**	2.26	4.20
5	0.03	0.14	**35**	2.21	4.04
6	0.10	0.43	**36**	2.21	3.98
7	0.10	0.39	**37**	2.21	3.92
8	0.21	0.81	**38**	2.28	4.00
9	0.17	0.60	**39**	2.26	3.91
10	0.30	1.04	**40**	2.36	4.04
11	0.41	1.35	**41**	2.46	4.16
12	0.62	1.95	**42**	2.57	4.30
13	0.58	1.73	**43**	2.54	4.18
14	0.79	2.28	**44**	2.60	4.24
15	1.00	2.78	**45**	2.74	4.41
16	1.14	3.07	**46**	2.76	4.41
17	1.24	3.26	**47**	2.89	4.56
18	1.28	3.26	**48**	2.97	4.64
19	1.36	3.38	**49**	3.19	4.93
20	1.49	3.59	**50**	3.28	5.02
21	1.58	3.72	**51**	3.55	5.38
22	1.79	4.12	**52**	3.59	5.38
23	1.79	4.04	**53**	3.66	5.43
24	1.84	4.06	**54**	3.77	5.55
25	1.97	4.27	**55**	3.93	5.73
26	2.02	4.28	**56**	3.95	5.71
27	2.15	4.47	**57**	4.04	5.78
28	2.17	4.43	**58**	4.05	5.76
29	2.14	4.31	**59**	4.08	5.75
30	2.20	4.35	**60**	4.02	5.62

Figure 4

This shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the CAPM model.

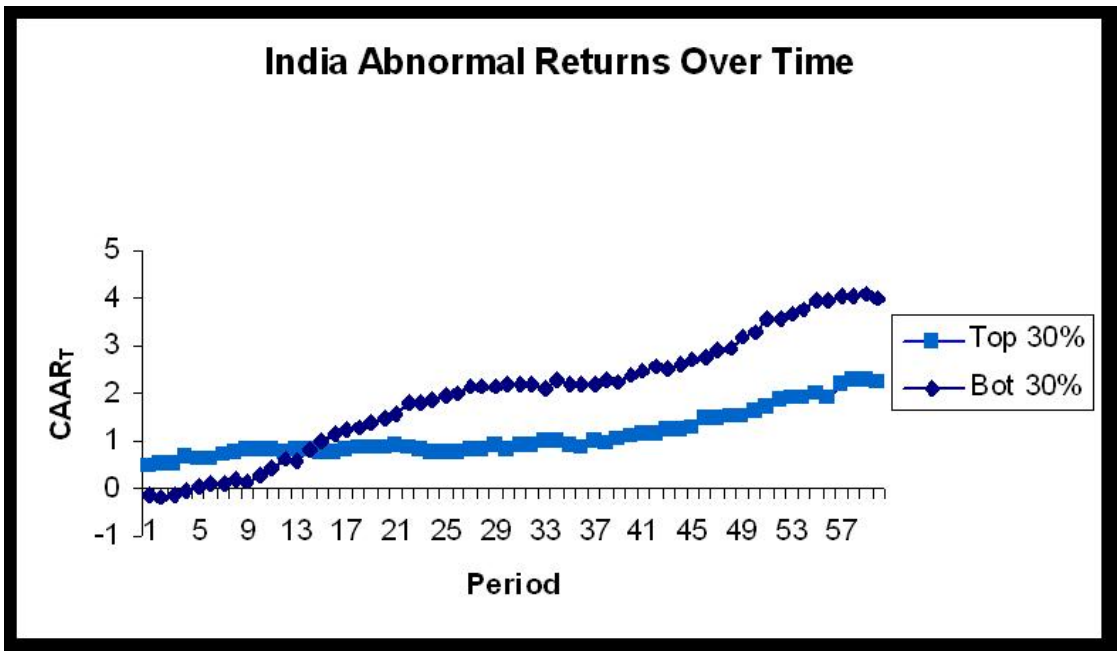


Table 6

Shown is the cumulative average abnormal return for up till 60 months using the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, none of them are negative with none of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 60 of them having t-statistics higher than 2.0.

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.11	3.40	**31**	3.25	18.63
2	0.13	2.87	**32**	3.38	19.10
3	0.21	3.90	**33**	3.44	19.15
4	0.31	4.97	**34**	3.53	19.36
5	0.39	5.57	**35**	3.44	18.55
6	0.47	6.19	**36**	3.41	18.13
7	0.56	6.78	**37**	3.40	17.86
8	0.67	7.60	**38**	3.39	17.59
9	0.75	7.99	**39**	3.39	17.34
10	0.85	8.54	**40**	3.39	17.14
11	0.92	8.90	**41**	3.41	17.00
12	1.05	9.71	**42**	3.45	17.01
13	1.12	9.92	**43**	3.45	16.79
14	1.28	10.94	**44**	3.48	16.77
15	1.39	11.49	**45**	3.62	17.24
16	1.53	12.23	**46**	3.76	17.69
17	1.65	12.77	**47**	3.91	18.21
18	1.72	12.95	**48**	4.02	18.55
19	1.86	13.61	**49**	4.18	19.07
20	1.98	14.16	**50**	4.30	19.44
21	2.09	14.58	**51**	4.51	20.16
22	2.21	15.08	**52**	4.59	20.34
23	2.26	15.05	**53**	4.80	21.08
24	2.35	15.33	**54**	4.89	21.27
25	2.46	15.71	**55**	5.09	21.90
26	2.60	16.30	**56**	5.17	22.07
27	2.78	17.07	**57**	5.35	22.64
28	2.87	17.32	**58**	5.44	22.82
29	2.98	17.68	**59**	5.50	22.88
30	3.08	17.98	**60**	5.48	22.58

Figure 5

This shows the abnormal returns over 60 months for India using the Fama-French three-factor model. The abnormal returns vary between 11% and 548%. A minimum return of 11% is recorded in the 1st month of listing, and the return peaks at 548% in the 60th month of trading. Average monthly returns up to the 60th trading month are all positive.

