

Model Specification and IPO Performance: New insights from Asia

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Abstract

This study examines the post-issue stock price performance of Initial Public Offerings (IPOs) from advanced and emerging Asian markets from 1991 to 2004. We provide a comparative assessment on the short- and long-term stock performance of Asian IPOs with comprehensive international evidence. We use several different methods to examine the robustness of IPO performance. Our results reveal that whilst there is initial underpricing in Asian IPOs, the existence of long run underperformance for the Asian IPOs depends resoundingly on the methodology used for assessment.

Keywords: Initial Public Offerings; Initial Returns; Long term Performance

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1. Introduction

The role and importance of initial public offerings (IPOs) in financial markets has changed over time and IPOs now represent a significant component of stock market activity. In Asian capital markets, initial public offerings (IPOs) perform one of the most crucial roles in the allocation of new capital. Over 2001-2005, Asia had the largest number of IPOs (2956), a lot more than North America (825), Europe (1098) and Australia and New Zealand (504). In terms of total capital raised, Asian IPOs have increased almost 64% from \$25 billion in Year 2001 to \$41 billion in 2005¹. Economic growth in China is driving IPO activity throughout Asia. According to Ernst and Young's (2006) survey, China (including Hong Kong) raised US\$24.3 billion from their Initial Public Offering activity in 2005, and tops the ranks in Asian IPO markets and is second worldwide after the U.S. The momentum of Initial Public Offerings in Asia warrants a closer understanding of their performance.

This pan-Asian study examines the post-issue stock price performance of Initial Public Offerings (IPOs) from 1991 to 2004 for China, Hong Kong, Japan, Korea, Malaysia and Singapore. Whilst there are many country-specific studies in the existing IPO literature, there have been very few regional studies on IPO performance. Hence, we provide comparative cross-country analyses on aspects of initial underpricing and long term performance of Asian IPOs to shed light at a regional level.

We find that initial underpricing in emerging Asian markets, China (202.63%), Korea (70.30%) and Malaysia (61.81%) exceed those in developed Asian markets, Hong Kong (21.43%), Japan (34.04%) and Singapore (33.10%). The varying degrees of underpricing observed in different countries suggest that there may be some unique market-specific features that influences IPO underpricing. In particular, listing standards are generally higher in more developed stock markets, resulting in the lower levels of underperformance observed. There are various explanations for underpricing, with theories based on asymmetric information, agency costs, and signalling but Ritter and Welch (2002) point out there is no single dominant theoretical cause for underpricing. Hence, there is no universal IPO underpricing theory or hypothesis applicable for all times and across countries.

There are considerable variations in the measures of abnormal returns and the statistical tests used to detect long-run abnormal stock returns. In fact, Barber and Lyon (1997, 1999) have revealed that the method for calculating returns influences both the magnitude of the measured abnormal return as well as the size and power of the statistical tests. Following these studies, we have used 4 alternative methods to

¹ Source: Thomson Financial

examine the robustness of the long run performance of Asian IPOs: buy and hold return, controlling firm approach, reference portfolio, and the Fama and French (1993) model. The variety of methods used will enable a comprehensive view to be formed as to whether our findings are sensitive to the models employed. Our work is motivated by the ongoing discovery of biases in event studies involving long horizon returns. In our study, we are not directly interested in explaining long-run underperformance. Rather, we are interested in explaining underperformance as a mis-measurement.

Our results show that the existence of long run underperformance for Asian IPOs depends on the methodology used. This finding supports Gompers and Lerner's (2003) argument that the relative performance of an IPO sample depends on the method used to examine performance. Moreover, Ritter and Welch (2002) argue that the characteristics of an IPO sample, in terms of the time period and the selection criteria, also contribute to the observed differences in the findings of studies on the long run performance of IPOs.

Our study makes the following contributions to the current literature on initial public offerings. First, we focus on a large sample of Asian IPOs starting from 1991 to 2004. Unlike most existing studies which are limited to studying an individual country, our broader sample includes six countries in Asia and provides a new regional perspective. Second, we provide comparative analyses on Asian IPOs' stock performance on both aspects of initial underpricing and long term performance. These are important issues for portfolio managers, investors and policy makers alike.

The remainder of this paper is organized as follows: Section 2 gives an overview of the Initial Public Offerings (IPOs) literature, whilst Section 3 and 4 describes the dataset and methodologies used respectively. Following this, Section 5 discusses the empirical results from different methods. In Section 6 we analyse Asian IPO performance in an asset pricing framework before finally concluding in Section 7.

2. Overview of the IPO Literature

Empirical studies traditionally show that there are two main patterns associated with IPOs: short-run underpricing and long-run underperformance. The first significant study that attempts to measure performance based on stock returns is Ritter (1991). In this study, issuing firms during 1975 to 1984 were matched by industry, size and indices. Returns were calculated using cumulative average adjusted return with monthly rebalancing, as well as buy-and-hold returns over three years. It was found that issuing firms substantially underperformed in the three years subsequent to going public. Ritter (1991) explains

this by investors being overoptimistic about the prospects of firms that are issuing equity for the first time, and firms taking advantage of these 'window of opportunities'. IPO underperformance is not restricted to the United States. The study of Loughran, Ritter and Rydqvist (1994) finds that the IPO underpricing phenomenon exists in all 25 countries investigated, with higher IPO underpricing in developing markets. Consequently, despite the fact that IPOs represent exploitable investment opportunities if the stocks are purchased at the price set in the initial offer, the empirical evidence seems to reveal that they should not be held in the long run.

