

The Underperformance of the Growth Enterprise Market in Hong Kong

Abstract

This paper examines the stock return performance of the IPO stocks which are listed on the Growth Enterprise Market (GEM) in Hong Kong. By using several benchmarks, over three years, this paper finds that the results produced are sensitive to the benchmark employed. The two factors causing the underperformance of GEM stocks are the 'technology boom' and 'IPO effects'. This suggests that appropriate benchmarks are very important for assessing the performance of newly issued stocks. The results of the cross-sectional analyses suggest that the Hong Kong GEM is a unique market. Since at least 70% of the IPO stocks listed on the GEM are technology stocks, the 'technology' factor outweighs the various hypotheses advocated by previous researchers to explain the poor performance of newly listed stocks.

JEL Classification: G14; G15; G39

Keywords: Initial Public Offerings, Technology, Emerging Stock Market, Equity Performance

1. Introduction

The Hong Kong Growth Enterprise Market (GEM) has been established as a market designed to accommodate companies to which a high investment risk may be attached. In particular, companies may list on the GEM with neither a track record of profitability nor any obligation to provide forecasts on its future profitability.

This paper investigates the stock performance of this newly established secondary market in Hong Kong. Several studies, including Ritter (1991) and Loughran and Ritter (1995), document severe underperformance of Initial Public Offerings (IPOs). However, recent literature has suggested that the poor performance of IPOs extends to other firms with similar characteristics (Brav and Gompers (1997), and Ritter and Welch (2002)). This paper seeks to assess whether IPO underperformance exists, or whether it is merely a result of misspecified tests in previous studies using the Hong Kong GEM data.

There are several theories attempting to explain IPO long run underperformance. Miller (1977) states that costly short-selling and heterogeneous beliefs among investors ensure only the most optimistic investors or speculators will subscribe to IPOs. However, after the initial public issue, more information becomes available about a firm over time, and the variance of investor opinions decreases. The valuation of the most optimistic investors converges to the mean, and as a result, prices fall. It is argued that this hypothesis is consistent with the patterns in the 1999-2000 internet bubble. On the other hand, Eckbo and Norli (2001) argue that IPOs have low returns because they actually have low risk, as indicated by high liquidity and low leverage. However, in a separate study, Ritter and Welch (2002) find a beta of 1.73 for their portfolio of IPOs, indicating a high exposure to market risk. Meanwhile, Teoh, Welch and Wong (1998) attribute some of the poor post-IPO stock performance to optimistic

accounting early in the life of the firm in order to induce investors to purchase their issue.

However, persistent underperformance brings into question the rationality of the majority of investors who hold IPOs in the long run. This suggests that investors should have access to a profitable trading strategy. Proper benchmarks must be constructed and tested before concluding that 'IPO underperformance' is evidence of market inefficiency. Other studies in the literature, suggest an international aspect to IPO underperformance. For example, Jain and Kini (1994), Kutsuna, Okamura, and Cowling (2002) and Kim, Kitsabunnarat and Nofsinger (2002) provide evidence to show that firms exhibit significant underperformance subsequent to IPOs, in the US, Japan and Thailand respectively.

Using a sample of 85 GEM IPOs in the period from November 1999 to August 2001, this paper attempts for the first time in this new emerging stock market, to examine IPO performance. Our methodology builds on that previously used in Loughran and Ritter (1995). In addition to calculating the Buy-and-hold Abnormal Returns (BHARs) based on the Hang Seng Index, we also calculate the BHARs based on the industry and book-to-market ratio, the industry and size, and the size and book-to-market matched control firm approaches. Following Barber and Lyon (1997), we use BHARs over a three-year holding period, and conduct a parametric t-statistic test. We also perform regression analyses to facilitate our investigation into the determinants of IPO performance on the GEM.

This paper makes three contributions to the IPO literature. Firstly, we find that IPO stock performance is sensitive to the benchmark employed. There are two reasons for the underperformance of GEM stocks - the 'technology boom' and 'IPO effects'. By splitting the IPO sample into non-technology and technology GEM

stocks, we find that underperformance occurs only on the technology stocks one year after their official listings and not on the non-technology stocks, based on the Hang Seng Index BHAR calculations. By matching the GEM firms with control firms based on size and industry or book-to-market (BTM) and industry, we eliminate the impacts of the ‘technology boom’ or other effects which are irrelevant to the IPO effects. There is evidence of underperformance of GEM firms 2 years after their official listings. This suggests that ‘IPO effects’ do exist in the HKGEM. Secondly, by splitting the sample based on the median of the initial returns and the median of the retention of ownership, our results do not support the agency and signaling hypotheses (Jensen and Meckling (1976) and Leland and Pyle (1977)). Since at least 70% of the IPO stocks listed on the GEM are technology stocks, HKGEM is a unique market and we reveal that the technology effect predominantly explains the underperformance of the GEM stocks in the period from 1999 – 2001. Finally, we find that the GEM firms using the “offer for placing” listing method performs better than firms using the “offer for subscription” and “offer for sale” listing methods.

The remainder of the paper is organized as follows: Section 2 introduces the Hong Kong GEM; Section 3 reviews the existing literature on IPO underperformance; Section 4 describes the dataset used; Section 5 describes the methodology; Section 6 discusses the empirical results and finally, Section 7 concludes.

2. Background¹

Hong Kong, as a gateway to Mainland China and with close business ties to other Asian economies, is strategically placed in a high growth region in which numerous companies with high growth potential are emerging. Furthermore, Hong Kong has been developed into an international financial center and has provided many Asian and multinational companies with fund raising opportunities. The following are the major reasons for developing the GEM in Hong Kong:

- The strong identity effect

The Main Board has been dominated by conglomerates, as well as finance and property companies. The GEM offers an independent and recognized market for growth companies, particularly those engaged in innovation and technology to list.

- An easier access to capital

Many growth companies find it difficult to meet the profit requirements of the Main Board to qualify for listing thereon. For the GEM, there is no profit history requirement and therefore, companies without a proven track record of performance but with growth potential can now gain access to equity capital.

- Technology development

The GEM can complement the HKSAR Government's initiative to promote the development of high technology and high value - added industries in Hong Kong.

There is also no liquidity guaranteed in the securities traded on the GEM. In guiding our study on this new emerging stock market, we review the existing

¹ Summary of the 'GEM Investor Guide' issued by The Stock Exchange of Hong Kong, December 1999. The principal means to disseminate information on the GEM is via publication on the internet website operated by the Stock Exchange. Listed companies are not generally required to issue paid announcements in gazetted newspapers.

literature in the next section.

3. Past literature

Much of the existing literature documents a significant decline in stock performance subsequent to an IPO issue. The short run underpricing is a persistent feature of the IPO market. Most of the existing theories or models of underpricing based on asymmetric information share the prediction that underpricing is positively related to the degree of asymmetric information. Ritter and Welch (2002) point out that these models have been overemphasized; there is no single dominant theoretical cause 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 be of more significance for some firms at different times.

