

Investor Demand for IPOs and Aftermarket Performance: Evidence from the Hong Kong Stock Market*

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Abstract

This study examines the relationship between investor demand for IPOs prior to offerings and aftermarket performance of IPO firms during the period from 1993 to 1997 in the Hong Kong stock market. The paper finds that the IPOs with high investor demand have large positive initial returns but negative longer-run excess returns, while the IPOs with low investor demand have negative initial returns but positive longer-run excess returns. The paper demonstrates that investor demand for IPOs is largely driven by investor over-optimistic and over-pessimistic reaction to the information about the IPO' prospects prior to offerings.

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I. Introduction

Initial public offerings (IPOs) of common stock, on average, earn abnormally high initial returns in general [Ibbotson (1975), Ritter (1984), Loughran, et al (1994)]. It is also well known that IPO firms significantly underperform the market in the long run (three to five years) following the offering date [Aggarwal and Rivoli (1990), Loughran and Ritter (1995, 1997), and Brav and Gompers (1997)]. This IPO return anomaly is observed in stock markets around the world. According to Ritter (1991), the relationship between the long-run underperformance to the short-run underpricing phenomenon is an unresolved mystery in the IPO literature.¹ Although these puzzling occurrences have prompted substantial research to investigate the causes of IPO underpricing, we know very little about why some IPOs are underpriced while others are not. Moreover, little attention has been paid to the long-run differences between those IPOs that are under- or over-priced [one exception is Mill and Reilly (1987)].

In this study, we want to address this issue by searching for the relationship between investor IPO demand prior to offerings and aftermarket performance of IPO firms. We are specifically interested to know how demand for an IPO affects its initial stock return as well as its long-run return.

Several recent studies have looked at the relationship between investor demand for IPOs and aftermarket performance of these firms. Hanley (1993) demonstrates that the relationship between the IPO offer price and the preliminary filing range predicts the direction of initial stock returns in the US stock markets. Specifically, stocks that are priced above the initial filing price perform very well on the first day in spite of being offered at the higher price, while stocks that are priced below the initial filing range do

poorly on the first day. Thus, the offer price represents a partial adjustment to the information about investor demand received during the pre-issuing period. Her study clearly indicates a positive relationship between investor demand and the first trading day performance of IPOs. Kandel, et al (1999) also document a positive relationship between the IPO demand schedule and the abnormal return on the first trading day for a small (27 IPOs) sample of Israeli IPOs. An interesting finding in their paper is that the above relationship holds even when the prices of IPOs are totally determined by investors rather than issuers or underwriters.² This underpricing phenomenon cannot be explained by existing rational expectation models. Hence, one interpretation of the above finding is evidence that investor demand may contain information about the quality of IPOs. The positive relationship between the demand elasticity of IPOs prior to offerings and their post-market abnormal returns is also documented in Taiwan stock market by Liaw, et al (2000). They analyze 52 Taiwanese IPOs that were conducted as discriminatory auctions between December 1995 and October 1998. Overall, the above studies all indicate that investor demand for IPOs prior to offerings play a nontrivial role in pricing these IPOs in the first trading day. However, no studies has ever examined the issue of whether long-run IPO performance has any relationship to investor demand. Furthermore, there has been virtually no empirical evidence on the difference in aftermarket performance between the IPOs that are underpriced and those that are overpriced.

Our objective in this study is to examine the relationship between investor demand and IPO performance by using a unique data set from the Hong Kong Stock Exchange that provides the over-subscription information at the IPO offer prices. Our sample firms conducted IPOs during the period between 1993 and 1997 in the Hong Kong stock market. It is well known that investor demand for IPOs is fairly volatile in the Hong Kong stock market. For instance, it is common to hear of over-subscribed IPOs in

the local financial press. Some hot IPOs are over-subscribed by as much as 1,000 times the shares being offered.³ In contrast, some cold issuers have to postpone or even cancel their IPOs because of under-subscription. Given the large variation of over-subscription in the Hong Kong IPO market, this provides us an excellent setting to examine whether the investor demand for IPOs is related to the aftermarket performance of these firms. Understanding this relationship is very important because we may understand why some IPOs are underpriced in the initial trading while others are not, and why some IPOs underperform the market in the long-run while others outperform the market. McGuinness (1992,1993) reports that, like other markets, IPOs in the Hong Kong market are “underpriced” in the first day of trading and significantly underperform the market in the long-run.

Not surprisingly, we discover strong relationships between investor demand for IPOs and short- and long-run post-issuing performance of IPOs. First, this paper documents that investor demand for IPOs is positively related to initial returns of these firms. We conduct this analysis by forming three IPO portfolios based on the over-subscription ratios of the IPOs. The initial returns for the high, medium, and low demand IPO portfolios are 59.96%, 14.87%, and -6.67%, respectively, which indicates that the IPOs with high investor demand are seriously underpriced, while the IPOs with low investor demand are overpriced. Next, we study the aftermarket performances of one-, six-, and twelve-month periods. The results are rather surprising. The size-adjusted excess returns of IPOs are negatively related to the investors' demand. After excluding the first trading day returns, the high demand IPO portfolio experiences a negative return of -5.98% for the one-month, which is statistically significant at the 5 percent test level. The corresponding return for the low demand IPO portfolio is positive although it is not statistically different from zero. The underperformance of the high demand IPO portfolio becomes more serious with the longer examination period. Its six-month and twelve-

month size-adjusted portfolio returns are -20.30% and -11.30%, respectively, and both are statistically significant at the conventional 1% level. Meanwhile, the low demand IPO portfolio has a statistically significant positive return of 24.77% when the period is extended to twelve months. Regressions detect a negative relationship between the investor demand and the long-run performance, in particular for the six- and twelve-month periods. To assess the robustness of above findings, we perform the calendar time portfolio regression on the six- and twelve-month excess returns for different IPO portfolios. The results remain unchanged: the high demand IPO portfolio significantly underperforms the market and the low demand IPO portfolio significantly outperforms the market. Overall, the IPOs with high investor demand have large positive initial returns but negative longer-run excess returns, while the IPOs with low investor demand have negative initial returns but positive longer-run excess returns.