Short-run underpricing is a persistent feature of the IPO market. Most models of underpricing based on asymmetric information share the prediction that underpricing is positively related to the degree information asymmetry. However, Ritter and Welch (2002) point out that these models have been overemphasized; there is no single dominant theoretical explanation for underpricing. Thus, it is not so much a matter of which model is right, but a matter of the relative importance of different models. One explanation can have greater importance for some firms at particular times.

In terms of long-term performance, studies on individual Asian market IPOs have mixed findings. Chun and Smith (2003) and Kim, Krinsky and Lee (1995) find that, in Korea, IPOs outperform the stock market average in the long run. This finding is consistent with the superior average *ex post*-financial performance of IPOs; and government intervention also helps to partially explain these results. Dawson (1987) reports negative long-run performance for IPOs in Hong Kong and Singapore but positive for Malaysia. More recently, Nurwati, Campbell and Goodacre (2007) also document significant overperformance in Malaysian IPOs. As we can see, some findings for long-term returns in the Asian region contradict the consensus in the IPO literature that there is pervasive significant long-term underperformance.

Indeed, the evidence on long run post-IPO performance is controversial, with researchers reporting contrasting results. Ritter (1991) and Loughran and Ritter (1995), report that U.S IPO companies do experience significantly negative returns in the first three to five years following an IPO. In a more recent study on the U.S. market, Gompers and Lerner (2003) investigate 3,661 IPOs from 1935 to 1972 for holding periods up to five years after listing but their findings demonstrate that IPO performance depends on the method used to measure returns. Their results show some evidence of underperformance when value-weighted event-time buy and hold abnormal returns are used. However, the underperformance disappears when either equally weighted event-time buy-and hold or cumulative abnormal returns are employed. Moreover, the results they derived from the CAPM and Fama French

three factor regressions suggest that there is no abnormal performance. Espenlaub, Gregory and Tonks (2000) provide further evidence on the sensitivity of long-term performance to the choice of empirical methods. Using data on 588 IPO companies in the UK over the period 1985 to 1992, they compare abnormal performance based on five alternative benchmarks using both an event-time approach and a calendar-time approach and find significant differences.

The degree of underperformance varies over time. Ritter and Welch (2002) showed that IPOs matched on size and Book-to-Market (BM) during 1990-1994, averaged 3-year BHARs of -12.7 percent, but IPOs over 1995-1998 had an average BHAR of 11.6 percent. Similarly, the Fama-French intercept for the 1973-1989 period was an insignificant -0.15 but it was a significant -0.48 during 1990-2000.

Brav and Gompers (1997) find the level of performance related to the characteristics of the investment using a sample of IPO firms from 1972 to 1992. They replicate the Loughran and Ritter (1995) approach whilst extending it along several dimensions. They find that when issuing firms are matched on size and Book-to-Market ratios, IPOs do not underperform. In fact, underperformance is a characteristic of small, low book-to-market firms regardless of whether they are IPO firms or not. The results are supported by those of Ritter and Welch (2002), who find that IPOs – when matched on size and Book-to-Market ratios – have only very modest underperformance. Additionally, when studying IPOs issued from 1973 and 2001, they indicate that the direction and magnitude of bias in long horizon studies can be sensitive to sample characteristics such as the Book-to-Market ratio, size, exchange listing, and the time period studied. They recognise that this is one of many difficulties faced by academics, and thus the extent of IPO abnormal performance remains unclear.

3. Data

In our paper we consider the initial public offerings of a sample of six Asian countries (China, Hong Kong, Japan, Korea, Malaysia and Singapore) between January 1, 1991 and December 31, 2004. The offers included in our study have to meet the following three criteria: 1) Only common stock is involved in the offering and is being offered; 2) The stock is only traded in domestic currency; and 3) The stock is listed on the mainboard only (stocks traded in a secondary stock exchange is excluded from the analysis).

The issue characterization consists of the offering price, issuing date, amount and place issued, and retained equity and is obtained from the Securities Data Company (SDC) database. We collected a

sample of IPOs from SDC's new issues database over the sample period. Data on public offerings is matched with data on stock market performance collected from Thompson's DataStream. This included stock prices, market capitalization, Price-to-Book and Book-to-Market ratios.² After matching the two databases and data cleaning we proceeded to analyse a total of 4439 initial public offerings.³

4. Methodology

There exists a diverse range of IPO performance measures. Barber and Lyon (1997), Kothari and Warner (1997), Barber and Lyon (1999), Fama (1998) and Loughran and Ritter (2000) all argue that the method of performance measurement influences both the magnitude of the abnormal returns as well as the size and power of the statistical test. Brav, Geczy and Gompers (2000) state that Buy-and-Hold abnormal returns (BHARs) tend to over-estimate the long-run underperformance of IPOs and the use of benchmark market indices suffers from new listing bias, survivorship bias and rebalancing bias.⁴ However, Barber and Lyon (1997) emphasize the advantage of BHARs for measuring the investor's experience, as the use of mean monthly calendar-time returns (cumulative returns) does not adequately measure the returns obtained by an investor who holds a stock for a long period of time. The modelling problem becomes more severe as the measured horizon for IPO returns is extended because of the compounding effect. As such, we employ alternative methods of measurement in this study to ensure robustness and to assess the sensitivity of Asian IPO performance to the models used.

Hence, in this paper, we calculate both short- and long-term abnormal equity returns based on (i) market indices, (ii) size and Book-to-Market ratio (BM) matched control firms and (iii) size and Book-to-Market ratio (BM) matched reference portfolios. The first-day return of the IPO firms is defined as the percentage change of the first-day closing price of the IPO firms from the IPO offering prices. For short-term stock price performance, we also calculate the 1-month, 3-month, 6-month and 1-year Buy-and-Hold Abnormal Returns (BHARs) based on the market indices and the control firm approach. For long-term performance, we calculate the 3-year and 5-year BHARs based on different benchmarks.