The first significant study to measure performance based on stock returns is Ritter (1991). In this study, issuing firms during 1975 to 1984 are matched by industry, size and market indices. Returns are calculated using cumulative average adjusted returns with monthly rebalancing, as well as buy-and-hold returns over three years. This study finds issuing firms especially the relatively young growth companies substantially underperform in the 3 years subsequent to going public, specifically the average buy-and-hold returns for a sample of 1,526 IPOs of common stock is 34.47% in the 3 years after going public. However, a control sample of 1,526 listed stocks, matched by market value and industry, generates an average total return of 61.86% over the same 3 years period. Ritter (1991) explains this with investors being over optimistic or refers to the “fad” explanation according to Ritter, about the prospects of firms that are issuing equity for the first time, and firms taking advantage of these ‘windows of opportunities’.

Extending Ritter (1991), Loughran and Ritter (1995) analyse US IPO firms from 1970 to 1990 by calculating three and five year buy-and-hold returns and wealth relatives. They match by size, book-to-market and four market wide indices. They find that IPOs generate average returns of only 5% over the five-year period following the offering, in contrast with the 11.8% generated by matched firms. This result suggesting severe long run IPO underperformance. Furthermore, those authors analyse IPO performance based on Fama and French's (1992) three factor time-series regression model. In addition to finding underperformance, they also report that investment in an equally weighted portfolio of IPO firms generates lower returns than that in a portfolio weighted according to the IPO's offering size. Following from this, they conclude that smaller offerings underperform larger offerings. Nevertheless, these results are consistent with those of Ritter (1991), in a market where firms take advantage of momentary windows of opportunity by issuing equity when, on average, they are overvalued.

However, this result contrasts those of Brav and Gompers (1997), who find the level of performance relates 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. One is matching by industry and removing unit offerings (which tend to be small and risky companies). They find that when issuing firms are matched by size and book-to-market, IPOs do not underperform. In fact, underperformance is a characteristic of small, low book-to-market companies regardless of whether they are, or are not, IPO firms. This result is somewhat supported by that of Welch and Ritter (2002) who find that IPOs, when matched on size and book-to-market, have only very modest underperformance. Additionally, when studying IPOs issued from 1973 to 2001, they show that long run

underperformance is sensitive to the choice of sample period. They recognize that this is one of the many difficulties faced by academics, and thus the true extent of IPO abnormal performance remains unclear.

Previous studies examining IPO performance in Hong Kong focus on the main board listings. McGuinness (1992) investigates 92 IPOs in Hong Kong from 1980 and 1990 inclusively and finds that most of the post-listing cumulative returns are contributed by the close of the first trading day. Dewenter and Field (2001) examine the infrastructure firm IPOs with relaxed listing requirement in the period from 1996 to first half of 1997. They find that investment banks will avoid highly speculative issues in order to protect their reputations. Cheng, Cheung and Po (2004) investigate the intra-day pattern of the 159 IPOs listed on the Stock Exchange of Hong Kong (SEHK) during the period of September 1995 and December 1998. They indicate that the initial underpricing for the IPO firms is 12.3 %. We seek to examine IPO performance on the specialized GEM to better understand the characteristics of abnormal IPO performance.

4. Data description

Our data covers² 85 Hong Kong GEM stocks from the 25th of November 1999 to the 30th of August, 2001. An initial public offering is defined as an existing private company being listed on the Growth Enterprise Market in Hong Kong. Data on the issuing details and the stock returns of each GEM stock are obtained from two sources. The historical daily stock price data comes from Thompson Financial Services (Datastream) while the financial data comes from the prospectuses and

² Three stocks are excluded from our original dataset, 8018 (SIIC Medical Sci. and Tech. (Group) Ltd.) and, 8017 (iLink Holding Limited) due to their privatisation and there is no stock return data for 8150 (Fast System Technology).

annual reports of the GEM stocks provided by the Hong Kong GEM website (www.hkgem.com). Among these 85 GEM stocks, there are 61 technology stocks and 24 non-technology stocks. There are 7 issued in year 1999, 47 issued in year 2000, and 31 in year 2001 until the 30th of August. The mean and median of the IPO prices are HKD 1.05 and HKD 1.36 with an initial public offering price range between HKD 0.20 and HKD 11.00. The median of the market capitalization at listing is HKD 398,000,000.

5. Methodology

In this paper, we will calculate the first day initial returns as well as the short- and medium-term abnormal equity returns based on the controlling firm approach and using the Main Board Hang Seng Index as a benchmark mechanism.³ The merit of using control firm approach is in selecting firms that have similar risk characteristics, financial variables from the same industries with respect to the event firms, which will minimise the information content that was irrelevant to specific GEM firm and improves our results. The first day initial return is defined as the difference between the IPO's first-day closing price and the offer price divided by the offer price.

5.1 Stock returns data – buy and hold

As documented in Loughran and Ritter (1995), the choice of a holding period involves a tradeoff – a longer period results in greater total underperformance, but a greater variability of returns (reducing the significance of any findings). We will use

³ We have adopted the Hang Seng Index as our benchmark because at the inception of the HKGEM index, it was just composed of two stocks. In order to avoid the 'new listing bias', our benchmark and control firms are based on the sample from the main board. Based on the data requirements of these established approaches, we believe the firms from the main board are the most suitable for control firms.

windows over the first day, three days, one month, three month, sixth month, one year, two year and three-year periods which is consistent with other studies. We also follow Loughran and Ritter (1995) in calculating buy-and-hold abnormal returns, BHARs (as opposed to a cumulated abnormal return measure that would suffer from a *measurement bias*) are found by Barber and Lyon (1997) to yield well-specified test statistics when used in conjunction with an appropriate benchmark of expected performance. The BHAR for one set of comparison in period τ is defined as

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

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 GEM firm i at month t whereas CR_{jt} is the buy-and hold investment return for the market index at month t.

5.2 Test of significance

A t-statistic is calculated based on the standard deviation of all firms' abnormal returns for an event window of interest. We will use t-statistics to test for the level of significance on the abnormal returns calculated by BHARs based on the market index.

The conventional t-statistic is defined as

$$t_{BHAR} = BHAR_p / (\sigma_{BHAR_p} / \sqrt{n})$$

where $BHAR_p$ is the sample average and σ_{BHAR_p} is the sample standard deviation of the BHARs of n firms.

5.3 Benchmarks

Lyon, Barber and Tsai (1999) describe the analysis of long-run abnormal returns as 'treacherous', and document the pervasiveness of misspecified test statistics in

commonly used methods of testing for abnormal stock returns. We therefore have to take care in choosing our benchmark measures, as studies of long run underperformance are joint tests of accurate measures of return, as well as whether an appropriate benchmark is employed.

5.4 Market index or industry median

Loughran and Ritter (1995) select five broad market indices as benchmarks, and found significant underperformance in all five benchmarks. As firms in broad indices and within industries are not accurate matches for IPO firms, setting Market Index and Industry Mean as the benchmarks has several drawbacks. Firstly, the index may contain the IPO firm itself, or other recent IPO firms. Moreover, indices also suffer from new listing bias, survivorship bias, and rebalancing bias.