These results are not explained by information asymmetry hypothesis or underpricing (or mispricing) hypothesis. Although the two hypotheses indicate a positive relationship between investor demand and IPO initial returns, neither information asymmetry hypothesis nor underpricing hypothesis can successfully explain differences in long-run performance between high demand IPOs and low demand IPOs. However, our empirical results are consistent with the speculative bubble hypothesis. Investor demand for an IPO is largely driven by the over-optimistic and over-pessimistic reaction by investors to the information about the IPO prospects prior to offerings. Consequently, both high- and low-demand IPOs are not priced at intrinsic values in early aftermarket trading. But, eventually their true values are reflected in the evolution of the pricing process. Specifically, a high-demand IPO, which, due to investors' over optimism, is more likely to create a speculative bubble. The speculative bubble may temporarily push the stock price above its intrinsic value, followed by long-run price correction. As a result, a relatively high positive initial return will be followed by a negative long-run

return for the IPO. On the other hand, since investors are more likely to underestimate the prospects of the low demand IPO, these IPOs will experience relative low returns on the first trading day. However, in the long run, they could have relative better performance because investors eventually will find the true value of these stocks.

The remainder of this paper is organized as follows. Section II provides a brief description of the data. Section III presents the short-run performance of IPOs with different levels of investor demand. Section IV presents the results for the long-run performance. Section V discusses explanations, and section VI provides the concluding remarks.

II. Data Description

The data for this study is obtained from two sources: the Stock Exchange of Hong Kong (SEHK) and the Pacific-Basin Capital Markets (PACAP) Research Center of the University of Rhode Island. Beginning in 1995, the Stock Exchange of Hong Kong started to disclose, in their Fact Books, offering price, offering proceeds and subscription ratio information for every IPO during that particular year. Prior to 1995, the Fact Books only provide information on funds raised from the issue and subscription ratio information but not offering price. Therefore, offering prices are collected from the hard copies of the Capital Change Forms that are supplied by the Stock Exchange of Hong Kong to the PACAP Research Center at the University of Rhode Island. Stock prices and daily returns are drawn from the PACAP Hong Kong Database.

The mechanism for allocating IPO shares in Hong Kong is similar to those employed in the United Kingdom and other Asian markets such as China, Singapore and Thailand, in the sense that issuing firms and underwriters distribute shares randomly and equally across application orders collected in the subscription period. The offer price is set before investors can submit purchase orders. Hence, the state of demand for a firm's shares is unobserved when the fixed offer price is established. Our sample consists of

256 IPOs during the study period from 1993 to 1997. Panel A of Table 1 reports summary statistics of several variables relating to IPOs in our study sample. For all IPOs in the sample, the mean subscription ratio is slightly over 90, suggesting a very active IPO market in Hong Kong. However, the level of investor demand for IPOs differs dramatically from firm to firm. For instance, the largest subscription ratio is reaching 1276 times and the least ration is only 0.22 time. It is suggested that, though shares of most IPOs in the Hong Kong stock market are over-subscribed by investors, there are existing IPOs that do not generate enough demand. Unsurprisingly, we also can see the IPO market in Hong Kong changes from year to year. Both years of 1993 and 1997 are associated with relatively hot issuing markets. During hot issuing periods, more firms conduct IPO and demand for the IPOs are large. The average subscription ratios for above two years are 134.24 and 121.09 times, respectively. By contrast, in 1995, a relative cool issuing market, the average ratio is 8.59 times. Moreover, the number of IPOs for 1995 is less than half of that for year 1993 or 1997.

For the purpose of this study, we categorize the 256 IPOs into three separate groups sorted by different levels of investor demand. IPOs with the lowest subscription ratio quartile are assigned to the low-demand IPO portfolio, IPOs with the highest subscription ratio quartile are assigned to the high-demand IPO portfolio, and the rest of IPOs are assigned into the medium-demand IPO portfolio⁴. Panel B of Table 1 presents summary statistics of three IPO portfolios. The level of investor demand for IPOs differs dramatically across the three IPO portfolios. Average subscription ratio of the low-demand portfolio is only 1.54, which contrasts with the ratio of 297.33 recorded for the high-demand portfolio. Interestingly, the offering proceeds of the high-demand portfolio is smaller than those of the low-demand portfolios: HK\$395 million vs. HK\$600 million.

III. Initial Returns

To measure the initial returns on the first trading day, we calculate raw returns (IR_i) using the following formula:

$$IR_i = (P_i - S_i) / S_i, \quad (1)$$

where P_i is the closing price on the first trading day and S_i is the subscription price. We then calculate the mean of initial returns for each IPO portfolio.

Table 2 reports the first day returns (offer-to-close) for the three IPO portfolios. Overall, Hong Kong IPOs experience an average initial return of 20.76% during the study period between 1993 and 1997, confirming substantially IPO underpricing. This finding is consistent with the results reported by McGuinness (1992) who reports an average excess return of over 17 percent between 1980 and 1990.