² To match the two databases (Securities Data Company SDC and Thompson Financial Service DataStream) by firms CUSIP code, Stock code and Firm's name.

³ A total of 384 IPOs with erroneous first trading or issue dates, missing shares outstanding, missing first day closing price and an issue size exceeding shares outstanding were omitted in the data clean up.

⁴ New listing bias, arises because some firms in the market indices (benchmark portfolio) have begun trading only recently and have abnormally low returns; Survivorship bias, arises because only companies which were successful enough to survive until the end of the period are included, and Rebalancing bias, arises from compounding returns on the market indices (benchmark portfolio) assuming periodic rebalancing, whereas sample firm returns are compounded without rebalancing. These potential biases are illustrated in Barber and Lyon (1997).

The control firm approach involves selecting firms that have similar risk characteristics and financial variables as the sample firms to control for common risk factors that are related to expected returns. As such, our matching is performed on the basis of size and Book-to-Market ratios. Loughran and Ritter (1995) examined the statistical and economic significance of Book-to-Market effects, and come to their conclusion on IPO long run underperformance without controlling for Book-to-Market effects. Both firm size and Book-to-Market ratio would play a big role in the decision of firms to go public. Value firms tend to have higher Book-to-Market ratios, while growth firms have lower Book-to-Market ratios, and this distinction is important. If not controlled for, we may erroneously compare the returns on an IPO with high growth potential but at an early stage of its life cycle (small firm with a low Book-to-Market) with a control firm that is a 'long-term loser' with no future growth prospects (small with a high Book-to-Market ratio). We first filter for size, and then select a non-issuer with the closest Book-to-Market ratio. Barber and Lyon (1997) find that a size filter of 70-130 percent yields well specified test statistics⁵. We employ a filter of 50-150% as this method involves a tradeoff between having a close match in size or proximity in Book-to-Market.

For the reference portfolio approach, starting from 1st January 1991 we use all stocks in each country to create size quintile breakpoints with an equal number of firms in each size quintile. Size is defined with market capitalization (i.e. number of outstanding shares X stock price at the end of the preceding month). Within each size quintile we form five Book-to-Market portfolios with an equal number of firms to form 25 (5 X 5) size and Book-to-Market portfolios. Equally-weighted returns are calculated for each portfolio for each month. Each IPO firm (issue) is matched to its corresponding benchmark portfolio. The matching is repeated monthly, creating a separate benchmark for each issue. We eliminate all IPO firms from the various portfolios for five years after their equity issue.

Fama (1998) and Mitchell and Stafford (2000) do not recommend BHARs because BHARs will overstate (understate) the real BHARs if any portion of the return horizon is positive (negative). However, in this paper, BHARs are used because: (i) Cumulative Abnormal Returns (CARs) neglect compounding effects whereas BHARs include compounding effects and produce returns that reflect investor experience; and (ii) Barber and Lyon (1997) state that CARs are subject to a measurement bias, a new listing bias and a skewness bias. On the other hand, the BHAR which is calculated as the rate of return for the sample firm less the rate of return for a reference portfolio is subject to a new listing bias, a skewness bias and

⁵ Firms with negative Book-to-Market ratios and missing data are excluded from analysis.

rebalancing bias. On balance, Barber and Lyon (1997) recommend BHARs in long-run studies because the test statistic is well specified and corresponds to an implementable trading strategy that does not make unrealistic assumptions about transaction cost (cost of frequent rebalancing). The BHAR for horizon τ is defined as:

$$BHAR_{k\tau} = \prod_{t=1}^{\tau} (1 + ER_{it}) - \prod_{t=1}^{\tau} (1 + CR_{jt}) \quad (1)$$

where $BHAR_{k\tau}$ is the Buy-and-Hold abnormal returns for k sets of comparison; ER_{it} is the Buy-and-Hold investment return for the event firm i at day (month) t whereas CR_{jt} is the Buy-and-Hold investment return for the control firm j at day (month) t . The return windows we use to capture long-run performance are 3 years and 5 years respectively. To furnish insight into the performance of new securities since their IPO date, a 1 year return window is also evaluated. We define a year as 12 x 21 trading day intervals, hence a 1-year window has 252 trading days, a 3-year window has 756 trading days and 5-year window has 1,260 trading days.

For each event window, a conventional t-statistic based on the cross-sectional standard deviation of rated firms' abnormal returns is calculated, which is then used to test the significance of the compounding BHARs. The conventional t-statistic is defined as:

$$t_{BHAR} = \frac{BHAR_p \times \sqrt{(n)}}{\sigma(BHAR_p)} \quad (2)$$

where $BHAR_p$ is the sample average and $\sigma(BHAR_p)$ is the cross-sectional sample standard deviation of the cumulative BHARs for n number of firms.

5. Results and Analyses

5.1 Comparing Initial Returns of Asian IPOs

In Table 1, we present the number of IPOs and first-day initial returns of the IPO firms across six major markets in the Asia-Pacific region in the period between 1st January 1991 and 31st December 2004. All countries have positive and statistically significant initial returns. The main finding of Table 1 is that

whilst the degree of underpricing is variable across countries there exists prevalent underpricing of IPO issues in Asia. Hence, investors can earn abnormal returns by simply subscribing to the IPO firms and selling them at the end of the listing day.