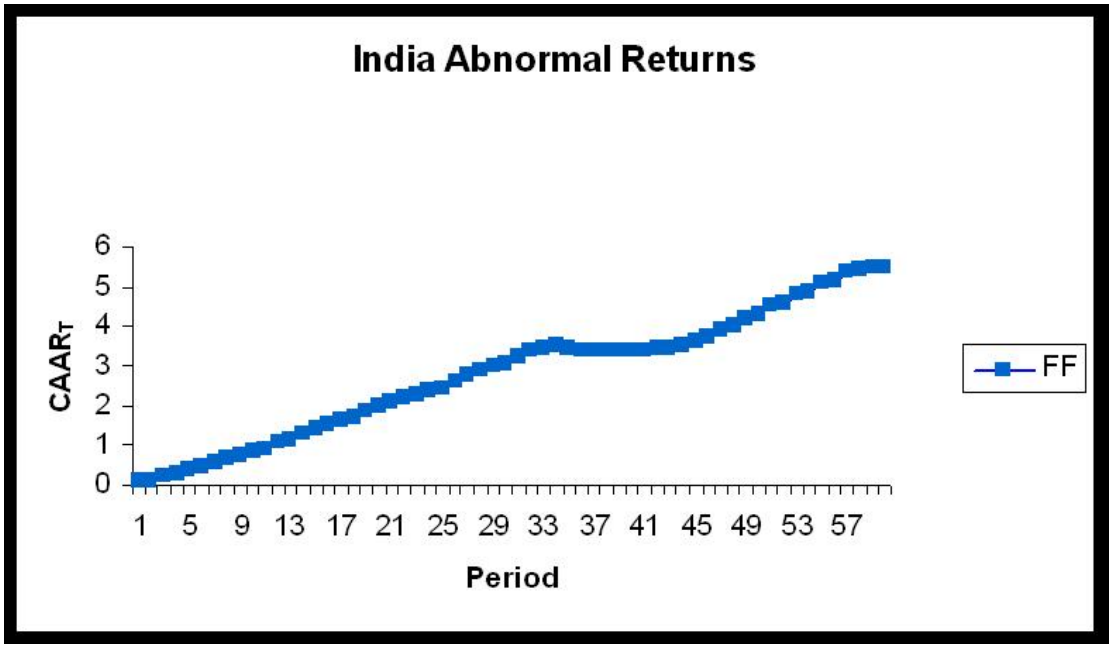


Table 7

Shown is the cumulative average abnormal return for the top 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, none of them are negative with 2 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 58 of them having t-statistics higher than 2.0.

Top 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.28	4.25	**31**	2.51	6.84
2	0.25	2.68	**32**	2.63	7.05
3	0.23	1.99	**33**	2.78	7.33
4	0.33	2.53	**34**	2.90	7.52
5	0.30	2.04	**35**	2.81	7.19
6	0.31	1.89	**36**	2.84	7.16
7	0.41	2.33	**37**	2.99	7.45
8	0.46	2.49	**38**	3.08	7.56
9	0.55	2.77	**39**	3.28	7.95
10	0.56	2.66	**40**	3.49	8.36
11	0.59	2.68	**41**	3.75	8.88
12	0.60	2.62	**42**	4.00	9.34
13	0.70	2.95	**43**	4.28	9.88
14	0.76	3.09	**44**	4.49	10.26
15	0.77	3.01	**45**	4.74	10.71
16	0.87	3.30	**46**	5.15	11.50
17	0.95	3.50	**47**	5.42	11.97
18	1.08	3.86	**48**	5.64	12.33
19	1.16	4.05	**49**	5.86	12.68
20	1.25	4.24	**50**	6.03	12.90
21	1.34	4.42	**51**	6.27	13.29
22	1.38	4.46	**52**	6.51	13.67
23	1.42	4.47	**53**	6.64	13.81
24	1.48	4.57	**54**	6.73	13.86
25	1.58	4.77	**55**	6.91	14.12
26	1.79	5.32	**56**	6.92	14.01
27	1.98	5.78	**57**	7.28	14.61
28	2.11	6.05	**58**	7.48	14.88
29	2.31	6.50	**59**	7.52	14.82
30	2.33	6.45	**60**	7.49	14.63

Table 8

Shown is the cumulative average abnormal return for the bottom 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, 1 of them is negative with 3 of them having t-statistics lower than 2.0 / -2.0, while 59 are positive with 57 of them having t-statistics higher than 2.0.

Bottom 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	-0.01	-0.15	**31**	5.00	11.06
2	0.07	0.63	**32**	5.15	11.21
3	0.25	1.77	**33**	5.07	10.86
4	0.40	2.46	**34**	5.23	11.03
5	0.56	3.07	**35**	5.15	10.71
6	0.72	3.61	**36**	5.14	10.55
7	0.81	3.75	**37**	5.12	10.36
8	1.01	4.39	**38**	5.15	10.29
9	1.04	4.27	**39**	5.08	10.00
10	1.25	4.88	**40**	5.07	9.87
11	1.43	5.30	**41**	5.06	9.73
12	1.68	5.96	**42**	5.10	9.69
13	1.69	5.78	**43**	4.99	9.36
14	1.98	6.52	**44**	4.97	9.23
15	2.25	7.15	**45**	5.15	9.45
16	2.45	7.54	**46**	5.21	9.45
17	2.62	7.83	**47**	5.35	9.61
18	2.72	7.90	**48**	5.50	9.77
19	2.86	8.08	**49**	5.78	10.16
20	3.04	8.38	**50**	5.93	10.31
21	3.19	8.57	**51**	6.25	10.77
22	3.48	9.12	**52**	6.32	10.78
23	3.54	9.07	**53**	6.42	10.86
24	3.68	9.25	**54**	6.57	10.99
25	3.90	9.61	**55**	6.79	11.26
26	4.06	9.80	**56**	6.86	11.29
27	4.32	10.22	**57**	7.00	11.41
28	4.47	10.40	**58**	7.06	11.40
29	4.62	10.55	**59**	7.10	11.37
30	4.84	10.88	**60**	7.02	11.16

Figure 6

This shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the Fama-French three-factor model.