However, not all IPOs are severely underpriced. For instance, the low-demand IPOs earn negative initial returns of -6.67 percent, implying that those IPOs are actually overpriced. On other hand, the high-demand IPOs earn astonishing positive initial returns of near 60 percent. These preliminary statistics from Table 2 suggest a critical role played by investor demand for IPOs in pricing. In fact, it appears that there exist a positive relationship between investor demand and the first day returns. High demand IPOs are associated with relatively higher positive first day returns and low demand IPOs are more likely to experience low or even negative returns.

The above summary statistics do demonstrate that high demand IPOs are associated with high initial returns, and low demand IPOs are associated with low returns. To assess the role of investor demand in IPO pricing in the Hong Kong market, we further examine other determinants of IPO initial return along with the over-subscription ratio in a regression framework. The following regression model is performed:

$$IR_i = \alpha_0 + \alpha_1 \text{Ratio}_i + \alpha_2 \text{Size}_i + \alpha_3 \text{Fund}_i + \alpha_4 \text{SD}_i + \alpha_5 \text{DIV}_i + \alpha_6 \text{Ind}_i + \alpha_7 \text{Year}_i + \varepsilon_i, \quad (2)$$

where Ratio is the over-subscription ratio, Size is the natural logarithm of the issuing firm's market capitalization (inflation adjusted to the 1993 value), Fund is the natural logarithm of the offering proceeds (inflation adjusted to the 1993 value), SD is the standard deviation of daily returns for the twenty-five days after listing, DIV is the first annual cash dividend yield after IPOs, Ind is a series of industry dummy variables and Year is a series of dummy variable indicating IPOs year.

The over-subscription ratio variable (Ratio) is included to test whether there exists a positive relation between investor demand and IPO initial return. We also employ a number of variables as proxies for the ex-ante uncertainty surrounding the IPOs. Following Ritter (1984), we calculate the standard deviation of daily stock returns between the close of the first trading day and the close of the twenty-fifth day of trading. McGuinness (1992) finds a positive relation between 15-day standard deviation of daily stock returns and initial underpricing for IPOs in Hong Kong during 1980-1990. We also introduce firm size as measured by market capitalization and adjusted net proceeds raised from the issue as a proxy for ex-ante uncertainty. Ritter (1984) argues that small, less established firms are related to high degree of ex-ante uncertainty and, therefore, should require more underpricing than large firms. McGuinness (1992) observes a negative relation between gross proceeds and initial underpricing among IPOs in Hong Kong. Following Michaely and Shaw (1994), we calculate the first cash dividend yield (DIV) after IPOs to signal the quality of the issuing firm. Allen and Faulhaber (1989) argue that, based on the signaling hypothesis, firms with large underpricing are more likely to have higher dividends than firms with small underpricing. To control for the industry effects (Ibbotson and Jaffe (1975), Ritter (1984)), we use a series of industry dummy variables based on the SEHK industry code. Finally, yearly dummy variables are used to account for market conditions.

Table 3 reports cross-sectional regression results showing that the over-subscription ratio is a strong predictor of initial returns. Every unit increase in the over-subscription ratio contributes to, on average, a 0.18 percent increase in initial returns. The positive coefficient estimated for the Ratio variable is the only one which is statistically significant among independent variables introduced in the regression. The positive relationship between investor demand and IPO initial returns is consistent with the results in Hanley (1993), Kandel, et al (1999), and Liaw, et al (2000). Furthermore, above multivariate regression results in Table 3 also yield consistent results with McGuinness (1992): issue size is negatively related to the initial return and 25-day standard deviation of daily stock returns is positively related to the initial return.

Given the fact that a strong positive relation between investor demand and IPO initial returns is present, the causality of the relationship is an interesting question needed to be discussed further. The classic asset pricing models in finance (e.g., CAPM, APT) take the point of view that the aggregate demand for financial assets is virtually perfectly elastic and an asset's value is independent of its supply. However, empirical evidence does support that the demand curves for stocks are not perfectly elastic. Scholes (1972), Mikkelsen and Partch (1985), Holthausen, et al (1990), among others, report significant price movements when large blocks of shares are traded. Harris and Gurel (1986), Shleifer (1986), Beneish and Whaley (1996), and Lynch and Mendenhall (1997) report a positive price reaction to the inclusion of a stock in the S & P 500 index, explained by the purchase of these shares by index funds. These empirical findings are consistent with inelastic demand for stocks. Above discussions clearly suggest that high investor demand certainly leads large IPO initial returns.

On the other hand, one may argue that the positive relation between investor demand and IPO initial returns is also likely to occur under such circumstance that the investor demand for a given IPO is determined by the IPO's expected return prior to

offering. As described before, the offer price of IPO shares in Hong Kong is set before investors can submit purchase orders. Hence, before submitting their purchase orders investors can gather information about expected returns for IPOs once the fixed offer prices are established. If investors believe the expected return for a particular IPO is high, the demand for the IPO shares will increase because more investors will submit more purchase orders. If this is the case, the high expected IPO return will induce high investor demand. To support this argument, however, we have to accept the assumption of that the market correctly prices the stock on the first day of listing, or in other words, the observed initial return truly is the result of an IPO being underpriced or overpriced at the initial offering. But we know from the IPO literature that the first day price is not efficient and it may well contain the investor's reaction (over or underreaction) to the newly listed firm. Failure to distinguish between the initial return and the true discount or premium may lead to problematic hypothesis. This issue will be clarified when looking at the relationship between investor demand and IPO long-term returns in the next section.

IV. Long-Run Excess Returns

In this section, we examine the relationship between investor demand and IPO long-run returns. We use the following methodology to measure the size-adjusted excess returns for longer buy-and-hold periods.

$$ER_{iT} = R_{iT} - RR_{iT}, \quad (3)$$

where ER_{iT} is the T period (one-month, six-month and twelve-month) buy-and-hold excess return for IPO i, R_{iT} is the T period buy-and-hold return, and RR_{iT} is the T period buy-and-hold return for the reference portfolio of IPO i.