5.5 Controlling firm

We choose a control firm approach, as advocated by Barber and Lyon (1997) and used by Loughran and Ritter (1995). This avoids the problem of survivorship bias arising from the choice of reference portfolios. We also avoid rebalancing bias, as the calculation of monthly CARs implicitly assumes a monthly rebalancing of the reference portfolio to maintain equal weights. Finally, despite the negative bias of BHARs, there is no reason to believe that this bias would be more or less pronounced for our IPO firm than for its control firm.

Our first match is on the basis of size and book-to-market ratio (BTM). The importance of both size and BTM is documented in Fama and French (1992), and industry BTMs plays a big role in the decision to go public. Value firms tend to have higher BTMs, while growth firms have lower BTMs, 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 (thus small firm with a low BTM) with a control firm that is a 'long term loser' with no future growth prospects (small with a high BTM).

We first filter for size, and then select a non-issuer with the closest BTM. Barber and Lyon (1997) find that a size filter of 70-130% yields well-specified test statistics. In essence, this method involves a tradeoff between having a close match in size, or proximity in BTM. As the focus of this benchmark is BTM, we must occasionally be flexible in our size filters.

The second matching is on the basis of size and industry. Our control firms should be selected on the basis of being the closest in size and in the same industry as our IPO firm. The third match is on the basis of BTM and industry. Our control firms should be selected on the basis of being closest in BTM and in the same industry as our IPO firm. Loughran and Ritter (1995) do not control for industry, stating that this will reduce the ability to identify abnormal performance if IPOs are timed to take advantage of industry-wide misvaluations. Thus if matching firms are misvalued, and hence revalued downward in the future, then even if the IPO firms were to underperform, our test would not detect this. However, controlling for industry effects is fundamental to all long run performance studies, as there are many factors and unexpected events that will commonly affect all firms in an industry. On the other hand, Loughran and Ritter (1995) also note that it may often be difficult to find listed firms within an industry with similar characteristics to the recent IPO issuer being studied. While this may apply to firms in a smaller market, it may not apply for a large and financially sophisticated market such as the US or Hong Kong.

6. Results

6.1 BHARs based on the Hang Seng index

The main finding of Table 1 is that there is evidence of underperformance in the Initial Public Offering (IPO) stocks listed on the GEM. Table 1 presents the BHARs of the GEM stocks based on the Hang Seng Index. For investors who purchase the GEM stocks through the initial public offerings and sell the stocks one day after listing, they can take 43 percent first-day profits on average. The median of the initial returns is 9 percent. The large differential between mean and median return indicates that the return distribution is positively skewed. The mean and median of the 3-day BHARs are -2 percent and -4 percent respectively and the abnormal returns are more severe in the long-term horizons. The underperformance is statistically significant one to three years after the IPO. The one-year, two-year and three-year BHARs are -17 percent -30 percent and -36 percent with t-statistics -2.66, -5.71 and -4.89 respectively. Our results suggest that there is evidence of initial underpricing and long-term underperformance for the GEM stocks which is consistent with earlier studies.

<Insert Table 1 about here>

Technology bubbles may cause the underperformance of the IPO firms in the period between 1999 and 2001. Hence, there may be no IPO effect. In Table 2, we split the IPOs into two samples based on whether they belong to the technology or non-technology sectors. Panel A of Table 2 suggests that there is no evidence of underperformance for the non-technology GEM stocks. The initial returns for the non-technology GEM firms are 36 percent the 3 years average abnormal return is 15 percent. Panel B of Table 2 indicates that investors should avoid holding stocks in

technology-based GEM firms over the long run. Except the first-day initial returns, all other event windows are negative and increasingly more severe in the long horizon. The one-year, two year and three year BHARs are -24, -36 and -41 percent with t-statistics -3.27, -6.78 and -4.76, respectively⁴.

<Insert Table 2 about here>

The main finding of Table 3 is that there is no underperformance for the People's Republic of China (PRC) IPO stocks. The PRC stocks are defined as those firms with business activity based mainly within Mainland China. There are 6 PRC IPOs and 79 non-PRC IPOs in our sample. The first-day initial returns are range from 54 percent to 178 percent with average returns 129 percent (t-statistic 6.24). For the non-PRC stocks, except for the first-day initial returns which are 37 percent (t-statistic 3.72), all the other IPO event windows are negative, performing poorly after the initial public offering.

<Insert Table 3 about here>

Dewenter and Field (2001) suggest that the highly reputable international investment banks will avoid speculative issues in order to protect their reputations. This suggests that IPO firms with international investment banks should perform better than the local investment banks. In Table 4, we split the samples based on whether the IPO firms are with local or international sponsors. The initial returns for GEM stocks with international sponsors are 37 percent whereas the initial returns for GEM stocks with local sponsors are 46 percent. In Panel A of Table 4, the 2-year BHARs are -24 percent with a t-statistic of -2.34. However, that underperformance

⁴ We also split the samples based on the business activity of the IPO firms and calculated the BHARs based on Hang Seng Index. Initial returns are positive in all sectors with the exception of manufacturing industry. The energy stocks have the highest initial returns and consistently outperform the Hang Seng Index whereas other sectors like chemicals, application software, E-commerce, internet content, internet software, IT infrastructure and telecom equipment are underperforming in both short and long run.

occurs earlier for stocks with local sponsors. The 1-year, 2-year and 3-year BHARs are -19 percent, -32 percent and -40 percent with t-statistics -2.60, -5.26 and -4.55 respectively. Hence, the underperformance of the IPO firms is irrelevant to the type of sponsor⁵.

<Insert Table 4 about here>

By separating our samples based on the median market capitalization, we investigate whether the underperformance is dominant in small size IPO firms or whether the sponsors have set the IPO prices greater than the intrinsic values of the IPO firms. Market capitalization is equal to the number of shares issued multiplied by the IPO prices. The median of the market capitalization is HK\$ 398 millions. Panel A of Table 5 shows the results for the IPO firms with market values less than the median. The average initial returns are 57 percent (t-statistic 3.87). The 2-year and 3-year BHARs are -21 percent and -30 percent with t-statistic -2.57 and -2.45 respectively. Panel B of Table 5, the average initial returns for the IPO firms with market values greater than the median are 29% which is less than the IPO firms with smaller market capitalizations. Nearly all the IPO event windows are negatively significant at 5% level. The 3-month, 6-month, 1-year, 2-year and 3-year BHARs are -21 percent (t-statistic -3.45), -26 percent (t-statistic -3.15), -30 percent (t-statistic -3.38), -39 percent (t-statistic -6.32) and -41 percent (t-statistic -5.45) respectively. The results in Table 5 suggests that big firms are under-performing over the long horizon.

<Insert Table 5 about here>

⁵ For average BHARs of the GEM stocks for individual sponsors we find BOCI Asia Ltd appears to be the best sponsor in HKGEM. Besides BOCI Asia Ltd, those stocks having Tai Fook Capital Ltd as a sponsor have also outperformed the market in the long run. On average, with the exception of N M Rothschild & Sons, all the GEM stocks with international sponsors have underperformed in the long run.