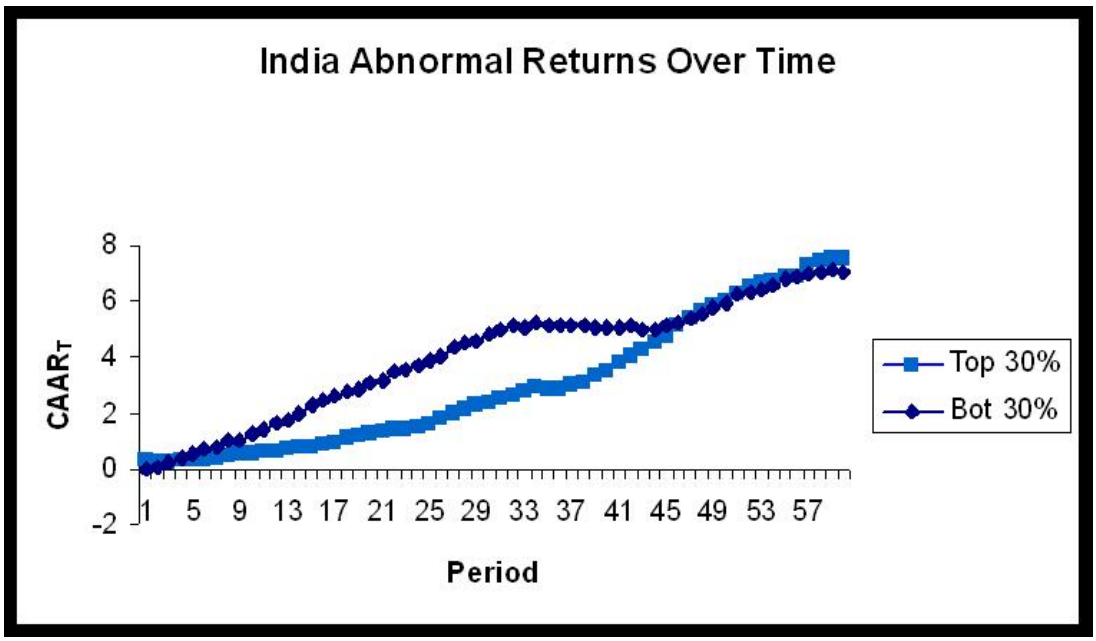


Figure 7

This shows the comparative plot for the cumulative average abnormal return for the Fama-French three-factor model and the CAPM.

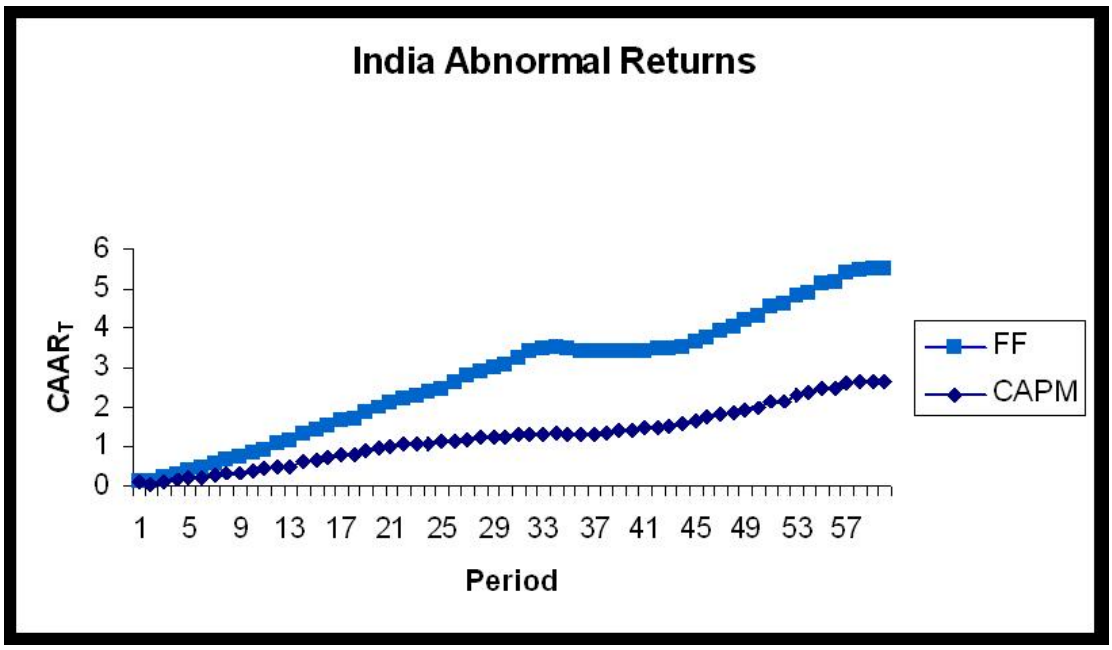


Table 9

Shown is the cumulative average abnormal return for up till 60 months using the CAPM. Among the 60 monthly cumulative average abnormal returns, 11 of them are negative with 1 of them having t-statistics lower than 2.0 / -2.0, while 49 are positive with 59 of them having t-statistics higher than 2.0.