The reference portfolio of IPO i has to be carefully constructed, since there are three effects that need to be addressed. They include the new listing bias, rebalancing bias, and size bias. To control for the new listing bias, the reference portfolio only

includes stocks with at least a three-year trading history. Next, controlling for the size effect, all qualified stocks are sorted into quintiles based on their market values at the beginning of period T. Only those stocks from the quintile in which the IPO i's size falls are eligible to become the components of the reference portfolio. Finally, to control for the rebalancing bias, RR_{iT} is calculated as follows:

$$RR_{iT} = \sum_{j=1}^{N_j} R_{jT} / N_j, \quad (4)$$

where N_j is the number of stocks included in the reference portfolio for IPO i, R_{jT} is the T period buy-and-hold return for the stock j. The return on this portfolio represents a passive equally-weighted investment in all stocks constituting the reference portfolio in period T. There is no investment in firms newly listed subsequent to period T, nor is there monthly (daily) rebalancing of the portfolio.

Another issue in the calculation of buy-and-hold return for the reference portfolio arises when an investor places the proceeds of investments in firms delisted subsequent to period T. Here, it is assumed that the proceeds of the delisted firms are invested in an equally-weighted reference portfolio, which is rebalanced monthly (daily). Thus, missing monthly (daily) returns are filled with the mean monthly (daily) return of firms comprising of the reference portfolio.

After obtaining ER_{iT} for all IPOs, the means of the size-adjusted excess returns for the three IPO portfolios are computed as shown in Table 4. The table reports the size-adjusted excess returns for one-, six- and twelve-month buy-and-hold periods. The beginning dates of buy-and-hold periods are from the second trading day of IPOs.

Several interesting findings emerge from Table 4 results. First, all IPOs as a group report one-month, six-month and twelve-month excess returns of -2.17% , -7.26% and 1.57% , respectively, and all are statistically insignificant. The results are consistent with the findings in McGuinness (1993), in which he finds that the excess returns of

Hong Kong stocks issued during the period of 1980 and 1990 are insignificantly different from zero within the first twelve months of listing, while these same stocks earn significant negative excess returns in longer period (2 years).

Second, results in Table 4 reveal an interesting difference in the size-adjusted excess returns between high demand IPOs and low demand IPOs. After excluding the returns of the first trading day, the high-demand IPO portfolio provide a one-month return of -5.98% , which is statistically significant at the 5%-level, while the corresponding return for the low-demand IPO portfolio is 1.32% although it is not significant. The underperformance of the high-demand IPO portfolio becomes more pronounced with the longer examination period. Its six-month and twelve-month size-adjusted returns are -20.30% and -11.30% , respectively, and both are significant at the 1%-level. In contrast, the low-demand IPO portfolio provides a statistically significant return of 24.77% when the period is extended to twelve months. Above results show that the high-demand IPOs significantly underperform their corresponding reference portfolios (or market portfolio) from one- to twelve-month buy-and-hold periods. However, the low-demand IPOs tend to overperform their corresponding reference portfolios. Clearly, the superior performance in the first trading day observed for IPOs with high investor demand does not sustain. Their excess returns quickly turns negative over the subsequent one to twelve months. Although the IPOs with low demand experience lower first day return, they perform well for longer buy-and-hold periods.

To assess the relationship between investor demand and IPOs' long-run performance, we perform two regressions. In the first regression, we examine whether investor demand can predict IPOs' long-run excess return. The regression model is similar to the one used for the first-day return regression. However, since Affleck-Graves and Spiess (1995) document that the first-day returns of IPOs predicting their

three-month aftermarket performance, the first-day (IR) return is added into the regression.

$$ER_i = \beta_0 + \beta_1 \text{Ratio}_i + \beta_2 \text{Size}_i + \beta_3 \text{Fund}_i + \beta_4 \text{IR}_i + \beta_5 \text{DIV}_i + \beta_6 \text{Ind}_i + \beta_7 \text{Year}_i + \mu_i, \quad (5)$$

The results summarized in Table 5 exhibit that both investor demand and the initial return are negatively related to long-run excess returns of IPOs. For instance, statistically significant and negative coefficients for the Ratio variable both for six and twelve-month holding periods suggest that investors who invest in high-demand IPO portfolio immediately after the first date of trading will earn significantly less than the market portfolio even if the same IPOs have high positive returns at the first trading day. In contrast, investment in low-demand IPO portfolio can expect to gain abnormal returns in the next six to twelve months after the offering. Meanwhile, the negative coefficients for the variable IR indicate that the high initial return is usually accompanied by the low long-run excess return.

The second regression is the calendar time portfolio regressions. We have demonstrated that IPOs with high investor demand generally underperform IPOs with low investor demand in the longer buy-and-hold periods. However, when measuring excess returns we have controlled only for size in our buy-and-hold return analysis. Lyon, et al (1999) support the use of the Fama-French three-factor model using calendar time portfolios to estimate long-run abnormal performance. This approach controls for the nonindependence of returns over time, size, and book-to-market effects, and avoids the problem associated with drawing inferences on skewed long-horizon returns. We estimate the following three-factor model:

$$R_p - R_f = \gamma_0 + \gamma_1 (R_m - R_f) + \gamma_2 \text{SMB} + \gamma_3 \text{HML} + \eta, \quad (6)$$

where R_p represents the monthly return on a portfolio of IPOs, R_f represents the risk-free interest rate, SMB is the difference in the returns of a value-weighted portfolio of

small stocks and large stocks, and HML is the difference in the returns of a value-weighted portfolio of high book-to-market stocks and low book-to-market stocks. The estimate of the intercept, γ_0 , provides a test of null hypothesis that the mean monthly abnormal return on the calendar portfolio is zero. The number of IPOs is not constant from month to month, thus we use weighted least squares to account for the time-varying number of observations used to create calendar portfolios. The calendar portfolios also are value-weighted.