The signaling theory (Leland and Pyle (1977)) states that to avoid the imitation of the low-quality issuers, better quality issuers will set the IPO prices less than the prices which investors are willing to pay. Welch (1989) and Jegadeesh, Weinstein and Welch (1993) suggest that high-quality issuers will leave the money on the table in the initial public offer (IPO) and will be compensated in the subsequent issuing activity. In order to investigate whether better quality issuers will signal their qualities by initial underpricing, we have split the samples based on the median of the initial returns that we have calculated in Table 1. The better quality firms should offer higher initial returns to investors. The median of the initial returns is 9 percent. In Panel A of Table 6, it shows the BHARs for GEM IPO firms with initial returns less than the median of initial returns (9%). The mean and median of the initial returns are -11 percent and -3 percent respectively. The mean and median returns in all event windows are negative. The 2-year and 3-year BHARs are -29 percent and -34 percent with t-statistics -4.17 and -3.31, respectively. In Panel B of Table 6, it shows the BHARs for GEM IPO firms with initial returns higher than the median of initial returns (9%). The mean and median of the initial returns are 98 percent and 60 percent respectively. After 1 month, the BHARs are negative and more severe in the long horizon. The 1-year, 2-year and 3-year BHARs are -23 percent (t-statistic -2.47), -31 percent (t-statistic -3.89) and -37 percent (t-statistic -3.56), respectively which means that 'better quality firms' are performing more poorly than the 'bad quality firms' in the long-run. In other words, the signaling theory does not hold up in the Hong Kong GEM stocks.

<Insert Table 6 about here>

The agency hypothesis (Jensen and Meckling (1976)) and the signaling hypothesis (Leland and Pyle (1977)) suggests that the conflicts between the owner and the other

shareholders arise when the owner sells a portion of the stakes to the outsiders and better quality firms will hold significant ownership to signal true project quality. However, the results of Table 7 contradict with both hypotheses and indicate that firms with higher retention of ownership perform more poorly than those with low retention of ownership. The median retention of ownership is 80% for the IPO stocks listed on the GEM. The initial return for the GEM stocks with low ownership retention is 51 percent (t-statistic 3.28) whereas the initial return for the GEM stocks with high ownership retention is 34 percent (t-statistic 2.81). This suggests that the demand and supply of stocks available in the market cannot explain the higher initial underpricing of the lower ownership retention stocks. The underperformance of high ownership retention GEM stocks occurs from 1 month after the official listing, the 1-month, 3-month, 6-month, 1-year, 2-year and 3-year BHARs are -12 percent (t-statistic -2.95), -18 percent (t-statistic-2.80), -21 percent (t-statistic -2.87), -34 percent (t-statistic -6.41), -46 percent (t-statistic -12.42) and -56 percent (t-statistic -13.07) whereas there is no significant evidence of underperformance in GEM stocks with low ownership retention. Panel C of Table 7 provides the explanations for the results which contradicts both the agency and signaling hypotheses. Owners of the non-technology stocks sell more shares to the public whereas the owners of the technology stocks retain more shares. The proportion of non-technology stocks which is above the ownership median is 16 percent whereas the proportion of technology stock is 84 percent. On the other hand, the proportion of non-technology stocks which is below the ownership median is 35 percent whereas the proportion of technology stock is 65 percent. In Table 2, compared with non-technology stocks, we have shown that technology stocks underperform in the long run. So, technology bubbles appear to be the dominant theory for explaining the underperformance of the GEM stocks.

<Insert Table 7 about here>

There are mainly three kinds of listing methods: offer for sale, offer for placing and offer of subscription. Offer for sale means that shares issued can be traded straight away. Investors do not need to subscribe for this sort of offer and they can buy or sell the shares directly from the market. Offer for subscription means that investors need to subscribe for the new shares before they can purchase them. Offer for placing means that new shares are purchased by the institutional investors only. We split the samples based on the three listing methods and calculate the BHARs based on the Hang Seng Index in order to examine whether the method of listing will affect the long-term performance of the IPO firms. Panel A of Table 8 shows that the initial returns for offers for sale is only 2 percent which is comparatively lower than the 43 percent for all IPOs which is shown in Table 1. The 2-year and 3-year BHARs are -60 percent and -83 percent with extremely high t-statistics of -14.63 and -26.84 respectively. Panel B presents the results for the offers for subscription, the initial returns are 35 percent for investors who sell the shares on the first day of listing. However, 3 months after the official listing, the abnormal returns are negative and statistically significant. The 3-month, 6-month, 1-year, 2-year and 3-year BHARs are -24 percent, -22 percent, -30 percent, -30 percent and -35 percent with t-statistics -2.77, -1.72, -2.50, -3.15 and -2.81 respectively. In Panel C of Table 8, the initial returns for offers for placing are 51 percent (t-statistic 3.70) and the abnormal returns are still positive until the first year after official listing. The 2-year and 3-year BHARs are -9 percent and -7 percent respectively with insignificant t-statistics

<Insert Table 8 about here>

6.2 BHARs based on the control firm approach

In section 5.1, we have shown that there is evidence of underperformance of the HKGEM stocks one year after the official listing. Further investigations suggest that the technology stocks contribute to the poor performances of the IPO stocks. Here, we will calculate the BHARs based on size and book-to-market, industry and size and industry and book-to-market matched control firm approach. The merit of using the control firm approach is that by selecting firms with similar risk characteristics, financial variables and from within the same industries with respect to the event firms, we minimize the information content that is irrelevant to the technology effects.

6.2.1. Size and book-to-market matched control firm approach

In Table 9 Panel A, we present the BHARs based on the control firm approach, sorted by book-to-market and size. All of the event windows are negative and become more severe in the long-horizon. The 1-year, 2-year and 3-year BHARs are -15 percent, -31 percent and -46 percent with t-statistics -2.07, -4.15 and -4.09 respectively.

<Insert Table 9 about here>

6.2.2. Industry and size matched control firm approach

Previously, we calculated the BHARs based on the Hang Seng Index as the benchmark and showed that technology stocks contribute largely to the underperformance of the IPO stocks. In order to investigate whether the exact time period chosen will affect our results, we use the control firm approach that is first sorted by industry and then by size. Panel B of Table 9 reveals that underperformance still exists after controlling for industry and size. The results are consistent with the

results of the industry and book-to-market matched control firm approach. The 2-year and 3-year BHARs are -26 percent and -34 percent with t-statistics -2.62 and -3.09 respectively.

6.2.3 Industry and book-to-market matched control firm approach

Panel C of Table 9 shows the BHARs based on industry and book-to-market matched control firm approach. The 1-year, 2-year and 3-year BHARs are -30 percent, -23 percent and -26 percent with t-statistics -2.79, -2.50 and -2.31, respectively. The industry and size matched and industry and book-to-market matched control firm approach suggest that the underperformance of IPO firms still exist after controlling for industry effects. All of the control firm approaches give consistent results compared with the market index. Therefore, the underperformance of the GEM stocks is not only due to the technology bubbles, but also the IPO effects. Our result is consistent with the previous finding by Lyon, Barber and Tsai (1999).