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.10	9.63	**31**	1.79	31.09
2	0.17	11.74	**32**	1.76	30.18
3	0.23	13.10	**33**	1.74	29.33
4	0.29	14.24	**34**	1.71	28.34
5	0.36	15.49	**35**	1.68	27.44
6	0.42	16.58	**36**	1.64	26.51
7	0.48	17.61	**37**	1.60	25.54
8	0.54	18.36	**38**	1.54	24.13
9	0.60	19.37	**39**	1.45	22.53
10	0.66	20.13	**40**	1.35	20.67
11	0.71	20.80	**41**	1.24	18.68
12	0.77	21.56	**42**	1.10	16.47
13	0.83	22.23	**43**	0.94	13.82
14	0.90	23.23	**44**	0.78	11.35
15	0.97	24.17	**45**	0.60	8.65
16	1.03	24.94	**46**	0.41	5.90
17	1.10	25.90	**47**	0.21	2.95
18	1.19	27.07	**48**	0.02	0.26
19	1.26	27.89	**49**	-0.18	-2.47
20	1.32	28.51	**50**	-0.37	-5.05
21	1.39	29.33	**51**	-0.53	-7.24
22	1.45	29.84	**52**	-0.74	-9.90
23	1.52	30.60	**53**	-0.92	-12.18
24	1.60	31.55	**54**	-1.12	-14.76
25	1.66	32.12	**55**	-1.25	-16.31
26	1.71	32.41	**56**	-1.39	-18.04
27	1.75	32.60	**57**	-1.59	-20.39
28	1.78	32.66	**58**	-1.76	-22.42
29	1.81	32.54	**59**	-1.94	-24.45
30	1.80	31.80	**60**	-2.06	-25.89

Figure 8

This shows the abnormal returns over 60 months for China using the CAPM. The abnormal returns vary between -206% and 181%. A minimum return of -206% is recorded in the 60th month of listing, and the return peaks at 181% in the 29th month of trading.

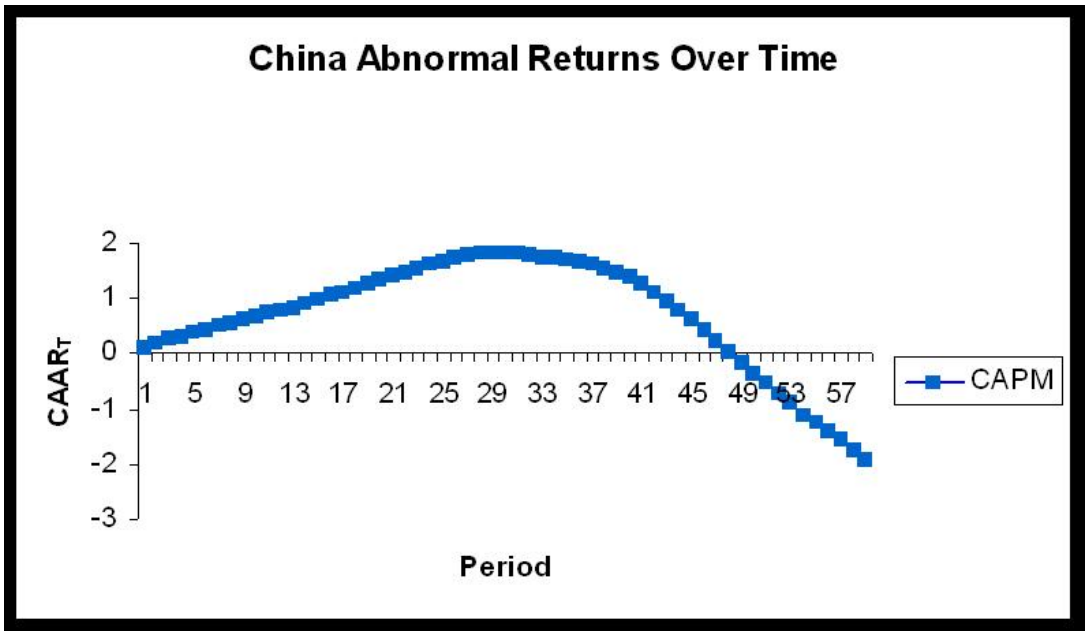


Table 10

Shown is the cumulative average abnormal return for the top 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns, 24 of them are negative with 2 of them having t-statistics lower than 2.0 / -2.0, while 36 are positive with 58 of them having t-statistics higher than 2.0.

Top 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.19	5.93	**31**	0.94	5.15
2	0.25	5.42	**32**	0.79	4.26
3	0.28	4.99	**33**	0.61	3.27
4	0.32	4.84	**34**	0.40	2.12
5	0.35	4.86	**35**	0.22	1.16
6	0.41	5.16	**36**	0.03	0.16
7	0.45	5.18	**37**	-0.19	-0.98
8	0.48	5.23	**38**	-0.45	-2.24
9	0.54	5.54	**39**	-0.75	-3.68
10	0.57	5.55	**40**	-1.02	-4.93
11	0.63	5.86	**41**	-1.24	-5.92
12	0.67	5.96	**42**	-1.46	-6.92
13	0.72	6.09	**43**	-1.71	-7.98
14	0.75	6.12	**44**	-1.95	-9.03
15	0.79	6.27	**45**	-2.20	-10.06
16	0.83	6.39	**46**	-2.45	-11.06
17	0.90	6.73	**47**	-2.70	-12.10
18	0.97	6.99	**48**	-2.93	-12.98
19	1.02	7.18	**49**	-3.19	-13.98
20	1.05	7.22	**50**	-3.48	-15.07
21	1.12	7.48	**51**	-3.69	-15.83
22	1.15	7.55	**52**	-3.92	-16.68
23	1.21	7.72	**53**	-4.16	-17.51
24	1.28	7.99	**54**	-4.41	-18.39
25	1.32	8.11	**55**	-4.56	-18.87
26	1.32	7.91	**56**	-4.72	-19.33
27	1.27	7.47	**57**	-4.96	-20.16
28	1.21	7.02	**58**	-5.12	-20.64
29	1.19	6.79	**59**	-5.34	-21.33
30	1.08	6.03	**60**	-5.46	-22.64

Table 11

Shown is the cumulative average abnormal return for the bottom 30% of companies in terms of returns up till 60 months for the CAPM. Among the 60 monthly cumulative average abnormal returns, none of them are negative with 19 of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 41 of them having t-statistics higher than 2.0.