The result in Table 6 confirm the findings in Table 5. During the six-month buy-and-hold period, the γ_0 for the low-demand IPO portfolio is positive while the γ_0 for the high-demand IPO portfolio is negative, but neither of them is statistically significant at the conventional level. However, when the holding period is extended to twelve months, the average monthly excess return for the low-demand IPO portfolio increases to 2.47% and this excess return is statistically and economically significant. By contrast, the average monthly excess return for the high-demand IPO portfolio decreases to -3.52%, and it also is significant at the 5%-level. So, even with the market risk, size and book-to-market factors controlled, evidence still suggests that the high-demand IPO portfolio underperforms and the low-demand IPO portfolio outperforms in the long run.

Overall results summarized in Tables 4, 5, and 6 clearly indicate that long-run performance of Hong Kong IPOs is negatively and significantly related to the levels of investor demand.

One question raised from the previous section is related to the causality of the relationship between investor demand and IPO aftermarket returns. The documented relation between investor demand and IPO initial returns do not indicate who causes whom. Now, with the results examining the relation between investor demand and IPO long-run returns, we have a much clear answer to the question. The argument of large

expected IPO return inducing high investor demand is not supported by the fact that the long-run performance of Hong Kong IPOs is negatively related to the levels of investor demand and initial returns.

One may wonder whether above conclusions on the relationship between the investor demand and IPO's long-run performance is still valid for the longer performance periods, for example, 2, 3 or even 5 years. To address this concern, we extend the performance period into 2 years and 3 years, respectively (not shown in a table)⁵. In the 2-year period, results reveal that, after excluding the returns of the first trading day, the 2-year size-adjusted excess return for overall sample is -27.68% ($t=2.40$), implying that they underperform their peers. However, the difference in performance between high demand IPOs and low demand IPOs is still present. As a matter of fact, the low-demand IPO portfolio provide a 2-year return of 4.95% although it is not significant ($t=0.61$), while the corresponding return for the high-demand IPO portfolio is -50.25%, which is statistically significant at the 1%-level ($t=7.86$). As the performance is extended into 3 years, we observe that both the high and low-demand IPO portfolios produce negative returns of -71.28% ($t=8.09$) and -54.00% ($t=4.38$), respectively. This suggests that the high and low-demand IPOs significantly underperform their corresponding reference portfolios (or market portfolio) in a 3-year buy-and-hold periods. Interestingly, results from the performance of 2 and 3 years seem to suggest a much weak relationship between the investor demand and IPO's long-run performance.

Although it is a widely accepted rule to measure the IPO long-run performance with periods of 3 to 5 years, we are rather more cautious to interpret above results in this particular study. There are several concerns for including these periods in this study. First, the focus of this study is to look at the issue whether and how the investor demand for IPOs prior to offerings will affect the aftermarket performance of the IPO firms. The question is how long the impact will last if it exists in the first place. Although there is no

way to know the duration of impact, we doubt that a period of several years (e.g. 3 or 5 years) is a reasonable time horizon. The main reason is expressed as following. The demand for a particular IPO prior to the offering will ultimately convert to the demand of trading for the firm's stock as long as the stock is listed on the stock exchange. In the early trading, the demand of trading for the stock is closely related to the demand for the IPO prior to the offering. In other word, a strong demand for an IPO prior to the offering is most likely to lead to a strong demand of trading for the stock. However, their strong relationship will become weak as time goes. New information about the firm continuously arrives in the market. As a result, investors incorporate the news and trading information into their beliefs on the firm's prospectus, to the extent that the demand of trading for the stock could change to reflective of the new information. It is hard to justify that the investor sentiment for an IPO prior to the offering can influence the trading of the firm's stock beyond several years.

Second, due of the new financing and business evens such as seasoned equity offerings (SEO), private placements and changes of business focus and strategies in the firms that conduct IPOs is another main concern for us to include 2 or 3-year long-run performance in our study. We find that the frequency of the above events greatly increases as the listing of a firm's stock exceeds more than one year. Take the private placement as an example, which is a very popular financing technique in the Hong Kong stock market. We identify that at least 44 firms in our sample conduct private placements once we extend the performance period to 3 years. However, for a performance period covering one year, the number of firms doing private placements is only 3. Because of the impact on the performance by these corporate events, it is implausible for us to infer the relationship between the investor demand and IPO's long-run performance. For above reasons, we believe that it is reasonable to limit the performance period to less than 2 years.

V. Discussions

Results from previous sections provide new evidence to demonstrate that investor demand for IPOs prior to offering can affect their aftermarket performance, both in the short and long run. However, to provide a rational explanation about the findings is a challenging job. This is partially due to the fact that the relationship between investor demand and firm performance during and after initial public offerings has been largely unexplored. Although several of the existing models or hypotheses by Rock (1986), Aggarwal and Rivoli (1990), and Chowdhary and Sherman (1996) provide predictions regarding the relationship between investor demand and IPO performance, the literature has focused mainly on the causes of IPO “underpricing,” such as information asymmetry, ex-ante uncertainty or speculative bubble.