6.3 The cross-sectional regression on equity returns

In this section, we run the following cross-sectional regressions on equity returns in order to investigate the key factors explaining the long-term underperformance of the GEM stocks.

$$R_i = \beta_0 + \beta_1 IR_i + \beta_2 Ownership_i + \beta_3 (Accruals / Total Assets)_i + \beta_4 Technology_i \quad (1)$$

$$R_i = \beta_0 + \beta_1 Technology_i + \beta_2 Sponsor_i + \beta_3 Listing_i + \beta_4 MC_i + \beta_5 \ln(M / B)_i \quad (2)$$

where the dependent variable R_i is the Buy-and-Hold Abnormal Returns (BHARs) based on the Hang Seng Index for each event window of interest; For independent variables, IR_i is the dummy variable which is equal to 1 if the initial returns of the

IPO firms are above the median of the initial returns for all the samples; Ownership_{*i*} is the retention of ownership of the GEM firms by the original owners; Accruals/ Total Assets_{*i*} is the ratio of total accruals divided by the total assets at year -1 ; Technology_{*i*} is the dummy variable equal to 1 if the IPO firm belongs to the technology sector. Sponsor_{*i*} is the dummy variable equal to 1 if the sponsor is international sponsor; Listing_{*i*} is the dummy variable equal to 1 if the IPO firm is an offer for placing; MC is the is the dummy variable which is equal to 1 if the market capitablization of the IPO firms are above the median of the market capitablization for all the samples; M/B_{*i*} is the ratio of the market value of equity to book value of equity.⁶

In order to investigate which hypothesis is applicable to the HKGEM, for equation (1), we regress the BHARs based on the Hang Seng Index for each window of interest on the independent variables for which each variable represents a particular hypothesis. According to the signaling hypothesis, better quality firms will leave more money on the table in order to avoid the mimic by the bad quality firms. The temporary loss in the IPO issue can be compensated by the subsequent SEO issue in the future. Therefore, the coefficient of the variable IR_{*i*} is predicted to have a positive sign.

Jain and Kini (1994) suggest that managers attempt to window-dress their accounting numbers prior to going public. This will lead to pre-IPO performance being overstated and post-IPO performance being understated. Teoh, Welch and Wong (1998) suggest that firms with high earning accruals will experience long-run stock return underperformance. Total accruals which is defined as Net Income minus Cash Flows from Operations is deflated by total assets prior to the official listing. If

⁶ To avoid the collinearity problem, the variables to be employed in this study is assessed by calculating the correlation coefficient between variables.. The correlation coefficient between Ownership and Technology is merely 0.1726 and, all the variables are not highly correlate. The correlation coefficient table is available based on the request to authors.

the earnings are boosted up by taking positive accruals, underperformance of the IPO stocks should be expected. The variable $(\text{Total Accruals} / \text{Total Assets})_i$ is predicted to have a negative sign.

<Insert Table 10 about here>

The inclusion of independent variable Ownership_i as we want to verify whether the agency cost hypothesis can explain the long term underperformance of the IPO firms. The coefficient of Ownership_i should have a predicted positive sign because of the potential increase in agency costs when a firm makes a transition from private to public and better type firms will signal their quality by selling fewer shares to the market. Furthermore, in the period of November 1999-August 2001, at least 70 percent of the IPO stocks listed on the HKGEM are technology stocks. Due to the technology bubble in 2001, we should expect that the variable Technology_i is the crucial factor in explaining the underperformance of the GEM stocks.

The results suggest that the signaling and market timing hypotheses cannot be used to explain the stock return underperformance because none of the coefficient of these factors are statistically significant, however, the negative coefficient of IR and $\text{Accruals} / \text{Total Asset}$ is consistent with Ritter (1991) and Jain and Kini (1994) studies. For all the event windows of interest, the coefficients of the Ownership_i are negative and statistically significant which means that stocks with lower retention of ownership perform better than those stocks with higher retention of ownership. The results seem to be conflicting with the agency cost and signaling hypotheses. This suggests that the variable Ownership_i has captured the characteristics of the technology stocks which is consistent with the results in Table 7. The majority of the GEM stocks with high ownership retentions are technology stocks which underperform in the long run. The effect of the technology bubble is more dominant than the signaling or agency cost

hypotheses. Therefore, we have the negative coefficients for the factor $Ownership_i$. This suggests that the collapse of the technology bubbles caused the common stock return underperformance in the HKGEM.

For equation (2), the first variable of interest is the dummy variable $Technology_i$. Due to the technology bubble in 2001, the coefficients of $Technology_i$ should have a predicted negative sign. The factor $Technology_i$ can explain -46.06 percent (t-statistic -2.1), -59.72 percent (t-statistic -2.72) and -78.20 percent (t-statistic -2.54) of the 1-year, 2-year and 3-year BHARs, respectively. The above interesting results can be explained by the fact that the technology bubble existed.

Investors are more willing to reveal their willingness to subscribe to the IPO shares to the well-known international investment banks than the local investment banks in the book-building process. The variable $Sponsor_i$ should have a predicted positive sign, since we expect international sponsors to be more accurate in predicting the demand of the IPO stocks, and can set the IPO prices close to the fair market values of the IPO firms. Surprisingly, the results in Panel B indicate that international sponsors are performing 18.62 percent and 8.28 percent more poorly than that of the local investment bank for the 1-month and 3-month BHARs. For the other event windows, the coefficient of the $Sponsor_i$ is positive but they are statistically insignificant which means that the type of sponsors will only have short-term impact on the common stock returns.

The financial and operating position of the IPO firms will be regularly monitored by the institutional investors whom hold large blocks of the IPO shares. The block holders will signal to the managers of the IPO firms that they will sell the IPO firms if the projected earnings of the IPO firms deviate from the industry average or the block holders' expectations. On the other hand, we expect that institutional investors or

block holders will be more accurate in forecasting the future prospects of the IPO firms that they subscribe to, therefore, the variable $Listing_i$ should have a predicted positive sign because shares are distributed to the institutional investors when the listing method is offer for placing. The results in Table 10 reveal that the variable $Listing_i$ is a crucial factor in explaining the long-run stock performance of the IPO firms. This factor can explain 40.35 percent (t-statistic 2.01) and 57.24 percent (t-statistic 2.03) of the 2-year and 3-year BHARs respectively.

The results in Panel B of Table 10 reveal that the coefficient of MC is negative in most event windows; small firms do not perform poorly when they are compared with the big firm which is consistent with our results presented in Table 5. The coefficients of $\ln(M/B)_i$ are positive and statistically significant meaning that glamour stocks perform better than the value stocks. The factor $\ln(M/B)_i$ can explain 15.59 percent (t-statistic 3.13), 26.38 percent (t-statistic 3.25), 32.74 percent (t-statistic 4.31) and 21.78 percent (t-statistic 2.3) for the 1-month, 3-month, 6-month and 1-year BHARs respectively.

To conclude, the results of the cross-sectional regressions suggest that (i) technology stocks are underperforming in the long run; (ii) In the short run, IPO firms with local sponsors are performing better than international sponsors; (iii) stocks with offer for placing outperform those stocks with other listing methods; (iv) high market capitalization stocks are underperforming in the long run; and (v) book-to-market effects exist in the HKGEM.