Bottom 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.06	3.66	**31**	3.00	33.19
2	0.17	7.45	**32**	3.10	33.77
3	0.29	10.36	**33**	3.20	34.34
4	0.39	11.85	**34**	3.28	34.66
5	0.48	13.32	**35**	3.44	35.78
6	0.57	14.34	**36**	3.55	36.45
7	0.67	15.63	**37**	3.67	37.11
8	0.76	16.56	**38**	3.74	37.36
9	0.87	17.88	**39**	3.82	37.68
10	0.98	19.07	**40**	3.81	37.09
11	1.08	20.00	**41**	3.77	36.28
12	1.16	20.58	**42**	3.72	35.34
13	1.24	21.21	**43**	3.64	34.13
14	1.36	22.45	**44**	3.57	33.11
15	1.48	23.45	**45**	3.43	31.49
16	1.58	24.38	**46**	3.35	30.37
17	1.70	25.39	**47**	3.23	29.04
18	1.82	26.38	**48**	3.09	27.49
19	1.92	27.05	**49**	2.99	26.29
20	2.02	27.83	**50**	2.90	25.26
21	2.13	28.61	**51**	2.82	24.31
22	2.21	29.00	**52**	2.70	23.05
23	2.34	29.99	**53**	2.57	21.71
24	2.46	30.85	**54**	2.35	19.68
25	2.54	31.30	**55**	2.34	19.43
26	2.63	31.73	**56**	2.37	19.50
27	2.72	32.20	**57**	2.30	18.73
28	2.79	32.50	**58**	2.12	17.13
29	2.86	32.71	**59**	2.02	16.22
30	2.91	32.69	**60**	1.77	15.38

Figure 9

This shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the CAPM model.

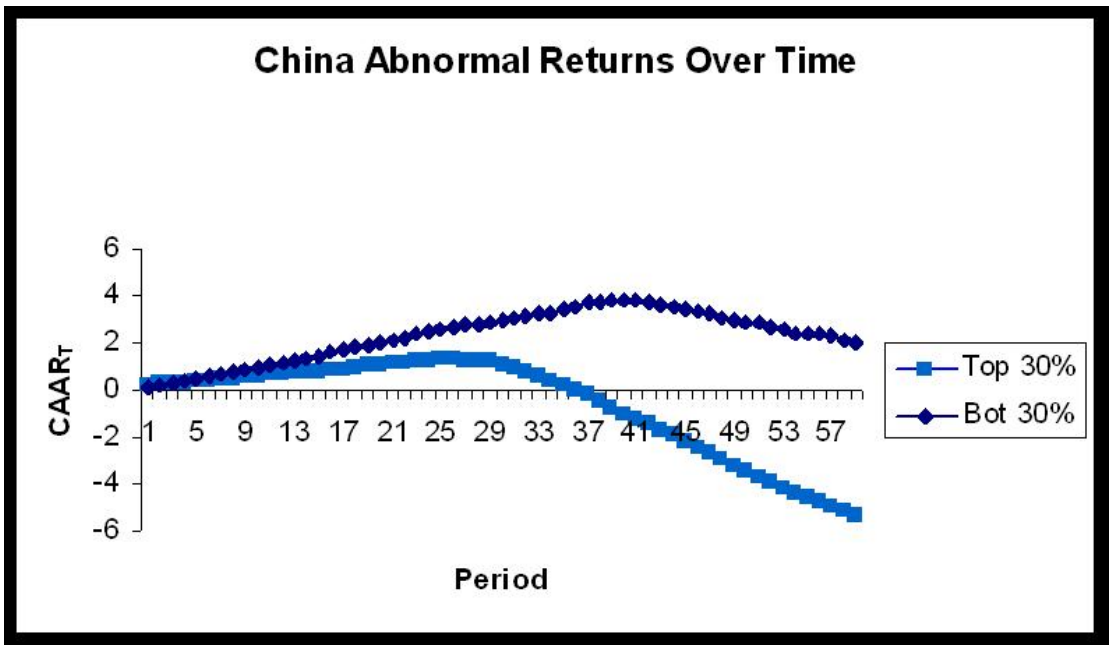


Table 12

Shown is the cumulative average abnormal return for up till 60 months using the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, none of them are negative with none of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 60 of them having t-statistics higher than 2.0.