In one of the well-known theoretical models explaining IPO underpricing in the first trading days, Rock (1986) suggests that underpricing is a consequence of rational behavior by issuing firms. This is due to the information asymmetry between two major groups of investors. The first group of investors have perfect information regarding the prospects of the issues and, therefore, is considered “informed” investors. The second group of investors are considered “uninformed” investors because they have less knowledge regarding the intrinsic value of the issues than the “informed” investors. As a result of this information asymmetry, “informed” investors compete only for good, underpriced issues and leave inferior, overpriced issues to the “uninformed” investors. Consequently, “uninformed” investors receive disproportionately larger numbers of overpriced issues, causing the “winner’s curse.” To alleviate this adverse selection problem, Rock (1986) argues that issuing firms have to underprice IPOs in order to induce participation by “uninformed” investors.

A number of empirical implications with regard to the IPO performance can be developed from Rock (1986)'s model, including the relationship between investor demand and IPO performance. According to his model, informed investors with superior information have selection ability to distinguish between "good" and "bad" IPOs. They will subscribe to only high quality issues and let uninformed investors subscribe to low quality issues. Therefore, the action by informed investors should lead to high demand for good IPOs. On the other hand, low quality IPOs will have mainly uninformed investors which, in turn, leads to low demand. This is particularly true in the Hong Kong market, where the offer price is set well in advance of the offering. The information about aggregate demand from investors, especially informed investors, may leak and become public knowledge before investors have finished bidding for firm's shares [Chowdhary and Sherman (1996)]. When all investors know ex-ante that the issuing firm is 'too good' to pass by, a large oversubscription for the firm's shares would be observed. In fact, Koh and Walter (1989) and Lee, et al (1996) use the subscription level (number of shares in a lot) as a proxy for "informed" demand in their study of short- and long-run performance of IPOs in Singapore. With above discussions, we can expect that a positive relationship between investor demand and IPO performance exists because the levels of investor demand are positively related to the quality of issuing firms. Specifically, we expect that high demand IPOs would not only exhibit relatively higher returns during the first trading days, but also continue to outperform in the long run.

Although the findings from this study show that high demand IPOs perform better on the first trading day for Hong Kong offerings, which seems to be consistent with the information asymmetry hypothesis, results on long-run performance totally conflict with the above prediction. High-demand IPOs do not have superior performance in long run. Moreover, the evidence of outperformance of low demand IPOs in long-run also demonstrates that these IPOs are not really "low quality."

The rational expectation hypotheses proposes to explain the IPO's underpricing puzzle by holding the view that the observed high initial returns are the result of an IPO being "underpriced" at the initial offering. To explain the motivations of why IPOs are "underpriced" by issuing firms and underwriters, some theories suggest the issuing firms or the underwriters can benefit from fixing too low a price because it can signal firm value [Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989)], reduce the probability of subsequent class action [Tinic (1988)], and enhance underwriter reputation among investors [Booth and Smith (1986), and Carter and Manaster (1990)]. If issuing firms and/or underwriters do misprice IPOs, investor demand and IPO performance could be related. Chowdhary and Sherman (1996) posit a positive relationship between investor demand (oversubscription) and underpricing of IPOs. They argue that information about aggregate investor demand may leak and become public knowledge before investors have finished bidding for firm's shares in many markets (including Hong Kong) where the offer price is set well in advance of the offering. Consequently, when all investors know ex-ante that the offer price is 'too low' and a large oversubscription for the firm's shares would be observed. In their model, investor demand is positively related to the levels of IPO underpricing. A severely underpriced IPO will attract a large number of investors who try to exploit short-run profit opportunities resulting from underpricing. If this is the case, we expect that the high-demand IPOs will experience a relatively large positive return on the first post-IPO trading day. However, this difference in post-issuing performance between high- and low-demand IPOs could only occur in the short run. Moreover, opening day trading could rapidly correct the mistake in pricing of the IPOs.

The hypothesis proposed by Chowdhary and Sherman (1996), which establishes a positive relationship between investor demand (over-subscription) and underpricing of IPOs is also difficult to reconcile with our findings. Our results, at first glance, are

consistent with their prediction and show a positive relationship between the over-subscription ratio and the initial returns. However, their hypothesis cannot explain the difference in the long-run performance between low demand IPOs and high demand IPOs. A large oversubscription of a severely underpriced firm's shares is not likely to impact on the firm's long-run performance because the opening-day trading could rapidly correct the mistake in the pricing of the IPOs. As a result, we do not believe that our results are fully explainable by their model. Furthermore, our results also raise a question of whether underwriters and issuing firms really price an IPO below its true value at the offering, which is the most widely held view in IPO underpricing theories.

Financial researchers have traditionally adhered to the notion of aftermarket efficiency. However, empirical results suggest otherwise. Studies from Reilly (1977) and Ritter (1984, 1991) provide some evidence that the IPO market may be subject to fads. Aggarwal and Rivoli (1990) propose a similar hypothesis to explain why the IPOs in the United States as a group experience an abnormal positive initial return but suffer from a poor long-run aftermarket performance. McGuinness (1993) also posits the speculative bubble as the most plausible explanation for the post-listing return behavior observed in the Hong Kong IPO market between 1980 and 1990. It is possible that the aftermarket is not efficient in valuing newly issued securities and that the abnormal returns that accrue to IPO investors are the result of temporary over- or under-valuation by investors in early trading. For instance, when investors do not behave rationally, they could either over- or under-react to the information about IPO prospects prior to the offerings. A high investor demand for an IPO could be due to the investors' over-optimistic about the future of the firm. This high demand is more likely to create a speculative bubble, temporarily pushing the stock price above its true value. The speculative bubble will be ultimately corrected. As a result, we would observe a relatively high positive short-run return followed by a negative long-run return for the IPO. In contrast, a low investor

demand for an IPO could be due to investors being over-pessimistic about the future of the firm. Since investors more likely underestimate the prospects of the low demand IPOs, these IPOs will experience relative low returns on the first trading day. However, in the long-run, they could have relative better performance because investors eventually will find the true value of these stocks. Our findings from this study are fully consistent with above arguments. As a result, we believe that, given the results from this study, a speculative bubble or fad explanation may be more appealing