<Insert Table 1>

Interestingly, initial underpricing in Asian emerging markets, China (202.63%), Korea (70.30%) and Malaysia (61.81%) exceed those in developed markets, Hong Kong (21.43%), Japan (34.04%) and Singapore (33.10%) where listing requirements are more stringent. Recent studies like Jelic, Saadouni and Briston (2001) document that high initial returns are a feature of immature IPO markets where the regulatory environment is weak and investment bankers have failed to adequately manage the process of listing new issues.

Our results show that the level of excess returns from IPO underpricing in the Asian region has gradually increased over the 1990s. Until the 1997 financial crisis, Asian IPOs had been typified by abnormal excess returns to investors. But since the beginning of the 1997 crisis, the IPO market has declined significantly. During the “Technology Boom” period of 1999-2000, there was a resurrection of Asian IPOs accompanied by a greater degree of underpricing.

IPO initial returns in other geographical regions have shown a similar pattern of underpricing over long periods of time. Underpricing in the U.S. averages between 10 and 20 percent but there is a substantial degree of variation over time. The average first-day return was 15% during 1990-1998, 65% during 1999-2000, and 12% during 2001-2004.⁶ During the “Hot Issue Period”, in 1999 and 2000, the average IPO was underpriced by 71% and 56%. Ljungqvist (2005) report average initial IPO underpricing for 19 European countries over the period 1990-2003, and 8 Latin American countries over the period 1990- 2001. Among European markets, 18 out of the 19 markets had initial underpricing less than 40%; and in Latin American countries, 7 out of 8 markets had initial underpricing less than 10%. Hence, our results on Asian IPOs show a substantially larger degree of average initial underpricing in comparison with U.S., the Europe, and Latin America. For Asian IPOs in our sample the average first-day return was 73% during 1990-1998, 70% during 1999-2000, and 57% during 2001-2004. However, the more developed markets, Hong Kong (21.43%), Japan (34.04%) and Singapore (33.10%) experienced a similar level of underpricing compared with U.S. and European markets for example U.K (28%), Germany (35%)

⁶ Underpricing averages are based on the data available from Jay Ritter’s website (<http://bear.cba.ufl.edu/ritter/ipodata.htm>).

and Switzerland (17%). Furthermore, the extent of IPO underpricing is much higher in Asia than in Latin America.

We find that China has the highest level of initial returns in the Asian region in almost every year within the period studied. This may be explained by its distinctive corporate governance system, security laws and lack of legal enforcement. Our results indicate that the market adjusted first-day return is 202.63 percent with a t-statistic of 10.504 in line with previous studies on Chinese IPOs (Su and Fleisher (1999), Chen, Firth and Kim (2004) and Chan, Wang and Wei (2004)) that also find that there is evidence of extreme initial underpricing. Reasons identified by existing studies for the large degree of IPO underpricing in China include the pre-delisting uncertainty of the IPO firms, uncertainty and information asymmetry in the transition from a closed economy to an open economy, substantial state or quasi-state share ownership, lengthy time gap between the offering and listing dates and limited investment opportunities for investors.

In contrast to China, Hong Kong has the lowest level of initial returns. Previous IPO studies on Hong Kong such as McGuinness (1992) find that there exists 17.6 percent initial underpricing of the IPO firms. When Cheng, Cheung and Po (2004) split their sample into pre-and post-1997 Asian Financial Crisis they find that investors could earn 20.3 percent before the crisis and only 6.5 percent after the crisis. Consistent with these studies, we find clear evidence of initial underpricing in Hong Kong IPO firms. The initial first-day return is 21.43 percent (t-statistic 2.844) which is statistically significant at the 1 percent level. The low degree of underpricing in Hong Kong is in line with that documented in other developed markets within the region like Japan (Hamao, Packer and Ritter (2000)) and Singapore (Lee, Taylor and Walter (1996)).

For all other developing markets in Asia, there is strong evidence of initial underpricing. In particular, during 2000 to 2002, Korea experienced the highest initial return within the region. This may be due to the effects of the 'Internet Bubble', followed by its advanced development and expansion of the technology industry. Consistent with Kim, Krinsky and Lee (1993) we find a significant 70.3% initial return for Korean IPOs for a more recent sample period. Lastly, our 1-day returns for Malaysian IPOs are similar to the findings made in Jelic, Saadouni and Briston (2001) on a yearly basis. Extreme initial underpricing of the Malaysian IPOs may be due to market inefficiencies and imperfections as well as government manipulation.⁷

⁷ The listing procedure is similar to that of Hong Kong and Singapore, however, government authorities constrained the offer price during the 1980s.

5.2 Comparing Short and Long Term IPO performance based on alternative benchmarks

Next, we analyse the stock performance of Asian IPOs based on alternative benchmarks: 1) Local market Index, 2) Size and Book-to-Market matched control firms and 3) Reference Portfolios. Inspection of Table 2 reveals results differ when different benchmarks are adopted. In fact, Lyon, Barber and Tsai (1999) claim that the analysis of long run abnormal returns is a treacherous game and this is precisely what we encounter in our study. Our results show the issue of benchmark misspecification is also a problem in Asian markets.

<Insert Table 2 here>

We present the post-listing Buy-and-Hold Abnormal Returns (BHARs) for the Chinese IPOs which issue A-shares in two stock exchanges (Shanghai Securities Exchange and Shenzhen Stock Exchange) based on the market indices. The BHARs of the IPOs are compared with the Shanghai (Shenzhen) A share index. We find that the BHARs are consistently positive and statistically significant at the one percent level in all event windows of interest. The 1-month, 3-month and 6-month BHARs are 63.63 percent (t-statistic 5.326), 59.14 percent (t-statistic 5.664) and 51.07 percent (t-statistic 5.420) respectively. For the long horizon, the BHARs still remain significantly positive, performing better than the market indices for up to five years. Contrary to the results benchmarked against the market indices, there is no evidence of IPO outperformance when they are compared with the control firm. The first-, sixth- and twelfth- month BHARs are positive but statistically insignificant. For the long-run horizon, the 3-year and 5-year BHARs are -8.16 percent and -22.47 percent with t-statistics of -2.533 and -4.999 respectively. Our results suggest that Chinese IPO firms underperform in the long-run based on the control firm approach.