7. Conclusion

This paper examines the stock return performance of the IPO stocks which are listed on the Growth Enterprise Market (GEM) in Hong Kong. In the period from

November 1999 to August 2001, for an investor whom subscribes to the IPO stocks and sells the stocks on the first-trading day, the average initial return is 43 percent. By calculating the BHARs based on the Hang Seng Index and splitting the samples based on the type of business activity, underperformance exists in the technology sector whereas the non-technology sector does not underperform in the long run. This result suggests that a ‘technology effect’ causes the underperformance of GEM stocks.

Alternatively, we calculated the BHARs based on the size and book-to-market, industry and size, and industry and book-to-market matched control firm approaches. Further investigations reveal that the underperformance of the IPO firms occurs one-year after the official listing of the GEM stocks based on the size and book-to-market (BTM) matched control firm approach. The results are consistent with the BHARs calculated by the market index. By matching the IPO firms with control firms based on size and industry or book-to-market (BTM) and industry matched control firm approach, we can eliminate the impacts of the ‘technology boom’ or other effects which are irrelevant to the IPO effects. Even though the buy-and-hold abnormal returns calculated by the industry and size and industry and book-to-market (BTM) matched control firm approaches are weaker than the BHARs calculated by the size and book-to-market (BTM) matched control firm approach, negative and statistically significant abnormal equity returns still exist 2 years after the official listing. This suggests that ‘IPO effects’ exists in the HKGEM. Therefore, the two factors that cause the underperformance of GEM stocks are the technology and IPO effects. Like previous studies, our results are sensitive to which benchmarks and methodologies are used.

The results of the cross-sectional analyses suggest that the HKGEM is a unique market. Since at least 70% of the IPO stocks listed on the GEM are technology

stocks, the 'technology' factor outweighs the hypotheses advocated by previous researchers to explain the poor performance of new stock listings. The Agency Cost hypothesis (Jensen and Meckling (1976)), Signaling hypothesis (Leland and Pyle (1977)) and Market Timing hypothesis (Jain and Kini (1994)) are not applicable to the HKGEM. Future research can focus on the intra-day data to understand the microstructural effects of market volatility, trading volume and liquidity for the observed underperformance of the GEM stocks.

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Hong Kong Growth Enterprise Market website – www.hkgem.com

The Stock Exchange of Hong Kong website – www.sehk.com

Table 1
The BHARs of GEM stocks based on the Hang Seng Index

The BHARs of the GEM stocks based on the Hang Seng Index								
	Initial Returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.09	-0.04	-0.08	-0.14	-0.29	-0.33	-0.50	-0.54
Mean	0.43	-0.02	-0.04	-0.06	-0.10	-0.17	-0.30	-0.36
S.D.	0.87	0.20	0.37	0.53	0.59	0.59	0.47	0.66
t-statistics	4.51***	-0.88	-0.97	-1.06	-1.60	-2.66**	-5.71***	-4.89***
*** 1% level of statistical significance								
** 5% level of statistical significance								

The sample comprises IPO firms with at least 3-years of historical daily stock price data available in Datastream. The initial returns of the IPOs are defined as the first-day closing price minus the IPO price divided by the IPO price. The initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offerings are shown. For each event window, the equity returns are compounded starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, the conventional t-statistic is calculated based on the cross-sectional standard deviation of all rated firms' abnormal returns.

Table 2

BHARs of GEM stocks based on the Hang Seng Index and splits the samples based on their business activity

PANEL A: Non-technology GEM stocks								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.01	-0.05	0.00	-0.12	-0.11	-0.12	-0.24	-0.48
Mean	0.36	-0.02	-0.05	-0.02	0.00	0.22	0.11	0.15
S.D.	0.89	0.16	0.25	0.50	0.59	0.97	1.07	1.39
t-statistics	1.99	-0.61	-1.07	-0.16	0.02	1.09	0.49	0.52
PANEL B: Technology GEM stocks								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.11	-0.02	-0.08	-0.13	-0.29	-0.35	-0.51	-0.54
Mean	0.46	-0.02	-0.03	-0.03	-0.10	-0.24	-0.36	-0.41
S.D.	0.86	0.21	0.41	0.63	0.65	0.56	0.41	0.67
t-statistics	4.14***	-0.56	-0.48	-0.41	-1.20	-3.27***	-6.78***	-4.76***
*** 1% level of statistical significance								
** 5% level of statistical significance								

A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data in Datastream. The initial returns of the IPOs are defined as the first-day closing price minus the IPO price divided by the IPO price. We calculate the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate the conventional t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns to gauge the level of significance. Panel A presents the non-technology IPO BHARs based on the Hang Seng Index whereas Panel B presents the technology IPO BHARs based on the Hang Seng Index.

Table 3

BHARs of the GEM stocks based on the Hang Seng Index and splits the samples into PRC and non-PRC stocks.

PANEL A: PRC GEM stocks								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	1.50	0.05	0.21	-0.02	0.16	0.30	-0.04	-0.33
Mean	1.29	0.13	0.37	0.25	0.19	0.31	0.14	0.14
S.D.	0.51	0.38	0.50	0.80	0.43	0.45	0.66	1.26
t-statistics	6.24***	0.83	1.82	0.76	1.07	1.68	0.52	0.27
PANEL B: Non-PRC GEM stocks								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.06	-0.04	-0.10	-0.15	-0.30	-0.37	-0.51	-0.54
Mean	0.37	-0.03	-0.07	-0.09	-0.13	-0.21	-0.33	-0.40
S.D.	0.86	0.18	0.34	0.51	0.59	0.59	0.44	0.59
t-statistics	3.72***	-1.53	-1.85	-1.49	-1.87	-3.15***	-6.55***	-5.87***
*** 1% level of statistical significance								

PRC stocks are the IPO firms with business activities based mainly in China. A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data in Datastream. The initial returns of the IPOs are defined as the first-day closing price minus the IPO price divided by the IPO price. We calculate the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate the conventional t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns and test for the level of significance on the abnormal returns calculated by BHARs based on the Hang Seng Index. Panel A presents the PRC IPO BHARs based on the Hang Seng Index whereas Panel B presents the non-PRC IPO BHARs based on the Hang Seng Index.

Table 4

BHARs of the GEM stocks based on the Hang Seng Index and splits the samples based on whether the sponsor is a highly reputable international investment bank or a local investment bank.

PANEL A: GEM stocks with international sponsors								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.02	-0.04	-0.14	-0.15	-0.21	-0.25	-0.44	-0.45
Mean	0.37	0.00	-0.09	-0.13	-0.08	-0.13	-0.24	-0.24
S.D.	0.89	0.23	0.29	0.46	0.60	0.67	0.48	0.61
t-statistics	2.01**	-0.03	-1.58	-1.40	-0.63	-0.93	-2.34**	-1.88
PANEL B: GEM stocks with local sponsors								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.16	-0.04	-0.05	-0.13	-0.29	-0.36	-0.52	-0.57
Mean	0.46	-0.03	-0.02	-0.03	-0.11	-0.19	-0.32	-0.40
S.D.	0.87	0.19	0.40	0.56	0.58	0.56	0.47	0.68
t-statistics	4.04***	-1.07	-0.36	-0.47	-1.49	-2.60**	-5.26***	-4.55***
*** 1% level of statistical significance								
** 5% level of statistical significance								

A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data in Datastream. The initial returns of the IPOs are defined as the first-day closing price minus the IPO price divided by the IPO price. We have calculated the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate a t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns to test for the level of significance. Panel A presents the BHARs of the GEM stocks based on the Hang Seng Index with international sponsors whereas Panel B presents the BHARs of the GEM stocks based on the Hang Seng Index with local sponsors.