In a recent study, Purnanandam and Swaminathan (2002) take a look at the valuation of IPOs using comparable firm multiples. They find that, on average, a typical IPO is overvalued at the offer by about 50% relative to its industry peers. More interestingly, they find that overvalued IPOs earn 5% to 7% higher first day returns than undervalued IPOs but earn 20% to 40% lower returns over the next five years. The results from their study are inconsistent with asymmetric information models of IPO pricing and provide support for behavioral theories based on investor overconfidence. Because investors are overconfident about the future success of IPOs, their excess demand for these IPOs leads issuers/underwriters to overvalue them. This overconfidence even carries over to the aftermarket causing additional overvaluation. In the long run, however, fundamental information about the company arrives and prices fall back to fair value. This seems to be a plausible explanation of what happens to IPOs. In fact, our findings from this study are consistent with their explanation.

VI. Concluding Remarks

Using a unique data set that provides the oversubscription information at the offer prices for IPOs, we have examined the relationship between investor demand for IPOs and aftermarket performance of these firms during the period between 1993 and 1997 in the Hong Kong stock market.

We find a strong relationship between investor demand and the short- and long-run post-issue performance of IPOs. First, we document that investor demand for IPOs is positively related to the initial returns of these firms. The returns on the first trading day indicate that the IPOs with high investor demand are significantly underpriced, while the IPOs with low investor demand are overpriced. Second, we find that the long-run size-adjusted excess returns of IPOs are negatively related to the investors' demands. We document that the high- demand IPO portfolio significantly underperforms the market and the low-demand IPO portfolio outperforms the market. Overall, the paper finds that the IPOs with high investor demand have large positive initial returns but negative longer-run excess returns, while the IPOs with low investor demand have negative initial returns but positive longer-run excess returns.

We believe that investor demand for an IPO is largely driven by investors' overreaction to the information about the IPO prospects prior to offerings. Hence, both high- and low-demand IPOs are not priced at intrinsic values in early aftermarket trading. But, eventually their true values are reflected in their pricing process.

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Table 1: IPO Sample Description

Panel A: Summary Statistics for the Sample

	Number of IPOs	Subscription ratio				Offering proceeds (HK\$ million)		Market capitalization (HK\$ million)	
		Mean	Stdv	Max	Min	Mean	Stdv	Mean	Stdv
Overall	256	91.36	162.00	1276.00	0.22	638	2193	1792	8673
By year									
1993	62	134.24	161.16	658.38	1.10	427	937	1201	2095
1994	50	62.67	126.42	583.00	0.22	334	473	756	786
1995	24	8.59	22.10	109.91	0.22	318	515	995	1905
1996	43	55.86	74.99	260.95	0.66	723	1029	2158	3883
1997	77	121.09	218.71	1276.00	0.58	1058	3782	2984	15374

Panel B: Summary Statistics for Three IPO Portfolios

	Low-demand IPOs (N=64)	Medium-demand IPOs (N=128)	High-demand IPOs (N=64)
Subscription ratio	1.54	33.28	297.33
Market capitalization (HK\$ million)	1350	2282	1250
Offering proceeds (HK\$ million)	600.42	778.46	395.28

Table 2: First Day Returns

	All IPOs (N=256)	Low-demand IPOs (N=64)	Medium-demand IPOs (N=128)	High-demand IPOs (N=64)
First-day returns	20.76	-6.67	14.87	59.96
t-stat	(7.66) ^{***}	(-4.35) ^{***}	(6.26) ^{***}	(8.06) ^{***}

Note: ^{***}: significant at 1% level; ^{**}: significant at 5% level; ^{*}: significant at 10%

Table 3: Investor Demand as a Predictor of IPOs' Initial Returns

We run the following regression model to examine the predictive power of investor demand to the first day returns of IPOs (IR).

$$IR_i = \alpha_0 + \alpha_1 \text{Ratio}_i + \alpha_2 \text{Size}_i + \alpha_3 \text{Fund}_i + \alpha_4 \text{SD}_i + \alpha_5 \text{DIV}_i + \alpha_6 \text{Ind}_i + \alpha_7 \text{Year}_i + \varepsilon_i,$$

where Ratio is the oversubscription ratio, Size is the natural logarithm of the issuing firm's market capitalization (inflation adjusted to the 1993 value), Fund is the natural logarithm of the offering proceeds (inflation adjusted to the 1993 value), SD is the standard deviation of daily returns for the twenty-five days after listing, DIV is the first annual cash dividend yield after IPOs, Ind is a series of industry dummy variables and Year is a series of dummy variable indicating IPOs year.

Independent variables	Dependent variable: IR	t-statistics
Intercept	29.72	(1.63)
Ratio	0.18	(14.83)***
Size	-1.13	(-0.28)
Fund	-1.41	(-0.40)
SD	1.51	(1.41)
Div	-0.03	(-0.04)
Ind dummy	Yes	
Year dummy	Yes	
Adj-R ² / Num of Obs	0.51	256

Note: ***: significant at 1% level; **: significant at 5% level; *: significant at 10%.