We compute the BHARs based on the reference portfolios, and all event windows of interest are negative. The 3-year BHARs are -22.6 percent with t-statistics of -9.730, these results are consistent with Chan, Wang and Wei (2004). Our results based on the reference portfolio approach suggest that there exists long-term underperformance of Chinese IPOs, which is consistent with the previous study.

In terms of Hong Kong's IPOs relative to the Hang Seng Index, the 1-month, 3-month, 6-month and 1-year BHARs are 13.52 percent, 12.85 percent, 15.92 percent and 14.75 percent with t-statistics of 2.705, 3.139, 4.584, and 2.945 respectively. For the long-run horizon, the BHARs are negative and statistically significant at the 1 percent level. The 3-year and 5-year BHARs are -26.66 percent and -39.60 percent with t-statistics of -3.266 and -3.909 respectively. This clearly suggests that Hong Kong

IPO firms underperform in the long run. Our results based on control firms are consistent with Chan et al. (2007)'s findings of long-term underperformance of Hong Kong's Growth Enterprise Market stocks relative to alternative control firms, based on the size and Book-to-Market ratio, size and industry, and Book-to-Market ratio and industry. Our results suggest that based on matched control firm approach, the 1-month, 3-month, 6-month and 1-year BHARs are all negative but statistically insignificant. In the long-run event windows of interest, the 3-year and 5-year BHARs are -65.27 percent and -41.98 percent with t-statistics of -4.221 and -2.34 respectively. For reference portfolio approach the results are similar with the main findings based on the control firm approach. The 1-year, 3-year and 5-year BHARs are -38.97 percent, -27.9 percent and -44.55 percent with t-statistics of -3.666, -2.553 and -2.284 respectively. Therefore, the results based on the reference portfolio approach suggests that long-term underperformance of IPOs does exist in the Hong Kong market.

Combined results indicate that there exists long-term underperformance of the Hong Kong IPO firms no matter which benchmarks are adopted for the long-run. However, conflicting results are obtained for the short-term performance of the Hong Kong IPO firms. Whilst positive and statistically significant BHARs are obtained based on the Hang Seng Index, negative but statistically insignificant BHARs are achieved based on control firm and reference portfolio approaches.

We present the BHARs for the Japanese IPO firms based on the Nikkei Index. Our results suggest that there is no evidence of long-term underperformance of the Japanese IPO firms. The 1-month, 3-month, 6-month and 1-year BHARs are 16.89 percent (t-statistic 1.981), 11.86 percent (t-statistic 2.552), 10.49 percent (t-statistic 1.988) and 12.14 percent (t-statistic 2.020). In long-run horizons, the 3-year and 5-year BHARs based on the market index are positive but with insignificant t-statistics. This implies that Japanese IPO firms do not underperform in the long run.

Different results are obtained by using the control firm approach, as the 1-month and 3-month BHARs are negative with insignificant t-statistics. However, the 6-month, 1-year and 3-year BHARs are -6.41 percent (t-statistic -2.624), -15.09 percent (t-statistic -1.966) and -14.12 percent (t-statistic -2.724). Our results based on control firm approach suggests that Japanese IPOs perform poorly in the long run. Similar to the control firm approach, the BHARs based on reference portfolios are negative and statistically significant in most event windows. In the long run, the 3-year and 5-year BHARs are -20.9 percent and -36.4 percent with t-statistic of -4.228 and -5.007 respectively. Therefore, our results based on the reference portfolios suggest that there exists short-term and long-term underperformance of the Japanese IPOs. These results are consistent with Hamao, Packer and Ritter (2000), those findings implied

that the Japanese IPOs performed more poorly than a portfolio of matching firms in a three-year investment horizon space. Again, different conclusions are drawn based on the different benchmarks. Underperformance of the IPOs exists based on control firms and reference portfolios, while there is no such evidence for the market indices which are similar with Chinese findings.

There is no evidence of long-term underperformance of Korean IPO firms based on the Korean stock market index. Chun and Smith (2003) investigate a sample of 325 Korean IPOs during their sample period from 1986 to 1995. The authors find that the 1-year, 3-year and 5-year BHARs based on the market index are 23.5 percent, 35.6 percent and 77.3 percent with t-statistics of 2.98, 2.67 and 3.93 respectively. In our study, the 1-year, 3-year and 5-year BHARs are 40 percent (t-statistic 2.064), 36.31 percent (t-statistic 1.671) and 43.02 percent (t-statistic 1.993) respectively. Our BHARs are different to the corresponding BHARs found in Chun and Smith (2003) due to different sample periods studied. However, we can confidently conclude that Korean IPOs outperform the stock market index over time. There is no evidence of long-term underperformance based on control firm approach either. For the long-run horizon, the 3-year and 5-year BHARs are positive and statistically insignificant. Our BHARs based on the reference portfolio approach contrast with the results based on the market index and control firm approach. The BHAR is -14.6 percent after the first year, and drops to -57.6 percent after 3 years, and -60.3 percent 60 months after listing. Our results imply that there is some evidence of long-term underperformance of Korean IPOs based on the reference portfolio approach. Again, we achieve different results based on different benchmarks.