Table 5

BHARs of the GEM stocks based on the Hang Seng Index and splits the samples based on the median of the market capitalization.

PANEL A: IPO firms with market capitalization less than the median								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.19	-0.04	0.01	-0.01	-0.06	-0.14	-0.43	-0.58
Mean	0.57	-0.03	0.01	0.08	0.05	-0.05	-0.21	-0.30
S.D.	0.96	0.20	0.42	0.62	0.60	0.59	0.53	0.80
t-statistics	3.87***	-0.97	0.18	0.83	0.51	-0.53	-2.57**	-2.45**
PANEL B: IPO firms with market capitalization higher than the median								
	Initial return	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.02	-0.04	-0.16	-0.22	-0.42	-0.46	-0.54	-0.52
Mean	0.29	-0.01	-0.09	-0.21	-0.26	-0.30	-0.39	-0.41
S.D.	0.76	0.20	0.31	0.39	0.53	0.57	0.39	0.48
t-statistics	2.42**	-0.27	-1.91	-3.45***	-3.15***	-3.38***	-6.32***	-5.45**
*** 1% level of statistical significance								
** 5% level of statistical significance								

Market capitalization is defined as the total number of shares issued multiplied by the IPO price. A valid observation is defined as the IPO firms have at least 3-years of historical daily stock price data in Datastream. The initial returns of the IPOs are defined as the first-day closing price minus the IPO price divided by the IPO price. We calculate the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate the t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns to indicate the level of significance. Panel A presents the BHARs based on the Hang Seng Index with market capitalization lower than the median of the samples whereas Panel B presents the BHARs based on the Hang Seng Index with market capitalization higher than the median of the samples.

Table 6

BHARs of the GEM stocks based on the Hang Seng Index and splits the samples based on the median of the initial returns which are calculated in Table 2.1.

PANEL A: IPO firms with initial returns less than the median								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	-0.03	-0.04	-0.11	-0.19	-0.29	-0.25	-0.47	-0.51
Mean	-0.11	-0.06	-0.10	-0.08	-0.07	-0.12	-0.29	-0.34
S.D.	0.17	0.16	0.31	0.53	0.66	0.60	0.44	0.66
t-statistics	-4.04***	-2.33**	-1.95	-0.97	-0.69	-1.29	-4.17***	-3.31***
PANEL B: IPO firms with initial returns higher than the median								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.60	-0.03	0.01	-0.12	-0.29	-0.42	-0.54	-0.57
Mean	0.98	0.02	0.02	-0.04	-0.14	-0.23	-0.31	-0.37
S.D.	0.95	0.23	0.42	0.54	0.51	0.59	0.51	0.67
t-statistics	6.58***	0.51	0.25	-0.52	-1.72	-2.47**	-3.89***	-3.56***
*** 1% level of statistical significance								
** 5% level of statistical significance								

The initial returns of the IPOs are defined as the first-day closing price minus the IPO price divided by the IPO price. A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data in Datastream. We calculate the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate the conventional t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns and we will test for the level of significance. Panel A presents the BHARs based on the Hang Seng Index with initial returns of the IPO firms lower than the median of the samples whereas Panel B presents the BHARs based on the Hang Seng Index with initial returns of the IPO firms higher than the median of the samples.

Table 7

BHARs of the GEM stocks based on the Hang Seng Index and splits the samples based on the median retention of Ownership

PANEL A: IPO firms with retention of ownership less than the median								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.17	-0.01	0.03	-0.08	-0.15	-0.20	-0.33	-0.46
Mean	0.51	-0.02	0.10	0.14	0.04	-0.02	-0.13	-0.16
S.D.	0.83	0.23	0.47	0.66	0.68	0.67	0.57	0.87
t-statistics	3.28***	-0.38	1.12	1.11	0.34	-0.17	-1.18	-0.97
PANEL B: IPO firms with retention of ownership higher than or equal to the median								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.05	-0.04	-0.15	-0.16	-0.38	-0.43	-0.54	-0.57
Mean	0.34	-0.04	-0.12	-0.18	-0.21	-0.34	-0.46	-0.56
S.D.	0.84	0.17	0.28	0.43	0.51	0.36	0.26	0.29
t-statistics	2.81***	-1.50	-2.95***	-2.80***	-2.87***	-6.41***	-12.42***	-13.07***
PANEL C: The proportion of non-technology and technology stocks based on the Ownership median								
	≤ 80%	>80%	Observations					
Technology stocks	65%	84%	59					
Non-technology stocks	35%	16%	22					
Total	100%	100%	81					
*** 1% level of statistical significance								
** 5% level of statistical significance								

The retention of Ownership is the percentage of shares owned by the owners after the IPO. The median of the retention of ownership is 80 per cent. A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data in Datastream. We calculate the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate the conventional t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns. Panel A presents the BHARs based on the Hang Seng Index with retention of ownership lower than the median of the samples and Panel B presents the BHARs based on the Hang Seng Index with retention of ownership higher than or equal to the median of the samples. Panel C presents the proportion of non-technology and technology stocks based on the Ownership median.

Table 8

BHARs of the GEM stocks based on the Hang Seng Index and splits the samples based on the listing method

PANEL A: IPO firms with “Offer for sale” listing method								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.01	-0.06	-0.08	-0.01	-0.19	-0.30	-0.64	-0.83
Mean	0.02	-0.07	-0.12	-0.01	-0.05	-0.16	-0.60	-0.83
S.D.	0.29	0.05	0.20	0.40	0.55	0.43	0.13	0.10
t-statistics	0.26	-4.67***	-1.94	-0.05	-0.29	-1.21	-14.63***	-26.84***
PANEL B: IPO firms with “Offer for subscription” listing method								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.06	-0.01	-0.18	-0.30	-0.42	-0.45	-0.54	-0.50
Mean	0.35	0.02	-0.10	-0.24	-0.22	-0.30	-0.30	-0.35
S.D.	0.81	0.22	0.29	0.39	0.58	0.55	0.44	0.57
t-statistics	1.96*	0.36	-1.62	-2.77***	-1.72	-2.50**	-3.15***	-2.81***
PANEL C: IPO firms with “Offer for placing” listing method								
	Initial returns	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.13	-0.01	0.05	-0.03	-0.08	-0.16	-0.43	-0.52
Mean	0.51	0.00	0.03	0.07	0.06	0.05	-0.09	-0.07
S.D.	0.89	0.21	0.35	0.67	0.67	0.83	0.86	1.22
t-statistics	3.70***	-0.09	0.48	0.71	0.54	0.37	-0.68	-0.35
*** 1 % level of statistical significance								
** 5% level of statistical significance								
* 10% level of statistical significance								

A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data available in Datastream. We calculate the initial, 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Hang Seng Index trading or the last day of the event window. For each event window of interest, we calculate the conventional t-statistic based on the cross-sectional standard deviation of all rated firms’ abnormal returns and we will test for the level of significance on the abnormal returns calculated by BHARs based on the Hang Seng Index. Panel A presents the post IPO BHARs based on the Hang Seng Index for IPO firms with the offer for sale listing method. Panel B presents the post IPO BHARs based on the Hang Seng Index for IPO firms with the offer for subscription listing method. Panel C presents the post IPO BHARs based on the Hang Seng Index for IPO firms with the offer for placing listing method.