Table 4: Size-Adjusted Excess Returns for the Longer Buy-and-Hold Periods

	All IPOs	Low-demand IPOs	Medium-demand IPOs	High-demand IPOs
1-Month	-2.17	1.32	-2.00	-5.98
t-stat	(-0.24)	(0.79)	(-0.13)	(-2.34)**
6-Month	-7.26	0.86	-5.32	-20.3
t-stat	(-1.45)	(0.13)	(-1.55)	(-3.21)***
12-Month	1.57	24.77	-2.70	-11.3
t-stat	(0.77)	(1.98)*	(-0.89)	(-2.89)***

Note: ***: significant at 1% level; **: significant at 5% level; *: significant at 10%.

Table 5: Investor Demand as a Predictor of IPOs' Long-run Returns

We run the following regression model to examine the predictive power of investor demand to the longer buy-and-hold period excess returns of IPOs (ER).

$$ER_i = \beta_0 + \beta_1 \text{Ratio}_i + \beta_2 \text{Size}_i + \beta_3 \text{Fund}_i + \beta_4 \text{IR}_i + \beta_5 \text{DIV}_i + \beta_6 \text{Ind}_i + \beta_7 \text{Year}_i + \mu_i$$

where Ratio is the oversubscription ratio, Size is the natural logarithm of the issuing firm's market capitalization (inflation adjusted to the 1993 value), Fund is the natural logarithm of the offering proceeds (inflation adjusted to the 1993 value), IR is the initial return, DIV is the first annual cash dividend yield after IPOs, Ind is a series of industry dummy variables and Year is a series of dummy variable indicating IPOs year.

	Intercept	Ratio	Size	Fund	IR	DIV	Ind	Year	Adj-R ²
1-Month	1.87	-0.01	-4.27	4.10	-0.10	0.51	yes	yes	0.05
t-stat	(0.16)	(-1.04)	(-1.52)	(1.56)	(-1.66)	(1.02)			
6-Month	-28.19	-0.08	3.92	-1.74	-0.19	0.43	yes	yes	0.10
t-stat	(-1.03)	(-1.77)*	(0.60)	(-0.29)	(-2.01)**	(0.37)			
12-Month	-103.34	-0.08	16.94	-9.11	-0.11	2.33	yes	yes	0.15
t-stat	(-2.01)**	(-1.84)*	(1.39)	(-0.80)	(-1.80)*	(1.08)			

Note: ***: significant at 1% level; **: significant at 5% level; *: significant at 10%.

Table 6: Calendar Time Portfolio Regression

We run the following three-factor regression model by using weighted least squares:

$$R_p - R_f = \gamma_0 + \gamma_1 (R_m - R_f) + \gamma_2 \text{SMB} + \gamma_3 \text{HML} + \eta,$$

where R_p represents the monthly return on a portfolio of IPOs, R_f represents the risk-free interest rate, SMB is the difference in the returns of a value-weighted portfolio of small stocks and large stocks, and HML is the difference in the returns of a value-weighted portfolio of high book-to-market stocks and low book-to-market stocks.

	Intercept	$R_m - R_f$	SMB	HML	Adj- R^2
6-Month Calendar Time Portfolio					
All IPOs	-1.23	0.56	0.51	-0.19	0.48
t-stat	(-1.56)	(3.24)***	(3.12)***	(1.57)	
Low Demand IPOs	1.85	1.07	0.56	0.42	0.51
t-stat	(1.45)	(3.78)***	(2.17)**	(1.66)	
Medium Demand IPOs	1.55	0.50	0.51	-0.11	0.40
t-stat	(1.11)	(3.20)***	(3.11)***	(-0.98)	
High Demand IPOs	-2.79	0.79	0.79	-0.45	0.27
t-stat	(-1.63)	(2.97)***	(2.08)**	(-1.23)	
12-Month Calendar Time Portfolio					
All IPOs	0.35	0.66	0.44	-0.17	0.65
t-stat	(0.54)	(2.98)***	(3.45)***	(-0.11)	
Low Demand IPOs	2.47	1.02	0.40	0.12	0.62
t-stat	(2.01)**	(3.01)***	(3.12)***	(0.23)	
Medium Demand IPOs	0.39	0.54	0.34	-0.02	0.48
t-stat	(0.98)	(2.99)***	(3.27)***	(-0.15)	
High Demand IPOs	-3.26	0.92	0.88	-0.37	0.65
t-stat	(-1.98)**	(3.23)***	(3.56)***	(-0.67)	

Note: ***: significant at 1% level; **: significant at 5% level; *: significant at 10%

Endnotes

¹ In a recent paper, Ritter and Welch and (2002) have given an excellent comprehensive overview of current research on various aspects of IPOs.

² This is possible because IPOs in Israel are conducted as nondiscriminatory auctions with a minimum price but not a maximum price.

³ For instance, an article in the Far Eastern Economic Review (March 9th, 2000) covered the following story. "Few people in Hong Kong would pass up a chance to gamble - be it at the racetrack, around the mahjong table or on the stock market - and there is nothing that excites them more than a sure bet." This story was in relation to a *red-hot* internet stock called *tom.com*. People were convinced that its share price would soar when trading began in the coming week. As a result the offers were oversubscribed by nearly 670 times and their investment skyrocketed from an issue price of HK \$1.78 a share to HK \$9.05 in the first hour of trading on March 1st, 2000.

⁴ The objective of the study is not to divide the IPOs into three equally sized portfolios. Rather, we are interested in the investor demand for very high (above 75th percentile) and very low (below 25th percentile) demand IPO's and their aftermarket performance.

⁵ It is implausible for us to look at the performance for the 5-year period in this study. Due to the limitation of data set, only few IPOs in our sample have a performance history of more than 5 years.