For Malaysia, results based on local market index in all event windows of interest are positive and statistically significant at the 1 percent level. The 1-month, 3-month and 6-month BHARs are 37.05 percent (t-statistic 5.957), 38.08 percent (t-statistic 5.518) and 30.64 percent (t-statistic 4.738). Jelic, Saadouni and Briston (2001) finds 1-year and 3-year market-adjusted BHARs of 12.82 percent and 21.98 percent respectively in the study period from 1980-1995. Similarly, our results suggest that positive and statistically significant excess returns exist in the long run. The 1-year, 3-year and 5-year BHARs are 34.16 percent, 25.93 percent and 27.55 percent with t-statistics of 3.347, 2.727 and 2.864 respectively. Positive long run returns feature in other earlier studies relating to Malaysian IPOs such as Dawson (1987).

The short-term BHARs based on the control firm approach are weaker compared with BHARs based on the market index, but they are still positive and statistically significant. The 1-month, 3-month and 6-month BHARs are 14.17 percent, 12.90 percent and 21.24 percent with t-statistics of 4.170, 3.686

and 3.521 respectively. For the long-run horizon, the 1-year, 3-year and 5-year BHARs are positive but insignificant. Our results based on the reference portfolio approach suggest that underperformance exists for Malaysian IPOs in the medium- and long-run horizon. We find negative and statistically significant BHARs. The 1-year, 3-year and 5 year BHARs are -5.9 percent, -35.0 percent and -71.7 percent respectively. Our results based on the reference portfolio approach are in contrast the previous findings in Malaysian IPOs studies over the long-run horizon. In short, we observe an outperformance of Malaysian IPOs based on the market index and control firm approach, whereas there is an evidence of long-term underperformance based on the reference portfolio approach. Conflicting results may due to benchmark misspecification.

For Singaporean results based on the market index, the 1-month, 3-month, 6-month and 1-year BHARs are 19.87 percent (t-statistic 3.484), 23.42 percent (t-statistic 3.752), 24.21 percent (t-statistic 4.124) and 12.81 percent (t-statistic 3.123) respectively. For the long-run horizon, the 3-year BHAR is positive; the 5-year BHAR is negative but insignificant. Consistent with Ritter (1991) we document that long-term underperformance does not exist in Singaporean IPO firms. However, we cannot find any statistically significant BHARs based on control firm approach.. Based on the reference portfolio approach, in the long run, the 3-year and 5-year BHARs are -20.3 percent and -39.9 percent with t-statistics of -2.092 and -2.186. Our results imply that Singaporean IPOs perform poorly in the long run based on the reference portfolio. Again, different conclusions are drawn on the basis of different benchmark specifications.

In summary, based on the results across six major Asian financial centers, the market index approach suggests that short term outperformance occurs in all countries. Except for Hong Kong, we cannot observe negative and statistically significant BHARs in the long-run horizon based on the market index. The size- and Book-to-Market control firm approach indicates obvious long-term underperformance of the IPO firms in China, Hong Kong and Japan, while insignificant returns are found in the other three countries. Hence, we can infer that IPO firms perform poorly from the perspective of the reference portfolio approach. We find conflicting results are obtained when different benchmarks are adopted.

6. Explaining IPO returns with the Fama-French Three-Factor Model

We employ the three-factor model of Fama and French (1993) in explaining the time-series variations of IPO returns over time. We assume an event period of five years. For each calendar month,

we calculate the return on a portfolio composed of IPO firms within the last five years of the calendar month. The calendar-time return on this portfolio is used to estimate the following regression:

$$R_{pt} - R_{ft} = \alpha_0 + \alpha_1 (R_{mt} - R_{ft}) + \alpha_2 SMB_t + \alpha_3 HML_t + \varepsilon_{it} \quad (3)$$

Where R_{pt} is the simple monthly return on the calendar-time portfolio, R_{ft} is the monthly short-term (three-month deposit) interest rate, R_{mt} is the return on an equal-weighted market index, SMB_t is the difference in the returns of portfolios of small stocks and big stocks, HML_t is the difference in the returns of portfolios of high book-to-market stocks and low book-to-market stocks. The portfolios, which are constructed at the end of each June, are the intersections of two portfolios formed on size (Market Capitalization) and three portfolios formed on the ratio of Book-to-Market. The size breakpoint for year t is the median (Market Capitalization) market equity at the end of June of year t . Book-to-Market for June of year t is the book equity for the last fiscal year end in $t-1$ divided by size for December of $t-1$. The Book-to-Market breakpoints are the 30th and 70th (country) percentiles.

<Insert Table 3 here>

The results of each country obtained by using the Fama and French three-factor model (1993) confirms the non-existence of long-run abnormal returns (underperformance). The intercept takes negative but insignificant values.

Nevertheless, only the market premium is significant. For countries like China, Malaysia, and Korea, they have a positive factor loading for SMB, indicating that the outperformance (relative to the market index) of IPO firms is due to the small firm effects. And for other countries, as neither the SMB nor HML have statistically significant coefficients. Fama-French regressions tend to have negative intercepts for portfolios of small growth (low Book-to-Market) stocks, whether or not IPOs are included in the portfolio (Brav and Gompers, 1997). The model is biased towards finding IPO underperformance since a large fraction of IPOs fall into this category. As Fama(1998) highlights, the number of firms in the IPO portfolio changes through time, creating residual heteroskedasticity that can affect inferences based on the intercept.