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.26	33.64	**31**	7.51	172.13
2	0.51	45.75	**32**	7.72	174.19
3	0.75	54.93	**33**	7.93	176.24
4	0.98	62.87	**34**	8.14	178.32
5	1.23	70.10	**35**	8.35	180.16
6	1.47	76.61	**36**	8.55	181.92
7	1.71	82.69	**37**	8.74	183.52
8	1.95	87.92	**38**	8.84	183.16
9	2.19	93.05	**39**	8.89	181.80
10	2.42	97.82	**40**	8.88	179.33
11	2.66	102.23	**41**	8.85	176.49
12	2.90	106.72	**42**	8.77	172.76
13	3.13	110.88	**43**	8.64	168.13
14	3.38	115.22	**44**	8.51	163.85
15	3.63	119.56	**45**	8.38	159.50
16	3.87	123.55	**46**	8.25	155.28
17	4.11	127.36	**47**	8.11	150.99
18	4.37	131.56	**48**	8.02	147.76
19	4.62	135.19	**49**	7.91	144.35
20	4.85	138.40	**50**	7.82	141.23
21	5.09	141.82	**51**	7.75	138.63
22	5.32	144.83	**52**	7.65	135.45
23	5.56	148.01	**53**	7.56	132.60
24	5.81	151.46	**54**	7.45	129.35
25	6.05	154.50	**55**	7.40	127.37
26	6.28	157.29	**56**	7.37	125.70
27	6.52	160.26	**57**	7.28	123.18
28	6.77	163.30	**58**	7.25	121.52
29	7.03	166.76	**59**	7.21	119.79
30	7.28	169.65	**60**	7.15	117.94

Figure 10

This shows the abnormal returns over 60 months for India using the Fama-French three-factor model. The abnormal returns vary between 26% and 715%. A minimum return of 26% is recorded in the 1st month of listing, and the return peaks at 715% in the 60th month of trading. Average monthly returns up to the 60th trading month are all positive.

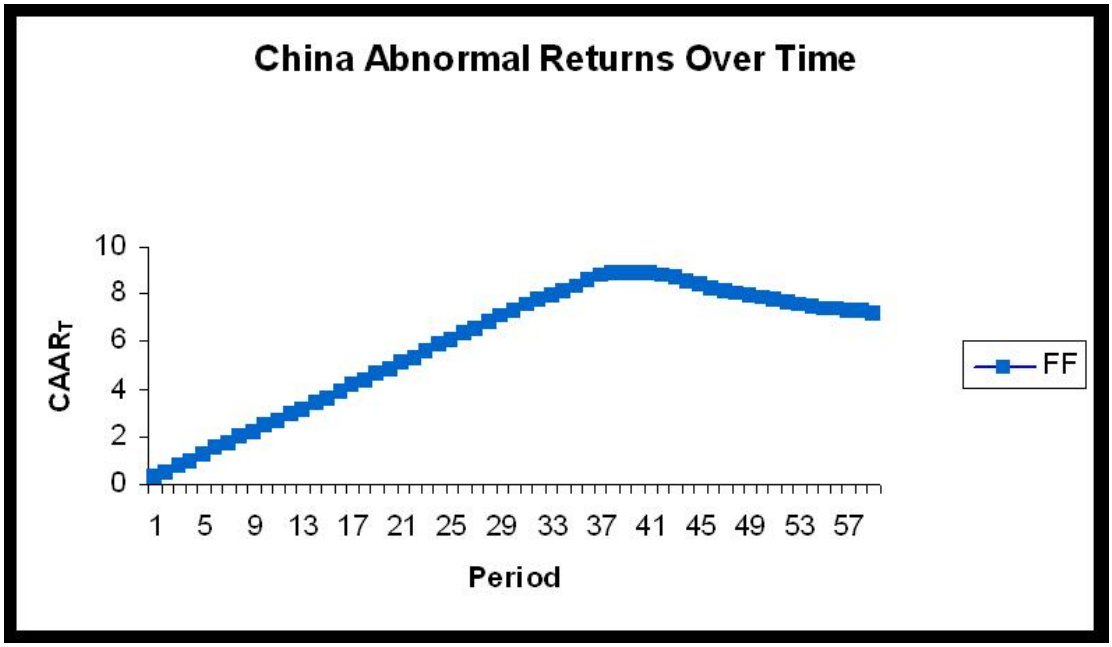


Table 13

Shown is the cumulative average abnormal return for the top 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, 6 of them are negative with 5 of them having t-statistics lower than 2.0 / -2.0, while 54 are positive with 55 of them having t-statistics higher than 2.0.

Top 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.17	7.35	**31**	2.66	20.40
2	0.23	6.84	**32**	2.75	20.75
3	0.28	6.88	**33**	2.82	21.02
4	0.35	7.40	**34**	2.93	21.50
5	0.41	7.77	**35**	3.07	22.17
6	0.49	8.55	**36**	3.19	22.76
7	0.56	9.13	**37**	3.30	23.20
8	0.64	9.63	**38**	3.23	22.40
9	0.71	10.19	**39**	2.99	20.51
10	0.78	10.54	**40**	2.77	18.72
11	0.87	11.23	**41**	2.53	16.93
12	0.96	11.79	**42**	2.30	15.17
13	1.04	12.31	**43**	2.05	13.35
14	1.10	12.54	**44**	1.82	11.71
15	1.18	13.07	**45**	1.57	10.03
16	1.27	13.57	**46**	1.34	8.45
17	1.35	14.02	**47**	1.11	6.93
18	1.46	14.68	**48**	0.97	6.01
19	1.55	15.17	**49**	0.81	4.93
20	1.61	15.44	**50**	0.62	3.76
21	1.70	15.85	**51**	0.49	2.93
22	1.77	16.12	**52**	0.34	2.02
23	1.84	16.39	**53**	0.18	1.06
24	1.93	16.85	**54**	0.00	0.02
25	2.03	17.33	**55**	-0.09	-0.50
26	2.11	17.73	**56**	-0.17	-0.95
27	2.18	17.96	**57**	-0.34	-1.90
28	2.26	18.28	**58**	-0.37	-2.09
29	2.43	19.31	**59**	-0.47	-2.64
30	2.55	19.88	**60**	-0.52	-3.16

Table 14

Shown is the cumulative average abnormal return for the bottom 30% of companies in terms of returns up till 60 months for the Fama-French three-factor model. Among the 60 monthly cumulative average abnormal returns, none of them are negative with none of them having t-statistics lower than 2.0 / -2.0, while 60 are positive with 60 of them having t-statistics higher than 2.0.