Table 9

BHARs of the GEM stocks based on the book-to-market and size matched control firm approach.

PANEL A: Book-to-market and size matched control firm approach							
	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	-0.05	-0.12	-0.13	-0.16	-0.21	-0.24	-0.33
Mean	-0.05	-0.05	-0.04	-0.05	-0.15	-0.31	-0.46
S.D.	0.17	0.41	0.58	0.61	0.54	0.55	0.83
t-statistics	-1.97	-0.88	-0.50	-0.61	-2.07**	-4.15***	-4.09***
PANEL B: Industry and size matched control firm approach							
	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	0.01	-0.03	-0.04	-0.12	-0.08	-0.13	-0.22
Mean	0.01	0.00	-0.14	0.02	-0.08	-0.26	-0.34
S.D.	0.20	0.43	1.07	0.68	0.73	0.84	0.92
t-statistics	0.38	-0.07	-1.11	0.20	-0.89	-2.62**	-3.09***
PANEL C: Industry and book-to-market matched control firm approach							
	3-day	1-month	3-month	6-month	1-year	2-year	3-year
Median	-0.01	-0.08	-0.12	-0.18	-0.18	-0.14	-0.25
Mean	-0.02	-0.09	-0.14	-0.14	-0.30	-0.23	-0.26
S.D.	0.18	0.65	0.80	0.87	0.87	0.74	0.89
t-statistics	-0.78	-1.11	-1.36	-1.32	-2.79***	-2.50**	-2.31**
*** 1% level of statistical significance							
** 5% level of statistical significance							

A valid observation is defined as the IPO firms having at least 3-years of historical daily stock price data in Datastream. We calculate the 3-day, 1-month, 3-month, 6-month, 1-year, 2-year and 3-year equity returns after the initial public offering. For each event window, we compound the equity returns starting from the second day of the beginning of the event window and ending on the earlier of either the last day of the Datastream records or the last day of the event window. For each event window of interest, we calculate the conventional t-statistic based on the cross-sectional standard deviation of all rated firms' abnormal returns and test for the level of significance on the abnormal returns calculated by BHARs based on the book-to-market and size matched control firm approach.

Table 10**Results of the cross-sectional regressions**

PANEL A:						
$R_i = \beta_0 + \beta_1 IR_i + \beta_2 Ownership_i + \beta_3 (Accruals/Total\ Assets)_i + \beta_4 Technology_i$ (1)						
Variables	1-month	3-month	6-month	1-year	2-year	3-year
IR	0.0871	0.0115	-0.0877	-0.0816	-0.0234	-0.0621
t-statistics	(0.96)	(0.09)	(-0.59)	(-0.60)	(-0.24)	(-0.44)
Ownership	-1.5838	-2.3157	-2.0911	-2.678	-3.1611	-4.423
t-statistics	(-2.47)**	(-2.57)**	(-2.01)**	(-2.80)***	(-4.50)***	(-4.41)***
Accruals/ Total assets	-0.0158	0.0180	-0.0055	0.0144	-0.0075	-0.0609
t-statistics	(-0.18)	(0.15)	(-0.04)	(0.11)	(-0.08)	(-0.45)
Technology	0.08298	0.0263	-0.0184	-0.2143	-0.1841	-0.2522
t-statistics	(0.82)	(0.19)	(-0.11)	(-1.42)	(-1.66)	(-1.59)
Constant	1.1334	1.7710	1.6389	2.1566	2.3430	3.3646
t-statistics	(2.20)	(2.45)**	(1.96)*	(2.81)***	(4.15)***	(4.17)***
Adj R²	0.0610	0.0418	0.0055	0.1033	0.2492	0.2390
PANEL B:						
$R_i = \beta_0 + \beta_1 Technology_i + \beta_2 Sponsor_i + \beta_3 Listing_i + \beta_4 MC_i + \beta_5 \ln(M/B)_i$ (2)						
Variables	1-month	3-month	6-month	1-year	2-year	3-year
Technology	-0.0109	0.0271	-0.0186	-0.4606	-0.5972	-0.7820
t-statistics	(-0.1)	(0.14)	(-0.11)	(-2.1)**	(-2.72)***	(-2.54)**
Sponsor	-0.1862	-0.0828	0.0524	0.0363	0.0036	0.0103
t-statistics	(-1.58)	(-0.43)	(0.29)	(0.16)	(0.02)	(0.03)
Listing	0.0508	0.1576	0.1262	0.3176	0.4036	0.5724
t-statistics	(0.48)	(0.92)	(0.79)	(1.59)	(2.01)**	(2.03)**
MC	0.0514	0.0741	-0.0733	-0.0579	-0.0832	0.0533
t-statistics	(0.44)	(0.39)	(-0.41)	(-0.26)	(-0.37)	(0.17)
Ln(M/B)	0.1559	0.2638	0.3274	0.2178	0.0572	0.0825
t-statistics	(3.13)***	(3.25)***	(4.31)***	(2.3)**	(0.60)	(0.62)
Constant	-0.1907	-0.3980	-0.4542	-0.1842	-0.0431	-0.1068
t-statistics	(-1.51)	(-1.93)*	(-2.35)**	(-0.76)	(-0.18)	(-0.31)
Adj R²	0.1362	0.1365	0.2541	0.1229	0.0924	0.0734
*** 1% level of statistical significance						
** 5% level of statistical significance						
* 10% level of statistical significance						

The dependent variable R_i is the Buy-and-hold abnormal returns (BHARs) based on the Hang Seng Index for each event window of interest; IR_i is the dummy variable which is equal to 1 if the initial equity returns of the IPO firms are above the median of the initial returns for all samples; $Accruals/Total\ Assets_i$ is the ratio of total accruals divided by total assets at time $t-1$; $Technology_i$ is the dummy variable equal to 1 if the IPO firm is belonging to the technology sector; $Ownership_i$ is the retention of ownership by the owners of the GEM firms; $Sponsor_i$ is the dummy variable equal to 1 if the sponsor is the international sponsors; $Listing_i$ is the dummy variable equal to 1 if the IPO firm is offer for placing; MC is the is the dummy variable which is equal to 1 if the market capitablization of the IPO firms are above the median of the market capitablization for all the samples; M/B_i is the ratio of the market value of equity to the book value of equity.