In summary, when using Buy-and-Hold returns based on market Indices, there exists abnormal returns that are occasionally significant in certain periods. Nevertheless, when using the other two methodologies – calendar-time portfolios and the Fama and French three-factor model, which are based

on the calculation of mean monthly calendar-time returns – the existence of long-run underperformance is supported. The magnitude of the long-run abnormal returns depends on the methodology and the benchmark used for the return adjustment on IPOs.

Consequently, the existence or otherwise of long-run underperformance in IPOs is a question of methodology that depends on the form of estimating the long-run abnormal returns. In short, as argued by Fama (1998), all the methods used for the estimation of abnormal returns are subject to problems arising from the poor specification of the models and no method is able to minimise these problems for all classes of events. Even models, such as the Fama French three-factor model and benchmark matched on size and Book-to-Market ratio, controlling for variations in the returns influenced by these two variables, give rise to different estimations of the abnormal returns (Fama, 1998)⁸.

7. Conclusion

This study provides comparative pan-Asian analyses on the stock performance of Asian IPOs based on alternative methodologies. The results of the long-run performance of the IPOs made between 1991 and 2004, in different event windows, reveal, that conflicting results are obtained when different benchmarks are adopted. One of the possible explanations for this phenomenon is that our results may be subject to benchmark mis-specification, which is normally found in a long-run event study. The magnitude of abnormal returns depends on the methodology used and on the benchmark used for the return adjustment on IPOs. The existence or otherwise of long-run underperformance in IPOs is a methodological issue that depends on the approach used in estimating the long-run abnormal returns. Thus, long-run abnormal returns are present when BHARs are used, but not when using other methodologies, like monthly calendar-time returns and the control firm approach. Thus, we contribute new evidence on Asian IPOs in this study to support the inconsistencies in measures of IPO performance in financial research. The measure of IPO performance remains an unsatisfactory issue and warrants further research in this area.

⁸ It should be noted that Fama and French (1993) document that the three-factor model has systematic problems in explaining the average returns on categories of small stocks.

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Table 1

Initial Returns of IPOs among Asian countries

Table 1 shows the number of and first-day raw returns (in percentages) of the IPO firms across the six financial markets in the Asian Region over the period from 1st Jan 1991 to 31st Dec 2004. The first-day initial raw return is defined as the difference between the IPO's first-day closing price and the offer price divided by the offer price. T-statistics are shown in brackets. ** and * denotes significance at the 1 and 5% levels respectively.

	China		HK		Japan		Korea		Malaysia		Singapore	
	No. of IPOs	Initial return	No. of IPOs	Initial return	No. of IPOs	Initial return	No. of IPOs	Initial return	No. of IPOs	Initial return	No. of IPOs	Initial return
1991	-	-	31	17.96 (1.286)	44	15.98 (1.670)	14	33.20* (2.404)	27	43.58** (3.425)	11	27.40* (2.039)
1992	22	1299.50** (9.484)	43	23.48 (1.838)	15	14.85 (1.049)	7	37.25* (2.018)	19	51.71* (2.097)	12	24.01 (1.055)
1993	92	144.74** (5.782)	48	22.54** (2.966)	70	12.73 (1.215)	7	95.30 (1.216)	36	102.77** (3.422)	18	54.74 (1.924)
1994	29	64.11** (2.914)	32	21.95 (1.311)	112	16.22* (2.038)	24	51.07** (2.709)	56	89.11** (8.539)	28	22.15** (3.439)
1995	14	50.39 (1.204)	17	7.71 (1.412)	144	18.72** (3.294)	32	43.60 (1.799)	36	97.69** (7.645)	15	19.44 (1.555)
1996	134	102.03** (6.663)	29	16.21 (1.147)	121	24.39 (1.554)	36	33.41 (1.832)	82	161.35** (10.614)	13	47.96 (1.149)
1997	172	145.48** (9.403)	50	47.17* (2.013)	110	20.48** (2.617)	18	44.69** (4.764)	70	39.44** (2.802)	28	45.40** (2.602)
1998	93	143.78** (8.017)	19	20.04 (1.579)	65	51.10* (2.293)	4	18.28* (2.367)	11	4.31 (0.707)	15	26.16** (2.883)
1999	57	109.92** (6.899)	29	25.54** (3.067)	82	64.44** (2.840)	35	57.13* (2.405)	14	25.36** (3.023)	62	54.26** (4.790)
2000	116	148.15** (10.869)	58	18.98** (3.478)	156	84.55* (2.093)	5	158.50** (3.250)	36	56.33** (7.053)	66	37.30** (2.769)
2001	55	134.75** (7.996)	65	22.81** (3.534)	132	47.05** (2.950)	19	152.16** (2.697)	15	65.89 (1.957)	23	4.39 (1.777)
2002	56	123.37** (10.488)	77	21.62** (3.795)	101	39.52** (4.625)	77	125.35 (1.689)	74	69.19* (2.334)	26	25.32 (1.608)
2003	54	62.97** (8.173)	34	12.88* (2.373)	99	32.23 (1.918)	70	81.08* (2.475)	100	17.18* (2.064)	28	43.44** (2.669)
2004	88	104.97** (2.622)	31	21.06 (1.753)	141	34.36** (3.494)	62	53.14 (1.843)	132	41.44** (2.934)	39	31.43** (2.800)
1991-2004	982	202.63** (10.504)	563	21.43** (2.844)	1392	34.04* (3.137)	410	70.30** (4.233)	708	61.81** (11.144)	384	33.10** (4.880)

Table 2
Short and Long Term Stock Performance of Initial Public Offerings based on Different Benchmarks

This table presents the short and long term BHARs (in percentages) of Initial Public Offerings in six Asian countries from 1991 to 2004 based on different benchmarks - Market Index, Control Firm Approach and Reference Portfolio. T-statistics are shown in brackets Significance at the 1% and 5% levels are denoted with ** and * respectively.