Bottom 30%

Period	CAART	t-Stat	Period	CAART	t-Stat
1	0.40	27.20	**31**	13.00	160.63
2	0.84	40.93	**32**	13.40	162.92
3	1.29	51.32	**33**	13.79	165.09
4	1.72	59.14	**34**	14.14	166.83
5	2.16	66.35	**35**	14.55	169.14
6	2.58	72.43	**36**	14.95	171.43
7	3.01	78.25	**37**	15.34	173.51
8	3.42	83.26	**38**	15.66	174.79
9	3.86	88.55	**39**	15.99	176.07
10	4.30	93.48	**40**	16.09	175.03
11	4.73	98.10	**41**	16.19	173.86
12	5.13	101.93	**42**	16.19	171.84
13	5.54	105.69	**43**	16.16	169.46
14	5.98	109.97	**44**	16.11	167.03
15	6.41	113.90	**45**	16.03	164.37
16	6.84	117.62	**46**	16.02	162.42
17	7.27	121.33	**47**	15.97	160.24
18	7.71	124.93	**48**	15.93	158.10
19	8.12	128.17	**49**	15.90	156.22
20	8.55	131.46	**50**	15.91	154.73
21	8.98	134.72	**51**	15.92	153.37
22	9.38	137.54	**52**	15.91	151.72
23	9.83	140.92	**53**	15.87	149.97
24	10.26	144.06	**54**	15.75	147.39
25	10.66	146.63	**55**	15.77	146.22
26	11.04	148.91	**56**	15.82	145.42
27	11.44	151.39	**57**	15.77	143.67
28	11.83	153.78	**58**	15.62	141.03
29	12.23	156.25	**59**	15.54	139.19
30	12.61	158.37	**60**	15.26	137.22

Figure 11

This shows the plot for the cumulative average abnormal returns for the top and bottom 30% companies for India using the Fama-French three-factor model.

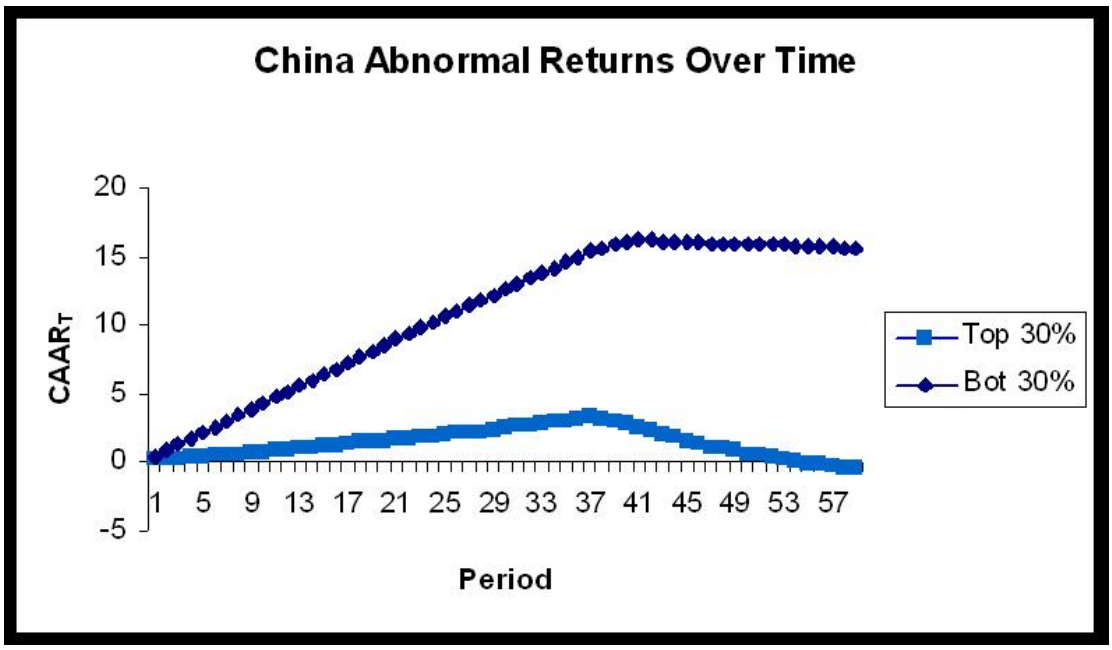
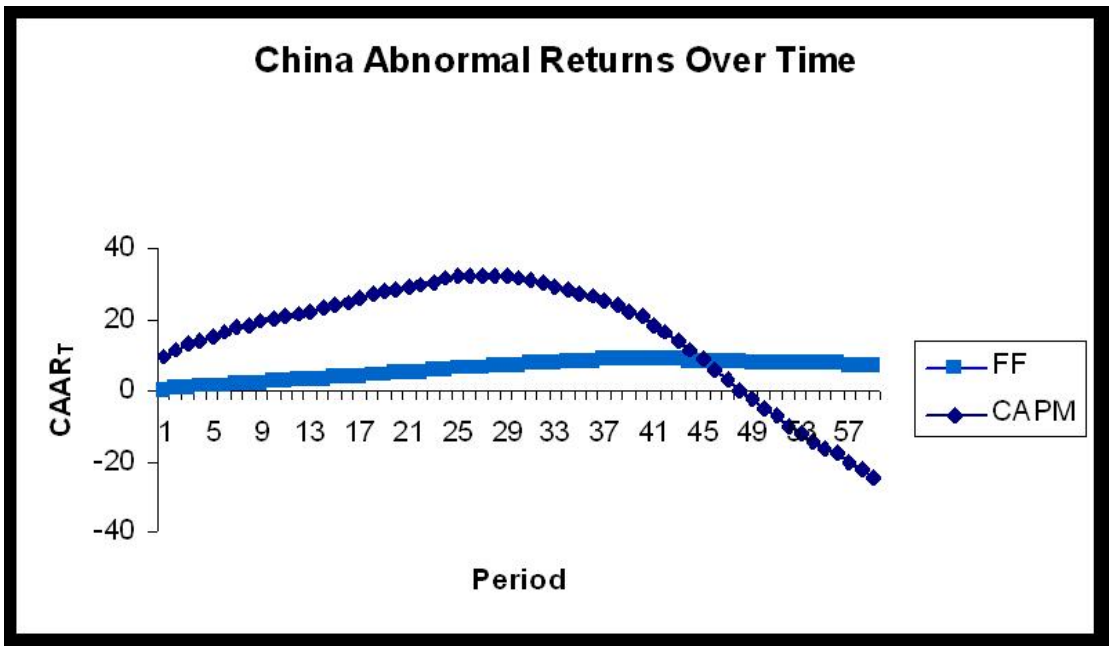


Figure 12

This shows the comparative plot for the cumulative average abnormal return for the Fama-French three-factor model and the CAPM.



8. Bibliography

[i] Loughran, T, Ritter J. R., Rydqvist K. (1994). Initial public offerings: International insights. *Pacific-Basin Finance Journal*, 2:165 - 199

[ii] Saurabh, Ghosh (2005). The Post Offering of IPOs in the Indian Banking Industry. *Applied Economics Letters*, vol. 12, issue 2, pages 89-94

[iii] Foerster, Stephen. IPOs: The Short and Long of What We Know. *Canadian Investment Review*

[iv] Dimson, E. and P. Marsh (1986). Event study methodologies and the size effect, *Journal of Financial Economics*, 17, 113-42.

[v] Ritter, J. (1991). The long-run performance of initial public offerings, *Journal of Finance*, 46, 3-27.

[vi] Gregory, A., Matatko, J., Tonks, I. and R. Purkis (1994). UK directors' trading: the impact of dealings in smaller firms. *Economic Journal*, January 1994, 37-53.

[vii] Fama, E.F. and K.R. French (1992), The cross-section of expected stock returns. *Journal of Finance*, 47, 2, 427-66.

[viii] Fama, E. (1998). Market efficiency, long-run returns and behavioural finance. *Journal of Finance*, 49, 283-306

[ix] Ibbotson, R.G. (1975). Price performance of common stock new issues. *Journal of Financial Economics*, 3, 235-272.

[x] Ritter (1991), op. cit.

[xi] Levis, M. (1993). The long-run performance of initial public offerings: the UK experience 1980-88. *Financial Management*, 22, 28-41.

[xii] Loughran, T. and J.R. Ritter (1995). The new issues puzzle. *Journal of Finance*, 50, 23-51.

[xiii] Brav, Alon and Paul A. Gompers (1997). Myth or Reality? The Long-run Underperformance of Initial Public Offerings: Evidence from Venture Capital and Nonventure Capital-backed Companies. *Journal of Finance,* 52: 1791 - 1822

[xiv] Jones, S.L., W.L. Megginson, R.C. Nash and J.M. Netter (1999). Share Issue Privatisations as Financial Means to Political and Economic Ends, *Journal of Financial Economics,* 53, 217-253.

[xv] Megginson, W.L., R.C. Nash, J.M. Netter and A.L. Schwartz (2000). The Long-run Return to Investors in Share Issue Privatization, *Financial Management*, 29, 67-77.

[xvi] Sun, Q. and H.S. Tong (2003). China Share Issue Privatization: The Extent of its Success, Journal of Financial Economics, 70, 183-222.

[xvii] Chan, K., J.B. Wang and K.C. Wei (2004). Underpricing and Long-run Performance of IPOs in China. *Journal of Corporate Finance*, 10, 409-430.

[xviii] Aggarwal, R., R. Leal and L. Hernandez (1993). The After-market Performance of Initial Public Offerings in Latin America, *Financial Management*, 22, 42-53.

[xix] Ritter (1991), op. cit.

[xx] Fama, E.F. and K.R. French (1996). Multifactor explanations of asset pricing anomalies. *Journal of Finance*, 50, 131-155.

[xxi] Fama, French (1992), op. cit.

[xxii] Fama, French (1996), op. cit.

[xxiii] Brown, S., J.B. Warner (1980). Measuring Security Price Performance. *Journal of Financial Economics*, 8, 205-258.

[xxiv] Lyon, J., B. Barber and C.L. Tsai (1999). Improved Methods for Tests of Long-run Abnormal Stock Returns. *Journal of Finance*, 54, 165-201.

[xxv] Fama (1998), op. cit.

[xxvi] Loughran, Ritter, Rydqvist (1994), op. cit.

[xxvii] D. Baron (1982). A model of the demand of investment banking advising and distribution services for new issues. *Journal of Finance*, 37 : 955 – 976.

[xxviii] Chris J. Muscarella and M. Vetsuypens (1989). A simple test of Baron's model of IPO underpricing. *Journal of Financial Economics*, 24 : 125 – 135.

[xxix] Chi, J. and C. Padgett (2004). Short-run Underpricing and its Characteristics in Chinese Initial Public Offering Markets. *Review of International Business and Finance,* Forthcoming.

[xxx] Boycko, M., A. Shleifer and R. Vishny (1996), A Theory of Privatization, *Economic Journal*, 106, 309-319.

[xxxi] Ritter (1991), op. cit.

[xxxii] Levis (1993), op. cit.

[xxxiii] Fama (1998), op. cit.