		1-month	3-month	6-month	1-year	3-year	5-year	
China	Market Index	63.63**	59.14**	51.07**	42.64**	32.56**	28.01*	
		(5.326)	(5.664)	(5.420)	(5.335)	(3.688)	(2.370)	
	Contolling firm	0.54	1.60	2.69	-3.06	-8.16*	-22.47**	
		(0.739)	(1.322)	(1.942)	(-1.682)	(-2.533)	(-4.999)	
	Reference Portfolio	-0.50	-0.60	-3.20*	-7.00**	-22.60**	-31.80**	
		(-1.439)	(-0.955)	(-2.482)	(-4.037)	(-9.730)	(-9.090)	
	HK	Market Index	13.52**	12.85**	15.92**	14.75**	-26.66**	-39.60**
		(2.705)	(3.139)	(4.584)	(2.945)	(-3.266)	(-3.909)	
	Contolling firm	-2.84	-4.76	-17.46	-20.41	-65.27**	-41.98*	
		(-1.463)	(-0.816)	(-1.736)	(-1.235)	(-4.221)	(-2.340)	
	Reference Portfolio	5.22	-2.25	-9.00	-38.97**	-27.90*	-44.55*	
		(1.267)	(-0.189)	(-0.610)	(-3.666)	(-2.553)	(-2.284)	
Japan	Market Index	16.89*	11.86*	10.49*	12.14*	4.84	2.78	
		(1.981)	(2.552)	(1.988)	(2.020)	(1.144)	(1.136)	
	Contolling firm	-1.55	-2.12	-6.41**	-15.09*	-14.12**	-7.02	
		(-1.214)	(-1.245)	(-2.624)	(-1.966)	(-2.724)	(-1.179)	
	Reference Portfolio	-2.80**	-5.50**	-7.00**	-4.40	-20.90**	-36.40**	
		(-3.138)	(-4.472)	(-3.397)	(-0.938)	(-4.228)	(-5.007)	
	Korea	Market Index	34.30**	34.03**	38.63*	40.00*	36.31*	43.02*
		(3.344)	(2.950)	(2.265)	(2.064)	(1.671)	(1.993)	
	Contolling firm	4.10	4.36	-4.17	2.64	3.20	1.49	
		(0.777)	(0.800)	(-0.442)	(0.310)	(0.188)	(0.138)	
	Reference Portfolio	1.50	2.30	-2.70	-14.60	-57.60	-60.30**	
		(0.419)	(0.437)	(-0.394)	(-1.446)	(-1.429)	(-3.066)	
Malaysia	Market Index	37.05**	38.08**	30.64**	34.16**	25.93**	27.55**	
		(5.957)	(5.518)	(4.738)	(3.347)	(2.727)	(2.864)	
	Contolling firm	14.17**	12.90**	21.24**	8.74	5.14	11.32	
		(4.170)	(3.686)	(3.521)	(1.660)	(0.539)	(0.575)	
	Reference Portfolio	-0.40	1.70	-2.50	-5.90	-35.00**	-71.70	
		(-0.234)	(0.565)	(-0.628)	(-1.099)	(-3.463)	(-1.290)	
	Singapore	Market Index	19.87**	23.42**	24.21**	12.81**	4.18	-3.52
		(3.484)	(3.752)	(4.124)	(3.123)	(1.739)	(-1.161)	
	Contolling firm	-4.18	-0.70	0.52	0.22	-7.91	-6.21	
		(-1.339)	(-0.223)	(0.124)	(0.033)	(-0.931)	(-0.586)	
	Reference Portfolio	-0.30	-0.10	2.20	-1.30	-20.30*	-39.90*	
		(-0.160)	(-0.023)	(0.430)	(-0.253)	(-2.092)	(-2.186)	

Table 3**Time-series regressions of monthly IPO portfolio returns on the Fama and French three-factors**

This table reports the results of the time-series regressions of monthly IPO portfolio returns with the Fama and French three-factor model. R_{mt} is the return on the equal-weighted index of the market in month t . R_{ft} is the three-month deposit interest rate which is a proxy for the risk-free rate. SMB_t is the return on small firms minus the return on big firms in month t ; and HML_t is the return on the high book-to-market stock portfolio minus the return on the low Book-to-Market stock portfolio in month t . T-statistics are shown in brackets Significance at the 1% and 5% levels are denoted with ** and * respectively.

$$R_{pt} - R_{ft} = \alpha_0 + \alpha_1[R_{mt} - R_{ft}] + \alpha_2SMB_t + \alpha_3HML_t + \varepsilon_t \quad (3)$$

	α_0	α_1	α_2	α_3	R^2
China	-0.002	0.972**	0.313**	0.032	0.973
	(-1.64)	(30.98)	(4.49)	(0.28)	
HK	-0.004	0.797**	0.149	0.120	0.858
	(-1.01)	(8.77)	(1.12)	(0.27)	
Japan	-0.005	0.776**	-0.273*	-0.229	0.769
	(-1.77)	(10.45)	(-1.99)	(-0.796)	
Korea	-0.008	0.645**	0.349**	0.231	0.836
	(1.23)	(9.75)	(3.34)	(1.21)	
Malaysia	-0.004	0.810**	0.515**	-0.117	0.879
	(-0.79)	(11.76)	(6.79)	(-1.66)	
Singapore	-0.002	0.824**	0.012	0.034	0.785
	(-1.74)	(9.54)	(1.03)	(0.97)	